

Curriculum Guide

Science Grades K-8

**Office of Education
North American Division
of Seventh-day Adventists**

2008

The North American Division

The North American Division includes the United States and Canada, as well as the Islands of Bermuda, St. Pierre, and Miquelon. With such a diversity of cultures, this curriculum guide is designed to ensure that uniform standards are maintained. In those places, within the Division where governmental academic requirements differ from those of this guide, appropriate adjustments may be made as long as the Seventh-day Adventist philosophy is maintained.

Acknowledgements

The following persons served as members of the North American Division Workshop Committee for Science Curriculum K-8, June 11-29, 2007.

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Introduction

The primary goal of the *K-8 Science Curriculum Guide* for the Seventh-day Adventist school system is to provide teachers support in implementing a Christ-centered perspective in all areas of the science curriculum. The guide is designed to provide direction in both long-range and short-term program planning so that the Spirit-filled classroom teacher will be better equipped to provide instruction emphasizing Seventh-day Adventist goals, concepts, and values while encouraging the development of scientific literacy among students.

Philosophy

The Seventh-day Adventist Church recognizes God as the ultimate source of existence and truth. In the beginning, God created in His image a perfect humanity, a perfection later marred by sin. Through Christ and His Spirit, God determined to restore humanity from its lost state. Through the Bible, He has revealed His will to the world, a revelation that supersedes human reason. Through His Church on Earth, He seeks the lost for His kingdom.

The basic tenets of the Seventh-day Adventist Church, as well as the inspired writings of Ellen White are directed toward God's restorative plan for fallen humanity. The Church conducts its own system of education to engender belief in these tenets, within the context of one's personal relationship with Jesus Christ, and to foster a desire to share that relationship with others.

Made in God's image, every human being, although fallen, is endowed with attributes akin to those of the Creator. Therefore, Adventist education seeks to nurture thinkers rather than mere reflectors of others' thoughts; loving service rather than selfish ambition; maximum development of one's potential; and an appreciation for all that is beautiful, true, and good.

An education of this kind imparts far more than academic knowledge. It is a balanced development of the whole person. Its time dimensions span eternity. In Adventist education, homes, schools, and churches cooperate together with divine agencies in preparing learners for citizenship here on this earth and in the New Earth to come.

Rationale

Science is a process of inquiry and discovery. Inquiry and discovery includes an understanding of life science, earth science, physical science, and health science, connecting history, technology, and the nature of science. It is dependent upon, and influenced by, the interaction of these disciplines within the context of the individual's cultural and ethnic background, values, lifestyle, and physical and mental makeup.

Recognizing that:

- Spiritual values are taught as students acknowledge God as Creator and Sustainer of all living things and Originator of all scientific principles.
- Basic science principles apply to every living and non-living thing.
- Careful stewardship of the earth's environment is influenced by a study of earth and space science.
- Personal responsibility for achieving and maintaining optimum physical, mental, and spiritual health is achieved through the study of health.
- Scientific principles and developing technology are determined by the study of physical science.
- The ability to use skills is improved through understanding and practicing scientific methods and processes.
- Hands on laboratory activities and study provide a deeper understanding of the integration of science and mathematics.

It is critical that changes in methodology, articulation, and evaluation must be current and remain flexible. Ever changing developments within the scientific community require a constant monitoring and readjustment of goals and objectives.

The objectives of science education are to provide students with a knowledge and understanding of the basic principles of science, to motivate them to apply that knowledge to daily living so that they may achieve optimum health and the knowledge of science. To encourage students to share this knowledge, investigate and obtain careers in science while maximizing their service to God and humanity is paramount.

Journey to Excellence
A Focus on Adventist Education in the 21st Century
North American Division Office of Education

