

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 program, students develop an understanding of the Earth as a system of independent living things and their non-living environment; the interactions of matter and energy; and the relationships between motion, work, and machines.

Topics to be studied include: Earth's biomes; ecosystems; moving plates; earthquakes; volcanoes; the physical properties of matter; elements and atoms; chemical changes; temperature and heat; sources of energy; circuits; electricity; speed and distance; forces and motion; acceleration and momentum; and energy, work, and machines..

Students in sixth grade are expected to complete laboratory investigations that stress problem solving skills and cooperative group interaction. These investigations include the following: measurement; using formulas; interpreting graphs, tables and maps; computation; and the application of the scientific method. The students will be expected to interpret and analyze data, draw conclusions and communicate their ideas in laboratory reports.

Sixth grade science is a comprehensive program that covers aspects of geology, chemistry, physics, and life science.

COURSE PROFICIENCIES

COURSE OBJECTIVES

1. To enable students to identify and solve problems related to Earth science, life science and physical science.
5.1/8B-1
2. To have students correctly use scientific instruments and apparatus and demonstrate the skills necessary to conduct investigations.
5.1/8B-2
3. To appreciate the role of mathematics in the study of science.
5.3/8 A-1, B-1, D-1
4. To develop an understanding of the composition, properties and interactions of matter.
5.6/8A-1-4, B-1-4
5. To learn the major, recent advancements in science and technology, and how major discoveries and events have advanced science and technology in the past.
5.4/8 A-1; 8.2/8 A1-5, B1-5, C1-3
6. To encourage students to utilize technology skills and tools for laboratory activities and research reports.
5.4/8 A-1, B-1, C-1; 8.1/8 A1-6
7. To provide students with information on various career opportunities in science.
9.1/8 A-1-7
8. To examine various Earth biomes as habitats for a variety of life forms.
5.5/8 A-2
9. To explain the relationship between tectonic plates and earthquakes and volcanoes.
5.8/8 C-1
10. To generalize how combinations of atoms determine the physical and chemical properties of matter.
5.6/8 A- 3
11. To demonstrate the relationships between temperature and heat.
5.7/6 B-1
12. To demonstrate and explain basic electrical circuits.
5.7/6 B-3

13. To employ formulas to compute speed and distance.
5.7/6 A-1
14. To understand acceleration and momentum.
5.7/6 A-1
15. To investigate the relationships between energy and work.
5.7/ 6 A-1
16. To illustrate how simple machines apply and change forces to do work.
5.7/6 A-1

STUDENT PROFICIENCIES

The student will be able to:

1. Apply the scientific method to problem solving.
(5.1/8 B1-3)
2. Solve problems cooperatively and creatively with multiple solutions.
(5.1/8 B-1-3)
3. Gather, organize, and summarize data in tables and graphs.
(5.3/8 D-1-4)
4. Design and conduct a controlled scientific experiment, practicing proper use of laboratory equipment and safety procedures.
(5.1/8 C-1-2)
5. Recognize the contributions of multi-cultural scientists.
(5.2/8 A 1-3)
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.
(5.6/8 A-1)
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.
(5.6/8 A-3)
8. Apply knowledge of the Periodic Table and an understanding of how elements combine to form compounds and mixtures through chemical and physical changes.
(5.6/8 A-4, B-1-2)
9. Explain the impact of natural and human/induced environmental conditions on ecosystems.
(5.10/8 A-1; 8.2/8 C1-3)
10. Diagram how tectonic plate movement causes earthquakes and volcanoes.
(5.8/8 C-1)
11. Incorporate available technologies in identifying a problem, researching and developing ideas and sharing solutions with others.
(5.4/8 A-1; 8.1/8 B2-10)

12. Identify career opportunities in the areas of life, physical and Earth science.
(9.1/8 A-1-7)
13. Differentiate between temperature and heat, their measuring units and measuring equipment.
(5.7/6 B-1)
14. Construct an electric circuit and gain a basic understanding of how electricity is generated, distributed and used by consumers..
(5.7/6 B-3)
15. Measure, compute speed, distance or time from related formulas for moving objects.
(5.7/6 A-1)
16. Understand acceleration and momentum as they relate to balanced and unbalanced forces and the mass of moving objects.
(5.7/6 A-1)
17. Demonstrate the relationship between energy and work.
(5.7/6 A-1)
18. Know that energy can be transformed from one type to another and understand the Law of Energy Conservation..
(5.7/8 A1)
19. Understand the basic types of simple machines (lever, inclined plane, and wheel and axle).
(5.7/8 A1)
20. Construct a simple machine to do work and compare the work input with the work output.
(5.7/6 A-1)

