Content Standards and Expected Performances for

Middle School Science

Feedback Edition

Core Scientific Reasoning and Communication Skills for Middle School Students*	
Content Standards	**Expected Performances**
SRC 6-8.1 Scientific investigation is a thoughtful and coordinated attempt to search out, describe and explain the natural world	**SRC 6-8.1(a)** Identify questions that can be answered through scientific investigations **SRC 6-8.1(b)** Seek relevant information in books, magazines and electronic sources of information. **SRC 6-8.1(c)** Design and conduct scientific investigations, including controlled lab experiments. **SRC 6-8.1(d)** Use appropriate tools and techniques to gather, analyze and interpret data. **SRC 6-8.1(e)** Use mathematical operations to analyze the data. **SRC 6-8.1(f)** Develop descriptions, explanations, predictions and models based on evidence and logical thinking **SRC 6-8.1(g)** Analyze, critique and communicate investigations by words, graphs and drawings.
SRC 6-8.2 Science literacy includes speaking, listening, presenting, interpreting, reading and writing about science.	**SRC 6-8.2(a)** Communicate ideas and support arguments about science-related matters using relevant science vocabulary, evidence and logic. **SRC 6-8.2(b)** Develop the interpretive, analytical and critical capacities needed for reading and writing various scientific texts. **SRC 6-8.2(c)** Use web search engines to locate relevant information, and examine the credibility and validity of on-line information sources.
SRC 6-8.3 Mathematics provides useful tools for the description, analysis and presentation of scientific data and ideas.	**SRC 6-8.3(a)** Use mathematics to analyze data, interpret it and present relationships between variables in bar and line graphs.

*** NOTE: THE CONTENT STANDARDS FOR SCIENTIFIC REASONING AND COMMUNICATION SHOULD BE LEARNED WITHIN THE CONTEXT OF THE CONTENT STANDARDS AND EXPECTED PERFORMANCES FOR LIFE, PHYSICAL AND EARTH SCIENCES.**

Grade 6: Energy	
Content Standards	**Expected Performances**
Work: How Much Energy Does It Take to Do the Job? **6.1** Energy is the ability to do work and can be either potential (energy of position) or kinetic (energy of motion). **6.2** Potential energy and kinetic energy can be transformed from one to the other, and both can be used to do work.	**6(a)** Perform experiments to explore the relationship between force, distance, and work. **6(b)** Explore how simple machines (e.g. inclined plane, pulleys and levers) are used to create mechanical advantage. **6(c)** Explore and describe how the transformations of potential and kinetic energy are used to do work.
Ecology: How Do Energy and Matter Flow Through Ecosystems? **6.3** Energy from sunlight is captured and transformed into chemical energy by green plants to support life in most ecosystems.	**6(d)** Explore and describe the exchange of carbon dioxide and oxygen during the process of photosynthesis in green plants. **6(e)** Describe matter and energy flow in food webs. **6(f)** Explore a natural or simulated ecosystem and describe the density and distribution of typical organisms in that ecosystem.
Weather and Climate: How Does the Sun's Energy Affect Phenomena on Earth? **6.4** Variation in the amount of the sun's energy hitting the Earth's surface affects daily and seasonal weather patterns. **6.5** Factors such as latitude, topography and proximity to an ocean affect regional climates.	**6(g)** Describe how the sun's energy affects air pressure in the atmosphere and influences the weather. **6(h)** Explore and describe the gas composition of the atmosphere and its protective effects on Earth. **6(i)** Explore how changes in the temperature of the atmosphere and the oceans affect the climate.
How Do We Design Technological Solutions to Problems? **6.6** People use scientific principles, creativity and careful analysis to invent technological devices to meet human needs.	**6(j)** Design and build simple machines to meet specific needs and make everyday tasks easier to perform.