Goals and Essential Core Elements that Connect to the Science Curriculum

The following goals have been established to support the unique philosophy of Adventist education. Each student will:		Essential core elements clarify and expand the goal statements and are intentionally infused into a curriculum that teaches students to:
Acceptance of God	Surrender one’s whole life to God: develop a relationship with Jesus Christ; and allow the Holy Spirit to work in one’s life	<ul style="list-style-type: none"> ▪ Accept God as the Creator and the Redeemer ▪ Value God’s revelation of Himself through inspired writings and creation ▪ Respond to God’s love by using one’s spiritual gifts to serve others ▪ Recognize that God gave the Ten Commandments to show us how to love Him and each other ▪ Value and participate in worship alone and with others
Commitment to the Church	Desire to know, live, and share the message and mission of the Seventh-day Adventist Church	<ul style="list-style-type: none"> ▪ Be an active participant in one’s local church ▪ Become involved in spreading the gospel throughout the world ▪ Accept the fundamental beliefs of the Seventh-day Adventist Church ▪ Appreciate the heritage of the Seventh-day Adventist Church ▪ Relate to lifestyle choices and cultural issues based on biblical principles
Interpersonal Relationships	Develop a sense of self-worth, skills in interpersonal relationships, and understanding of the responsibilities of family membership, and the ability to respond with sensitivity to the needs of others	<ul style="list-style-type: none"> ▪ Recognize that God’s ideal for the basic unit of society is the family ▪ Develop an appreciation for the diversity of individuals ▪ Acquire knowledge, attitudes, and skills essential to meeting family responsibilities whether living alone or with others ▪ Recognize that God’s unconditional love gives one self-worth ▪ Value sexuality in the context of God’s ideal
Responsible Citizenship	Develop an understanding of cultural and historical heritages, affirm a belief in the dignity and worth of others, and accept responsibility for local, national, and global environment	<ul style="list-style-type: none"> ▪ Assume an active role in nurturing and preserving God’s creation
Healthy Balanced Living	Accept personal responsibility for achieving and maintaining optimum physical, mental, and spiritual health	<ul style="list-style-type: none"> ▪ Recognize that God’s ideal for quality living includes a healthy lifestyle ▪ Incorporate into one’s lifestyle the principles that promote health: nutrition, exercise, water, sunlight, temperance, air, rest, trust in God ▪ Avoid at-risk behavior ▪ Apply Christian principles in recreation and sports ▪ Achieve a balance in work and leisure; balancing physical, mental, social, and spiritual activities ▪ Recognize the interaction of physical, mental, and spiritual health with emotional and social well-being

The following goals have been established to support the unique philosophy of Adventist education. Each student will:		Essential core elements clarify and expand the goal statements and are intentionally infused into a curriculum that teaches students to:
Intellectual Development	Adopt a systematic, logical, and biblical based approach to decision-making and problem-solving when applied to a developing body of knowledge	<ul style="list-style-type: none"> ▪ Broaden intellectual abilities through the study of God’s Word ▪ Use critical and creative thinking skills in “real-world experiences ▪ Develop one’s intellectual potential in natural sciences and mathematics; arts and humanities; social sciences and applied arts ▪ Utilize effective study techniques to locate, organize, and learn information ▪ Apply the principles of life-long learning ▪ Approach all intellectual pursuits from a biblical perspective
Communication Skills	Recognize the value and importance of effective communication and develop the requisite skills	<ul style="list-style-type: none"> ▪ Communicate effectively through the avenues of reading, writing, listening, speaking, and non-verbal languages ▪ Apply a Christ-centered perspective to all forms of personal expression and media ▪ Recognize how media and information technology impacts communication
Personal Management	Function responsibly in the everyday world, using Christian principles of stewardship, economy, and personal management	<ul style="list-style-type: none"> ▪ Develop responsible decision-making skills ▪ Acquire skill in the use of technologies ▪ Value cooperation and teamwork when interacting in groups ▪ Manage time effectively
Aesthetic Appreciation	Develop an appreciation of the beautiful, both in God’s creation and in human expression, while nurturing individual ability in the fine arts	<ul style="list-style-type: none"> ▪ View God as the author of beauty both in His creation and in human expression
Career and Service	Develop a Christian work ethic with an appreciation for the dignity of service	<ul style="list-style-type: none"> ▪ Develop an awareness of career options and opportunities in a changing world, as well as in the church ▪ Develop skills that will enhance employability ▪ Experience the joy of serving others ▪ Identify one’s interests, abilities, and values, understanding their relationship to career options

How To Use This Guide

The hallmarks of this science curriculum guide are simplicity, usability, and practicality. It is designed to correlate content topics with strands and essential learning elements that are universally found throughout the science curriculum. The following steps are recommended for maximizing the use of this guide.

The organization of the materials in this guide does not mandate the instructional methods to be used but permits the teachers to utilize a variety of teaching strategies, instructional techniques, and materials for implementing a curriculum in the science program.

STRANDS AND ESSENTIAL LEARNINGS

The essential learnings guide provides a breakdown of the content, strand, and essential learning elements. This section will be valuable as a reference resource in organizing lesson plans. The essential learnings may also be significant determiners of student progress.

Each section is organized as follows:

- I Strand** – major/broad area
- II Sub-topics** – sub-points of the major areas
- III Essential Learnings** – the most important specific objectives for planning and evaluation

SCOPE AND SEQUENCE CHART

The scope and sequence is a quick matrix reference depicting the concepts presented in each grade level for the core context areas of physical science, life science, earth and space science, and health.

Strand Overview

Seventh-day Adventist education recognizes the natural correlation of science into major areas. These areas are grouped into strands which identify the broad areas of knowledge taught in the elementary science curriculum. Strands have been further divided into sub-topics. The purpose of this graphic is to provide an overview of the curriculum. Although spiritual values are not listed as a content area, it is expected that it will be interwoven and captured at each teachable moment.