METHODS OF EVALUATION

1. Homework and class work.
2. Notebooks.
3. Tests
4. Quizzes
5. Lab Reports

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 5.6 9.1 9.2	A1-4 B1, 3 C1-2 A1 B1 C1 D1-3 B1-2 A B A D	I. Ecosystems A. Comparing Earth’s Biomes 1 Compare and contrast biome conditions and inhabitants 2 Understand how biomes dictate agricultural uses/businesses 3. Identify the biome in which we live B. Interactions 1. Explore the biotic and abiotic factors 2. Explain relationships among organisms 3. Describe the organization of living things at community level 4. Compare and contrast water ecosystems

5.1	A1-4 B1,3 C1-2	II. Earth's Moving Crust A Moving Plates 1. Find patterns in the coastlines of continents 2. Evaluate the evidence for plate tectonics a. continental drift b. sea-floor spreading 3. Compare plate tectonics with other theories and explain how plate tectonics unifies them
5.3	A1 B1 D1,3	B. Earthquakes 1. Explore patterns in earthquake locations 2. Description of earthquakes 3. Explain the correlation of seismic waves 4. Describe how to prepare for and predict earthquakes
5.7	A1	
5.8	A C1-2 D1-2	C. Volcanoes 1. Explore patterns in volcano locations 2. Relate volcanoes and plate tectonics 3. Compare and contrast the different kinds of volcanoes 4. Describe features and effects of different eruptions
9.1	A B	
9.2	F	

5.1	A1-2	<p>III. Properties and Changes of Matter</p> <p>A. Physical Properties of Matter</p> <ol style="list-style-type: none"> 1. Explore how substances or objects float on top of each other due to differences in their densities 2. Identify measurement and. physical properties of matter <p>B. Elements and Atoms</p> <ol style="list-style-type: none"> 1. Explore ways scientists study something that cannot be seen 2. Explain how changing an atom's composition produces different elements 3. Compare and contrast particles and waves <p>C. Physical and Chemical Changes</p> <ol style="list-style-type: none"> 1. Explore examples of physical and chemical changes 2. Explain formation of compounds, mixtures, and solutions 3. Compare and contrast physical and chemical changes and their causes 4. Understand release of energy during changes
5.3	A1 B1 C1	
5.6	A1-4 B1-2	
5.7	B2	

5.1	A1-2,4 B1-3 C1,2	<p>IV. Heat Energy</p> <p>A. Temperature and Heat</p> <ol style="list-style-type: none"> 1. Explore how temperatures change as a result of heat exchange 2. Relate the following concepts: <ol style="list-style-type: none"> a. energy b. heat c. temperature 3. Compare and contrast heat transfer in different materials 4. Explain how insulation works <p>B. How Heat Affects Matter</p> <ol style="list-style-type: none"> 1. Explore how heat can change matter physically 2. Relate temperature with expansion of matter 3. Relate heat to change of state 4. Explain the workings of the following systems/devices <ol style="list-style-type: none"> a. heating systems b. refrigerators c. engines <p>C. Sources of Energy</p> <ol style="list-style-type: none"> 1. Explore how sunlight can heat matter 2. Explain solar energy and how it can be converted to other forms 3. Compare and contrast alternative forms of energy 4. Trace the path of electricity from a power station to home
5.2	A1 B1-2	
5.3	A1 B1	
5.4	C1	
5.7	B1-3	
5.8	A B1	
5.10	B1	

5.1	A2	V. Electricity and Magnetism
5.2	A1 B1-2	A. Static Electricity <ol style="list-style-type: none"> 1. Explore interaction of charged objects 2. Cause and effects of static electricity 3. Distinguish between materials through which discharges will and will not travel
5.3	A1 B1	B. Circuits <ol style="list-style-type: none"> 1. Effects of different electrical pathways on the brightness of a bulb 2. Describe parts to make a circuit 3. Compare <ol style="list-style-type: none"> a. series and parallel circuits b. open and closed circuits C. Electromagnets <ol style="list-style-type: none"> 1. Explore what determines the strength of an electromagnet 2. Magnetic effect of a current in a wire 3. Ways of transforming energy D. Using Electricity <ol style="list-style-type: none"> 1. How to produce electrical current 2. Distinguish between sources of electric current 3. Describe household uses of electricity