Grade 7: Structures and Processes	
Content Standards	**Expected Performances**
Elements, Mixtures and Compounds: How Do Materials React With Each Other? **7.1** Elements are the simplest form of matter and they can be grouped by their chemical and physical properties. **7.2** Mixtures can be made from different combinations of elements and compounds in gases, liquids and solids. **7.3** The elements combine to produce compounds which account for the living and nonliving substances that we encounter.	**7(a)** Describe atomic structure, and explain how the properties of the first 10 elements in the Periodic Table are related to their atomic structure. **7(b)** Explore and describe how mixtures can be separated based on the original properties of the substances, such as density, boiling point and solubility. **7(c)** Explore how elements can combine to form simple compounds such as water, carbon dioxide and salts.
The Human Body: How Does It Work? **7.4** All organisms are made up of one or more cells that have common structures to maintain life. **7.5** Many organisms, including humans, have specialized organ systems that interact with each other to maintain dynamic internal balance.	**7(d)** Explore and describe the structures and function of a basic animal cell (e.g., nucleus, cytoplasm, mitochondria, and cell membrane). **7(e)** Explore and explain how materials move in and out of the cell through passive and active transport processes. **7(f)** Explore the structures of the human digestive, respiratory, and circulatory systems, and describe how they function to support life.
The Earth: Is It Still Changing? **7.6** The Earth is layered with a lithosphere, hot mantle and dense metallic core. **7.7** The rock cycle and soil formation are evidence that the Earth is continuously changing.	**7(g)** Explore and describe how the cycling of water in and out of the atmosphere ("the water cycle") shapes the face of the Earth. **7(h)** Explore how heat flow and movement of materials within the Earth cause the rock cycle, earthquakes and volcanic eruptions.
Infectious Diseases: Where Do They Come From? **7.8** Understanding the transmission of bacterial and viral diseases enables us to prevent, treat and cure many diseases.	**7(i)** Describe the cause and spreading mechanism of viral and bacterial diseases. **7(j)** Explore and explain the role of the immune system and how vaccination and antibiotics are used to enhance the fight against infectious diseases.

Grade 8: Systems and Changes	
Content Standards	**Expected Performances**
Laws of Motion: How Do They Explain Everyday Phenomena? **8.1** An object in motion that is not being subjected to a force will continue to move at a constant speed and in a straight line. **8.2** Unbalanced forces cause change in the speed and/or direction of an object's motion.	**8(a)** Explore how forces (pushes or pulls) speed up, slow down, stop, or change the direction of a moving object. **8(b)** Explore and explain how to measure the speed of objects in motion, calculate average speed, and illustrate the motion of objects in graphs of distance over time. **8(c)** Explore how Newton's laws of motion describe everyday phenomena.
Life: What Are Its Essential Characteristics? **8.3** Life is characterized by continuous transformations of energy and matter. **8.4** Reproduction is one of the defining characteristic of life and different organisms have different strategies for reproduction.	**8(d)** Explore and describe the nutritional needs of human beings in terms of nutrients and calories. **8(e)** Describe the differences between asexual and sexual reproduction and explain how sexual reproduction results in genetic variability. **8(f)** Explore and explain inheritance of traits in living organisms (e.g., genotype/phenotype, dominant/ recessive, sex determination).
The Solar System: What Forces Govern Its Motion? **8.5** The solar system is composed of planets and other objects that orbit the sun in regular and predictable motion. **8.6** Gravity is the force that governs the motions of the solar system, attracts objects to the Earth and influences tides.	**8(g)** Explore and explain the effect of gravity on the orbital movement of planets in the solar system. **8(h)** Explore and explain how the regular motion of the Sun, Earth and Moon explains the day, year, phases of the moon and eclipses. **8(i)** Compare and contrast the characteristics (i.e., orbital patterns, atmosphere, composition, temperature) of the planets in the solar system, and their potential to sustain life.
Space Explorations: What Do We Gain? **8.7** Space explorations provide information about the solar system, the universe and the possibility of life beyond Earth.	**8(j)** Explore how the space program provides new information about the solar system. **8(k)** Explore how life can be sustained in space.