Strand 1: Science as Inquiry

- Abilities to do Scientific Inquiry
- Understandings about Scientific Inquiry

Strand 2: Physical Science

- Properties and Changes of Properties in Matter
- Force and Motion
- Energy and Waves
- Careers and Service

Strand 3: Life Science

- Characteristics of Organisms
- Organisms and the Environment
- Structure and Function in Living Systems
- Reproduction and Heredity
- Regulation and Behavior
- Diversity and Adaptation of Organisms
- Careers and Service

Strand 4: Earth and Space Science

- Properties and Structure of Earth's Systems
- Changes in Earth and Sky
- Universe and the Solar System
- Careers and Service

Strand 5: Health

- Health Promotion and Disease Prevention
- Health Information, Products and Services
- Reducing Health Risks
- Influences on Health
- Using Communication Skills to Promote Health
- Setting Goals for Good Health
- Health Advocacy
- Careers and Service

Strand 6: Science and Technology

- Abilities of Technological Skills
- Understandings about Science and Technology
- Abilities to Distinguish Between Natural and Man-Made Objects

Strand 7: History and Nature of Science

- Science as a Human Endeavor
- Nature of Science
- History of Science

Strands and Essential Learnings

Strand 1: Science as Inquiry

Strand 2: Physical Science

Strand 3: Life Science

Strand 4: Earth and Space Science

Strand 5: Health

Strand 6: Science and Technology

Strand 7: History and Nature of Science

STRAND 1: SCIENCE AS INQUIRY
KINDERGARTEN – 8TH GRADE

Fundamental concepts and principles of science as inquiry emphasize the abilities necessary to understand and do scientific inquiry

1A Abilities to do Scientific Inquiry

- 1A.1 Ask questions that can be answered with scientific knowledge and personal observation
- 1A.2 Design and conduct investigations
- 1A.3 Use tools to gather and analyze data
- 1A.4 Use evidence to develop descriptions, explanations, predictions, and models
- 1A.5 Make relationships between evidence and explanations
- 1A.6 Recognize and analyze alternative explanations and predictions
- 1A.7 Communicate scientific procedures and explanations
- 1A.8 Use mathematics in all aspects of scientific inquiry

1B Understandings about Scientific Inquiry

- 1B.1 Ask and answer questions and compare the answer to what scientists already know
- 1B.2 Recognize that current scientific knowledge and understanding guides scientific investigations
- 1B.3 Use simple instruments and technology to extend observation beyond the senses
- 1B.4 Develop explanations consistent with the evidence obtained by investigation
- 1B.5 Scientific investigations sometimes results in new ideas and phenomena, new methods and procedures, and new technologies
- 1B.6 Communicate the data and results obtained from investigation to enable others to repeat, verify, or challenge the results
- 1B.7 Review and ask questions about the results of the work of other scientists
- 1B.8 Understand the importance of mathematics in all aspects of scientific inquiry

**STRAND 2: PHYSICAL SCIENCE
KINDERGARTEN – 8TH GRADE**

Fundamental concepts and principles of physical science include the study and analysis of the nature and properties of living and non-living matter and energy. Through this study teachers will lead students to recognize God as Designer and Creator of our physical world.

KINDERGARTEN		GRADE 1		GRADE 2	
2A	Properties and Changes of Properties in Matter	2A	Properties and Changes of Properties in Matter	2A	Properties and Changes of Properties in Matter
K.2A.1	Describe objects according to their physical properties e.g. color, texture, and size	1.2A.1	Describe differences among atoms, electrons, molecules, and compounds	2.2A.1	Understand forms and properties of matter
				2.2A.2	Identify and compare physical and chemical change
2B	Motions and Forces	2B	Motions and Forces	2B	Motions and Forces
K.2B.1	Define potential and kinetic energy	1.2B.1	Describe and compare types of force and motion	2.2B.1	Define potential and kinetic energy
K.2B.2	Define and understand simple and compound machines	1.2B.2	Define and apply understanding of gravity, mass, and weight	2.2B.2	Define simple machines
		1.2B.3	Define and describe mechanical, electrical, and magnetic force		
		1.2B.4	Explain and describe types of friction		
		1.2B.5	Define and use correctly the terms of motion		
		1.2B.6	Define simple machines		
2C	Transfer of Energy	2C	Transfer of Energy	2C	Transfer of Energy
K.2C.1	Describe various sources of light	1.2C.1	Define heat and how it affects matter	2.2C.1	Describe sound and its characteristics
K.2C.2	Identify sunlight as a composition of all colors	1.2C.2	Define heat transfer	2.2C.2	Describe light and its characteristics
K.2C.3	Identify the primary colors	1.2C.3	Define energy and a wave	2.2C.3	Describe heat and its characteristics
K.2C.4	Describe the composition of secondary colors	1.2C.4	Explain how sound is produced		
K.2C.5	Identify the order of colors as found in a rainbow	1.2C.5	Analyze how sound travels		
2D	Careers and Service	2D	Careers and Service	2D	Careers and Service
K.2D.1	Investigate careers and service opportunities related to physical science	1.2D.1	Investigate careers and service opportunities related to physical science	2.2D.1	Investigate careers and service opportunities related to physical science

