# Middle School Science

The ISK Science program is designed to engage students' natural curiosity. Teachers begin by laying a foundation of knowledge, and then students' own interests and curiosity help guide the learning. Many units integrate concepts and skills multiple curricular areas, such as: math, library, art, music and technology.

Science units are designed to provide opportunities for students to learn through inquiry and hands-on activities. Units are centered around five general strands:

1. *Nature of Science and Scientific Inquiry (integrated into all units)*
2. *Life Sciences*
3. *Physical Sciences*
4. *Earth and Beyond*
5. *Environmental Sciences (integrated into all units)*

## Grade 7

### 1. NATURE OF SCIENCE

**Standard 1.1: Understand the nature of scientific inquiry *(Understand and use the scientific method)***

1.1.1 Design and conduct an independent scientific investigation (e.g., formulate hypotheses, design and execute investigations, interpret data, synthesize evidence into explanations)
1.1.2 Understand why only one variable (independent) can be manipulated at a time

**Standard 1.2: Communicate scientific ideas and activities clearly**

1.2.1 Explain why and how scientists determine if experimental results are reliable
1.2.2 Explain how to prevent experiments from bias in what is observed, missed, and concluded in an investigation
1.2.3 Communicate the logical connection among hypotheses, science concepts, tests conducted, data collected, and conclusions drawn from the scientific evidence

**Standard 1.3: Investigate using appropriate tools and instruments to conduct scientific activities**

1.3.1 Select and use appropriate tools and technology to perform tests, collect data, and display data

**Standard 1.4: Understand the nature of scientific knowledge and enterprise *(Understand why science is important)***

1.4.1 Know that different models can be used to represent the same thing and the same model can represent different things; the kind and complexity of the model should depend on its purpose
1.4.2 Understand ethics associated with scientific study
1.4.3 Know that throughout history, many scientific innovators have had difficulty breaking through accepted ideas of their time to reach conclusions that are now considered to be common knowledge
1.4.4 Explain ways in which science and society influence one another

### 2. LIFE SCIENCES

**Standard 2.1: Understand biological evolution and diversity (scientific comparisons)**

2.1.1 Know ways in which living things can be classified (taxonomy of plants, internal/external features, function in an ecosystem…)
2.1.2 Know that disease in organisms can be caused by intrinsic failures of the system or infection by other organisms
2.1.3 Understands the concept of extinction and its importance in biological evolution

**Standard 2.2: Understand the structure and function of cells and organisms**

2.2.1 Understand the nature of structure and function in living systems
2.2.2 Name the basic cell structures and organelles and identify their functions
2.2.3 Explain cell structures and functions
2.2.4 Describe responses of plants and animals to various stimuli in their environment

**Standard 2.3: Understand the relationships among organisms and their environment**

2.3.1 Know factors that affect the number and types of organisms an ecosystem can support
2.3.2 Describe responses of plants and animals to various stimuli to grade

**Standard 2.4: Understand the cycling of matter and the flow of energy through ecosystems**

2.4.1 Explain how matter is recycled

**Standard 2.5: Understand the principles of heredity and related concepts**

2.5.1 Understand asexual and sexual reproduction
2.5.2 Know that hereditary information is contained in genes

### 3. PHYSICAL SCIENCES

**Standard 3.1: Understand the structure and properties of matter**

3.1.1 Know that elements often combine to form compounds (e.g., molecules, crystals)

## Grade 7

3.1.2 Know that states of matter depend on molecular arrangement and motion (e.g., molecules in solids are packed tightly together and their movement is restricted to vibrations; molecules in liquids are loosely packed and move easily past each other; molecules in gases are quite far apart and move about freely)
3.1.3 Know that substances containing only one kind of atom are elements and do not break down by normal laboratory reactions (e.g., heating, exposure to electric current, reaction with acids); over 100 different elements exist
3.1.4 Know methods used to separate mixtures into their component parts (boiling, filtering, chromatography, screening, magnetism)

**Standard 3.2: Understand the sources and properties of energy**
3.2.1 Know that most chemical and nuclear reactions involve a transfer of energy (e.g., heat, light, mechanical motion, electricity)
3.2.2 Know that vibrations (e.g., sounds, earthquakes) move at different speeds in different materials, have different wavelengths, and set up wave-like disturbances that spread away from the source
3.2.3 Know that waves (e.g., sound, seismic, water, light) have energy and interact with matter (e.g., light scattering) and can transfer energy (e.g., light absorption)
3.2.4 Know that only a narrow range of wavelengths of electromagnetic radiation can be seen by the human eye; differences of wavelength within that range of visible light are perceived as differences in color

### 4. EARTH AND BEYOND

**Standard 4.1: Understand the composition, structure and features of the geosphere, hydrosphere and atmosphere *(Earth, Water and Air)***
4.1.1 Describe our solar system, its place in our galaxy, and the galaxy's place and relative magnitude in the universe.
4.1.2 Investigate and describe the basic components of our solar system (e.g., planets, moons, stars, asteroids, etc…)
4.1.3 Explain the alignment of the Earth, moon and sun.
4.1.4 Explain that gravity is the force that governs motion in the solar system.
4.1.5 Provide an example of how technology has helped scientists investigate the universe.

### 5. ENVIRONMENTAL SCIENCES

**Standard 5.1: Understand atmospheric processes and cycles**
5.1.1 Explain the importance of biodiversity

**Standard 5.2: Understand how society uses and conserves resources and energy**
5.2.1 Describe how energy and other resource utilization impact the environment and recognize that individuals as well as larger entities have impact on energy efficiency

**Standard 5.3: Identify, investigate and evaluate environmental problems and issues**
5.3.1 Give examples of human impact on various ecosystems

**Standard 5.4: Develop an understanding and commitment to environmental responsibility**
5.4.1 Describe the actual and potential effects of habitat destruction, erosion and depletion of soil fertility associated with human activities.
5.4.2 Explain how the environment is perceived differently by various cultures
5.4.3 Explain and cite examples of how humans shape the environment



Tel +254-20-209-1308/9 or +254-733-639-363
communications@isk.ac.ke | **www.isk.ac.ke**
PO Box 14103 Nairobi 00800, Kenya