

## **GRADE 7 SCIENCE**

The goal of St. Michael School's Middle School Science program is to help students develop a foundation in earth, physical, and life sciences. This is achieved through lectures, activities, small group discussions, debates, current event analyses, and laboratory experiments. Classroom activities are supplemented by readings from the textbook series.

### **Earth and Space Science**

Students will:

- understand the history of the Earth. Specifically, the student will
  - explain how fossils are a record of the Earth's history and past life forms and how fossils are formed (molds, casts, trace, petrification, etc.).
  - recognize the organization of geological time including the four major eras and the periods associated with the eras.
  - describe the organisms present in each era and the changing features of the Earth

### **Life Science**

Students will:

- understand the structure and function of cells. Specifically, the student will
  - recognize that all organisms are composed of cells, and that many organisms are single celled.
  - compare and contrast plant and animal cells including major organelles
  - understand that within cells, many of the basic functions of organism are carried out
  - describe the hierarchical organization of multicellular organisms from cells to tissues to organs to systems to organisms
- learn the principles of heredity, cell division and genetics. Specifically, the student will
  - recognize that every organism requires a set of instructions that specifies its traits. These instructions are stored in the organism's chromosomes. Heredity is the passage of these instructions from one generation to another.
  - understand that cell division is the basic process for growth and reproduction
  - differentiate between mitosis (growth and asexual reproduction) and meiosis (sexual reproduction)
  - describe how change occurs from one generation to another: either mutation or mixing of traits through sexual reproduction
  - learn that Gregor Mendel's experiments led to our understanding of dominant and recessive genes
  - discuss our modern understanding of chromosomes and genes

- Understand the principles of the theory of evolution and natural selection. Specifically, the students will
  - Learn that evolution is the change in a population of organisms over time caused by both genetic change and environmental factors
  - Describe adaptation and mutation and their role in evolution
  - Understand natural selection as the mechanism of evolution
  - Learn about trait variation and change from generation to generation
  - Describe the evidence for the theory of evolution
  - Distinguish between and describe extinction and speciation

### **Physical Science**

Students will:

- Learn about atomic structure. Specifically students will
  - review the structure of atoms, molecules, and compounds
  - understand the early theories of matter and the start of modern chemistry
- Understand the principles of Chemical Bonds and Reactions. Specifically students will
  - Learn that to get a stable outer shell of electrons, atoms either give away, take on, or share electrons
  - Comprehend that chemical reactions rearrange the atoms and the electrons in elements and compounds to form chemical bonds
  - Understand that when single atoms combine with themselves or with other atoms, the result is a molecule
  - Describe and distinguish between ionic bonds, metallic bonds, and covalent bonds
  - Understand acids, bases, and pH
  - Learn about the different types of reactions including oxidation, reduction, and reactions with acids and bases
  - Discuss the role of catalyst in a chemical reaction
  - Describe reactions using equations

### **Laboratory investigations**

Students will:

- learn basic laboratory safety
- understand the use of laboratory equipment
- describe and apply the scientific method
- conduct experiments that directly link to topics being taught

## **Science Biographies**

Students will:

- learn about scientists who have been instrumental in our understanding of the world that surrounds us. Efforts are made to place equal emphasis on female scientists and those from a variety of ethnic backgrounds.
  - Marie Curie
  - Lewis Howard Latimer
  - Charles Drew
  - Dr. Daniel Hale Williams
  - Isaac Newton
  - Alfred Wegner
  - Charles Darwin
  - Mary Anning
  - Antoine Lavoisier
  - Lise Meitner
  - Dmitri Mendeleev
  - Rosalind Franklin
  - Francis Crick
  - James Watson
  - Severo Ochoa
  - Barbara McClintock
  - Albert Einstein
  - Dorothy Hodgkin
  - James Maxwell
  - Charles Steinmeitz
  - Elizabeth Blackwell
  - George Washington Carver

## **Materials**

- Prentice Hall Science Series
  - Cells: Building Blocks of Life
  - Evolution: Change over time
  - Heredity: The Code of Life
  - Chemistry of Matter
  - Matter: Building Block of the Universe
- Material from the world wide web
- Teacher created materials

**Instruction**

- Classroom lectures
- Group discussions
- Small group presentations
- Science Fair
- Debates
- Laboratory Experiments and Dissections
- Twice monthly current event analyses
- Interactive presentations given by William Anderson of RE-SEED to illustrate principles of physical science

**Sources:**

E.D. Hirsch Curriculum

Massachusetts Science and Technology/Engineering Curriculum Framework (2001)

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