STRAND 2: PHYSICAL SCIENCE

GRADE 3		GRADE 4		GRADE 5	
2A	Properties and Changes of Properties in Matter	2A	Properties and Changes of Properties in Matter	2A	Properties and Changes of Properties in Matter
3.2A.1	Describe the differences among atoms, electrons, molecules, and compounds	4.2A.1	Understand forms and properties of matter		
		4.2A.2	Identify and compare physical and chemical change		
		4.2A.3	Explain the structure of atoms and how they are the building blocks of matter		
		4.2A.4	Identify mixtures and compounds		
2B	Motions and Forces	2B	Motions and Forces	2B	Motions and Forces
3.2B.1	Describe and compare types of force and motion			5.2B.1	Describe the relationship between simple and compound machines
3.2B.2	Define and apply an understanding of gravity, mass and weight			5.2B.2	Explain the operation of a single mechanical device and its relation to work and power
3.2B.3	Define and describe mechanical, electrical and magnetic force			5.2B.3	Describe and compare types of force and motion
3.2B.4	Explain and describe types of friction			5.2B.4	Define and apply an understanding of gravity, mass, and weight
3.2B.5	Define and use correctly the terms of motion			5.2B.5	Define and describe mechanical force, nuclear force, and electrical force, and magnetic force
				5.2B.6	Explain and describe types of friction
				5.2B.7	Define and use correctly the terms of motion (velocity, speed, acceleration, momentum)
2C	Transfer of Energy	2C	Transfer of Energy	2C	Transfer of Energy
3.2C.1	Define heat and how it affects matter	4.2C.1	Describe the properties of magnets	5.2C.1	Describe the relationship between heat and the kinetic theory of matter
3.2C.2	Describe sound and its characteristics	4.2C.2	Define electricity and electrical fields	5.2C.2	Identify, describe, and compare different types of wave energy
3.2C.3	Describe light and its characteristics	4.2C.3	Identify the basic nature of current and static electricity	5.2C.3	Describe the organization and application of the electromagnetic spectrum
3.2C.4	Describe heat and its characteristics			5.2C.4	Compare electromagnetic and mechanical waves
				5.2C.5	Explore characteristics of heat, sound, and light
				5.2C.6	Compare the function of simple optical devices
2D	Careers and Service	2D	Careers and Service	2D	Careers and Service
2D.1	Investigate careers and service opportunities related to physical science	4.2D.1	Investigate careers and service opportunities related to physical science	5.2D.1	Investigate careers and service opportunities related to physical science

STRAND 2: PHYSICAL SCIENCE

GRADE 6		GRADE 7		GRADE 8	
2A	Properties and Changes of Properties in Matter	2A	Properties and Changes of Properties in Matter	2A	Properties and Changes of Properties in Matter
6.2A.1	Define atoms, elements, molecules, and compounds			8.2A.1	Identify characteristics of physical and chemical changes
6.2A.2	Identify characteristics of physical and chemical changes			8.2A.2	Describe the relationship between atoms, elements, molecules, ions, and isotopes
6.2A.3	Describe the relationship between atoms, elements, and molecules.			8.2A.3	Identify symbols of elements, describe the organization of the Periodic Table
6.2A.4	Identify symbols of elements,			8.2A.4	Distinguish between compounds and mixtures
6.2A.5	describe the organization of the Periodic Table			8.2A.5	Explain chemical reactions and chemical bonds
6.2A.6	Distinguish between compounds and mixtures			8.2A.6	Identify the make-up of types of radiation
				8.2A.7	Distinguish between nuclear fusion and fission
				8.2A.8	Compare the properties of acids and bases
2B	Forces and Motion	2B	Forces and Motion	2B	Forces and Motion
		7.2B.1	Describe and compare types of force and motion		
		7.2B.2	Define and apply understanding of gravity, mass, and weight		
		7.2B.3	Define and describe mechanical, nuclear, electrical force, and magnetic force		
		7.2B.4	Explain and describe types of friction		
		7.2B.5	Describe Newton's Laws of Motion		
		7.2B.6	Define and use correctly the terms of motion (velocity, speed, acceleration, momentum)		
		7.2B.7	Describe the relationship between simple and compound machines		
		7.2B.8	Explain the relationship between machines and work and power		
2C	Transfer of Energy	2C	Transfer of Energy	2C	Transfer of Energy
6.2C.1	Identify characteristics of magnets	7.2C.1	Describe the relationship between heat and the kinetic theory of matter		
6.2C.2	Describe the relationship between electricity and magnetism	7.2C.2	Describe the organization and application of the electromagnetic spectrum		
6.2C.3	Identify the uses of magnets and electromagnets	7.2C.3	Compare electromagnetic and mechanical waves		
6.2C.4	Compare and contrast static and current electricity	7.2C.4	Explore characteristics of heat, sound, and light		
6.2C.5	Identify the difference between conductors and insulators	7.2C.5	Compare the function of simple optical devices		
6.2C.6	Describe, identify, and explain circuits, batteries, and simple electronic devices	7.2C.6	Explain how energy can change from one form to another		
2D	Careers and Service	2D	Careers and Service	2D	Careers and Service
6.2D.1	Investigate careers and service opportunities related to physical science	7.2D.1	Investigate careers and service opportunities related to physical science	8.2D.1	Investigate careers and service opportunities related to physical science