5.1	A1-4 B1,3 C1-2	<p>VI. Objects in Motion</p> <p>A. Speed of a Moving Object</p> <ol style="list-style-type: none"> 1. Explore how to measure motion using distance and time 2. Describe position by using frames of reference 3. Distinguish between speed and velocity 4. Provide examples of acceleration and deceleration <p>B. Forces and Motion</p> <ol style="list-style-type: none"> 1. Explore the effects of forces and friction on moving objects 2. Identify forces that are being exerted 3. Describe the combined effects of many forces on an object as maintaining increasing or decreasing velocity 4. Understand the concept of inertia and how it is related to mass <p>C. Acceleration and Momentum Forces</p> <ol style="list-style-type: none"> 1. Explore what it takes to accelerate an object 2. Explain how variables in Newton's Second Law of Motion relate 3. Understand Newton's Third Law of Motion and Momentum 4. Explain the difference between mass and weight and what happens to weight in space <p>D. Gravitational Forces</p> <ol style="list-style-type: none"> 1. Understand that gravity is a force that exists between two or objects with mass 2. Describe how gravity causes objects to accelerate
5.2	A1,3 B1,2	
5.3	A1 B1 C1 D1-4	
5.4	A1	
5.7	A1-3	
5.8	A D2	

<p>5.1</p> <p>5.2</p> <p>5.3</p> <p>5.4</p> <p>5.7</p> <p>5.10</p> <p>9.1</p> <p>9.2</p>	<p>A1-4 B1-3 C1-2</p> <p>A1-3</p> <p>A1 B1 C1 D1-3</p> <p>A B C1,2</p> <p>A1-2 B2</p> <p>B1</p> <p>B1</p> <p>A2 C1-6 F1-3</p>	<p>VII. Work and Machines</p> <p>A. Energy and Work</p> <ol style="list-style-type: none"> 1. Explore how height and speed are related to energy 2. Distinguish between potential and kinetic energy 3. Give examples of energy transformation 4. Explain what work is and its equation <p>B. How Levers Work</p> <ol style="list-style-type: none"> 1. Explore the effect of applying force at different points 2. Explain levers as simple machines 3. Calculate mechanical advantage to describe simple machines 4. Explain how pulleys and wheel and axils are machines <p>C. How Inclined Planes Work</p> <ol style="list-style-type: none"> 1. Explore how ramps can affect the force to move object 2. Explain how inclined planes are machines 3. Identify kinds of inclined planes <ol style="list-style-type: none"> a. screws b. wedges 4. Understand what efficiency means .
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5.1	A1,3-4 B3	<p>VIII. Current Science</p> <p>A. New Inventions</p> <ol style="list-style-type: none"> 1. Review latest developments in local community 2. Design machines to solve current needs 3. Affects on people <p>B. Leading Scientists</p> <ol style="list-style-type: none"> 1. Scrutinize new contributions in the field 2. Examine contributions of peers 3. Analyze the discoveries and their affect on real life issues <p>C. Contemporary Issues</p> <ol style="list-style-type: none"> 1. Debate the points of view on controversial scientific issues 2. Investigate the impact of human activity on environmental issues
5.2	A1-3 B1-2	
5.3	A1 B2 D1-3	
5.4	A1 B1 C1	
5.10	A1 B1	

SUGGESTED AUDIO VISUAL/COMPUTER AIDS

1. Overhead Projector
 - Program Transparency Books
2. Microsoft Word Software
3. Microsoft Internet Explorer
 - Links to Science and Technology Websites
4. Lap Top Computers
5. VCR
 - Mind Jogger Videos
 - Explore Activity Videos
 - Bill Nye Videos

SUGGESTED MATERIALS

Resources for Students

Text:

Daniel, Lucy H., Jay Hackett, Richard H. Moyer, and JoAnne Vasquez. Science. Macmillan McGraw-Hill Co., 2005.

Junior Scholastic Magazine. Junior Scholastic Publishing. Jefferson City, Mo., 2005.

Resources for Teacher

Text:

Daniel, Lucy H., Jay Hackett, Richard H. Moyer, and JoAnne Vasquez. Science. Macmillan McGraw-Hill Co., 2005.

Junior Scholastic Magazine. Junior Scholastic Publishing. Jefferson City, Mo., 2005.

Mind Jogger Videos

Explore Activity Videos

Science Materials Kit

Activity Resource Book

Cross Curricular Projects