**STRAND 3: LIFE SCIENCE
KINDERGARTEN – 8TH GRADE**

Fundamental concepts and principles of life science include the study of living organisms, their structure and function, their behaviors, and their relationships with the environment. Through this study teachers will lead students to acknowledge God as the Creator of life.

KINDERGARTEN		GRADE 1		GRADE 2	
3A	Characteristics of Organisms	3A	Characteristics of Organisms	3A	Characteristics of Organisms
K.3A.1	Describe the basic needs of living things	1.3A.1	Describe characteristics of vertebrates and non-vertebrates	2.3A.1	Describe the basic needs of living things
K.3A.2	Describe the characteristics of animal groups	1.3A.2	Describe traits common to all animals		
K.3A.3	Understand the beneficial effects of earthworms				
K.3A.4	Explain how insects are both harmful and helpful				
K.3A.5	Know the dangers of poisonous spiders				
3B	Organisms and the Environment	3B	Organisms and the Environment	3B	Organisms and the Environment
K.3B.1	Understand environmental issues	1.3B.1	Understand environmental issues	2.3B.1	Understand environmental issues
K.3B.2	Know about food chains and food webs	1.3B.2	Know about food chains and food webs	2.3B.2	Know about food chains and food webs
K.3B.3	Identify natural resources	1.3B.3	Identify natural resources	2.3B.3	Identify natural resources
3C	Structure and Function in Living Systems	3C	Structure and Function in Living Systems	3C	Structure and Function in Living Systems
K.3C.1	Identify the parts of the human body	1.3C.1	Define what a plant is	2.3C.1	Define what a plant is
K.3C.2	Understand the function of the senses	1.3C.2	Define photosynthesis	2.3C.2	Define photosynthesis
		1.3C.3	Describe the process of digestion	2.3C.3	Describe the process of digestion
		1.3C.4	Identify the parts of the digestive system	2.3C.4	Identify the parts of the digestive system
		1.3C.5	Identify the parts of the human body	2.3C.5	Explain the importance of the excretory system
		1.3C.6	Understand the function of the senses	2.3C.6	Identify the parts of the human body
				2.3C.7	Understand the function of the senses
3D	Reproduction and Heredity	3D	Reproduction and Heredity	3D	Reproduction and Heredity
K.3D.1	Recognize that living things reproduce	1.3D.1	Describe life cycles of plants	2.3D.1	Describe life cycles of plants
		1.3D.2	Describe life cycles of animals	2.3D.2	Describe life cycles of animals
3E	Regulation and Behavior	3E	Regulation and Behavior	3E	Regulation and Behavior
K.3E.1	Identify plant responses	1.3E.1	Explain the behavior of various animals	2.3E.1	Explain behavior of various animals
		1.3E.2	Identify plant responses	2.3E.2	Identify plant responses
		1.3E.3	Describe animal migration	2.3E.3	Describe animal migration
3F	Diversity and Adaptations of Organisms	3F	Diversity and Adaptations of Organisms	3F	Diversity and Adaptations of Organisms
K.3F.1	Recognize that animals have adaptations that equip them for survival	1.3F.1	Identify endangered species	2.3F.1	Identify endangered species
K.3F.2	Identify endangered species	1.3F.2	Understand that ecosystems include plants and animals	2.3F.2	Recognize the diversity of animals and their habitats
K.3F.3	Recognize diversity within groups of animals	1.3F.3	Recognize the diversity of animals and their habitats		
3G	Careers and Service	3G	Careers and Service	3G	Careers and Service
K.3G.1	Investigate careers and service opportunities related to life science	1.3G.1	Investigate careers and service opportunities related to life science	2.3G.1	Investigate careers and service opportunities related to life science

STRAND 3: LIFE SCIENCE

GRADE 3		GRADE 4		GRADE 5	
3A	Characteristics of Organisms	3A	Characteristics of Organisms	3A	Characteristics of Organisms
3.3A.1	Describe the basic needs of living things	4.3A.1	Classify plants based on common characteristics	5.3A.1	Identify the characteristics of living and non-living things
3.3A.2	Classify organisms according to their characteristics	4.3A.2	Identify conditions necessary for plant survival and growth	5.3A.2	Use the standard classification system to group animals based on characteristics
		4.3A.3	Describe basic plant structures and systems identifying their functions	5.3A.3	Identify the main characteristics of fish, amphibians, reptiles, birds, and mammals
3B	Organisms and the Environment	3B	Organisms and the Environment	3B	Organisms and the Environment
3.3B.1	Explain food chains and food webs	4.3B.1	Explain food chains and food webs	5.3B.1	Explain food chains and food webs
3.3B.2	Distinguish between producers and consumers	4.3B.2	Distinguish between producers and consumers	5.3B.2	Identify producers and consumers
3.3B.3	Recognize that an ecosystem includes plants and animals	4.3B.3	Understand environmental issues		
3.3B.4	Understand environmental issues	4.3B.4	Identify natural resources		
3.3B.5	Identify natural resources				
3C	Structure and Function in Living Systems	3C	Structure and Function in Living Systems	3C	Structure and Function in Living Systems
3.3C.1	Define what a cell is	4.3C.1	Define what a cell is	5.3C.1	Describe, explain, and compare the structure and function of cells
3.3C.2	Distinguish types of cells	4.3C.2	Distinguish types of cells	5.3C.2	Describe the process of cell division
3.3C.3	Describe the process of photosynthesis	4.3C.3	Describe plants and their structures		
3.3C.4	Identify the structures of a plant and describe their function	4.3C.4	Describe the digestive system and digestion		
3.3C.5	Describe the digestive system and digestion				
3D	Reproduction and Heredity	3D	Reproduction and Heredity	3D	Reproduction and Heredity
3.3D.1	Describe life cycles of plants	4.3D.1	Describe the life cycle of a plant	5.3D.1	Identify the structure of the human reproductive system
3.3D.2	Describe life cycles of animals	4.3D.2	Distinguish between pollination and germination	5.3D.2	Describe growth from conception to birth
		4.3D.3	Describe plant processes	5.3D.3	Describe the changes associated with puberty
3E	Regulation and Behavior	3E	Regulation and Behavior	3E	Regulation and Behavior
		4.3E.1	Describe animal migration	5.3E.1	Compare and contrast the innate, learned, cyclic and social behaviors of animals
				5.3E.2	Describe animal migration
3F	Diversity and Adaptations of Organisms	3F	Diversity and Adaptations of Organisms	3F	Diversity and Adaptations of Organisms
3.3F.1	Identify endangered species	4.3F.1	Explain plant and animal adaptation	5.3F.1	Describe how the characteristics of animals affect their function and behavior
3.3F.2	Recognize the diversity of animals and their habitats	4.3F.2	Understand that ecosystems include plants and animals	5.3F.2	Explain plant and animal adaptation
		4.3F.3	Identify endangered species		
		4.3F.4	Recognize the diversity of animals and their habitats		
3G	Careers and Service	3G	Careers and Service	3G	Careers and Service
3.3G.1	Investigate careers and service opportunities related to life science	4.3G.1	Investigate careers and service opportunities related to life science	5.3G.1	Investigate careers and service opportunities related to life science

STRAND 3: LIFE SCIENCE

GRADE 6		GRADE 7		GRADE 8	
3A	Characteristics of Organisms	3A	Characteristics of Organisms	3A	Characteristics of Organisms
		7.3A.1 Distinguish between vertebrates and invertebrates 7.3A.2 Identify the characteristics and structures of sponges, cnidarians, worms, mollusks, echinoderms, and arthropods 7.3A.3 Identify the characteristics and structures of bacteria, protists, and fungi		8.3A.1 Compare and contrast the divisions that make up the plant kingdom 8.3A.2 Distinguish between flowering and non-flowering plants	
3B	Organisms and the Environment	3B	Organisms and the Environment	3B	Organisms and the Environment
				8.3B.1 Understand Environmental issues 8.3B.2 Know about food chains and food webs 8.3B.3 Identify natural resources 8.3B.4 Analyze the impacts of human activity on Earth's ecosystems 8.3B.5 Recognize that ecosystems include living organisms and the non-living environments	
3C	Structure and Function in Living Systems	3C	Structure and Function in Living Systems	3C	Structure and Function in Living Systems
6.3C.1 Identify and describe structure and function of the cell and its parts 6.3C.2 Identify common characteristics of cells 6.3C.3 Describe and explain the structure and functions of the human body 6.3C.4 Identify the relationship between cells, tissues, and organs		7.3C.1 Describe the structure of the cell 7.3C.2 Explain the function of the parts of the cell 7.3C.3 Define cell respiration 7.3C.4 Explain the process of osmosis and cell transport 7.3C.5 Explain the importance of the nucleus		8.3C.1 Analyze the relationship between photosynthesis and respiration. 8.3C.2 Distinguish between transpiration and transportation in plants 8.3C.3 Explain plant tropisms	
3D	Reproduction and Heredity	3D	Reproduction and Heredity	3D	Reproduction and Heredity
6.3D.1 Distinguish between chromosomes, genes, and DNA		7.3D.1 Describe the growth of bacteria 7.3D.2 Explain genetic engineering 7.3D.3 Explain the difference between heredity and genetics 7.3D.4 Distinguish between mitosis and meiosis 7.3D.5 Explain the relationship among DNA, genes and chromosomes		8.3D.1 Describe plant reproduction 8.3D.2 Analyze plant processes such as germination and pollination	
3E	Regulation and Behavior	3E	Regulation and Behavior	3E	Regulation and Behavior
6.3E.1 Describe how cells regulate body processes.		7.3E.1 Describe how cells regulate body processes 7.3E.2 Differentiate between cold-blooded and warm-blooded 7.3E.3 Describe how animals communicate 7.3E.4 Explain the immune response		8.3E.1 Describe types of plant tropisms and how plants adapt to their environments 8.3E.2 Compare and contrast the innate, learned, cyclic, and social behaviors of animals	
3F	Diversity and Adaptations of Organisms	3F	Diversity and Adaptations of Organisms	3F	Diversity and Adaptations of Organisms
				8.3F.1 Identify ways in which organisms adapt to changing environments 8.3F.2 Describe adaptations that improve survival and reproduction of organisms 8.3F.3 Identify factors to become endangered or extinct	
3G	Careers and Service	3G	Careers and Service	3G	Careers and Service
6.3G.1 Investigate careers and service opportunities related to life science		7.3G.1 Investigate careers and service opportunities related to life science		8.3G.1 Investigate careers and service opportunities related to life science	

**STRAND 4: EARTH AND SPACE SCIENCE
KINDERGARTEN – 8TH GRADE**

Fundamental concepts and principles of earth and space science are related to the origin, structure, and physical phenomena of the Earth and the universe.

KINDERGARTEN		GRADE 1		GRADE 2	
4A	Properties and Structure of Earth's Systems	4A	Properties and Structure of Earth's Systems	4A	Properties and Structure of Earth's Systems
K.4A.1	Recognize that the Earth is made up of land, water, and the air	1.4A.1	Distinguish between minerals and rocks	2.4A.1	Describe the surface features of the Earth
K.4A.2	Recognize and describe appropriate ways to care for our Earth			2.4A.2	Distinguish between minerals and rocks
K.4A.3	Understand how Earth's position in relation to the sun counts for days, season, and years			2.4A.3	Describe soil pollution
K.4A.4	Distinguish between minerals and rocks				
4B	Changes in Earth and Sky	4B	Changes in Earth and Sky	4B	Changes in Earth and Sky
K.4B.1	Explain what a fossil is	1.4B.1	Define meteorology, and describe the instruments used to study weather	2.4B.1	Explain how earthquakes are caused
K.4B.2	Describe different types of dinosaurs	1.4B.2	Identify elements of weather	2.4B.2	Explain how volcanoes are formed
K.4B.3	Explain how seasons affects weather	1.4B.3	Explain factors that affect climate	2.4B.3	Define erosion
K.4B.4	Describe the water cycle	1.4B.4	Explain what a fossil is	2.4B.4	Explain what a fossil is
K.4B.5	Identify ocean environments and the life that is found in them	1.4B.5	Describe different types of dinosaurs	2.4B.5	Describe different types of dinosaurs
		1.4B.6	Explain the change of seasons	2.4B.6	Identify evidences of the flood
		1.4B.7	Describe the water cycle	2.4B.7	Explain the change of seasons
				2.4B.8	Describe the water cycle
4C	Universe and the Solar System	4C	Universe and the Solar System	4C	Universe and the Solar System
K.4C.1	Identify God as Creator/Sustainer of the universe	1.4C.1	Identify God as Creator/Sustainer of the universe	2.4C.1	Identify God as Creator/Sustainer of the universe
K.4C.2	Describe the solar system	1.4C.2	Describe the Solar system	2.4C.2	Describe the Solar system
K.4C.3	Identify constellations	1.4C.3	Describe what galaxies are	2.4C.3	Describe what Galaxies are
		1.4C.4	Identify constellations	2.4C.4	Identify constellations
		1.4C.5	Learn about space exploration	2.4C.5	Learn about space exploration
				2.4C.6	Explain use of telescopes
4D	Careers and Service	4D	Careers and Service	4D	Careers and Service
K.4D.1	Investigate careers and service opportunities related to Earth and space science	1.4D.1	Investigate careers and service opportunities related to Earth and space science	2.4D.1	Investigate careers and service opportunities related to Earth and space science

STRAND 4: EARTH AND SPACE SCIENCE

GRADE 3		GRADE 4		GRADE 5	
4A	Properties and Structure of Earth's Systems	4A	Properties and Structure of Earth's Systems	4A	Properties and Structure of Earth's Systems
3.4A.1	Describe the surface features of the Earth	4.4A.1	Explain the formation of fossil fuels		
3.4A.2	Distinguish between minerals and rocks	4.4A.2	Identify Earth's natural resources and their use		
3.4A.3	Describe soil pollution				
4B	Changes in Earth and Sky	4B	Changes in Earth and Sky	4B	Changes in Earth and Sky
3.4B.1	Describe the sun's effect on Earth	4.4B.1	Explain why the story of a flood is important to man's creation	5.4B.1	Define meteorology
3.4B.2	Define meteorology	4.4B.2	Explain what a fossil is	5.4B.2	Describe the elements of weather
3.4B.3	Describe how clouds form	4.4B.3	Describe different types of dinosaurs	5.4B.3	Identify factors that affect climate
3.4B.4	Distinguish between weather and climate	4.4B.4	Explore and interpret evidences for the flood and ice ages	5.4B.4	Describe Earth's atmosphere
3.4B.5	Identify factors that affect climate	4.4B.5	Explain how processes such as plate tectonics, earthquakes, volcanoes, erosion, and weathering affect the Earth	5.4B.5	Describe global warming and its possible causes and effects
3.4B.6	Describe Earth's atmosphere	4.4B.6	Describe the rock cycle	5.4B.6	Explain the water cycle and its relationship to weather and climate
				5.4B.7	Describe the ecosystems that make up the marine environment
				5.4B.8	Explain currents, tides, and ocean waves
				5.4B.9	Identify resources available from the world ocean
				5.4B.10	Identify how humans affect the ecology of the ocean
				5.4B.11	Describe the layers of the atmosphere
4C	Universe and the Solar System	4C	Universe and the Solar System	4C	Universe and the Solar System
3.4C.1	Identify God as Creator/Sustainer of the universe	4.4C.1	Identify God as Creator/Sustainer of the universe	5.4C.1	Identify God as Creator/Sustainer of the universe
3.4C.2	Understand the purpose of God's law and order in the universe	4.4C.2	Learn about space exploration		
3.4C.3	Define astronomy	4.4C.3	Explain use of telescopes		
3.4C.4	Describe space exploration	4.4C.4	Identify the make-up of the solar system		
3.4C.5	Identify the make-up of the Solar system	4.4C.5	Describe what galaxies are		
3.4C.6	Describe the Moon's phases	4.4C.6	Identify constellations		
3.4C.7	Define asteroids, comets, meteors, meteoroids				
4D	Careers and Service	4D	Careers and Service	4D	Careers and Service
3.4D.1	Investigate careers and service opportunities related to Earth and space science	4.4D.1	Investigate careers and service opportunities related to Earth and space science	5.4D.1	Investigate careers and service opportunities related to Earth and space science

STRAND 4: EARTH AND SPACE SCIENCE

GRADE 6		GRADE 7		GRADE 8	
4A	Properties and Structure of Earth's Systems	4A	Properties and Structure of Earth's Systems	4A	Properties and Structure of Earth's Systems
6.4A.1	Describe Earth's structure and features			8.4A.1	Describe how to practice wise stewardship of the Earth and its resources
6.4A.2	Identify common minerals and rocks				
6.4A.3	Identify Earth's natural resources and their use				
4B	Changes in Earth and Sky	4B	Changes in Earth and Sky	4B	Changes in Earth and Sky
6.4B.1	Explain how Earth processes have changed the Earth's surface over time			8.4B.1	Explain how Earth processes have changed the Earth's surface over time
6.4B.2	Explore and interpret evidences for the flood and ice ages			8.4B.2	Compare and contrast the creationist and naturalistic interpretations of the fossil record
6.4B.3	Explain how processes such as plate tectonics, earthquakes, volcanoes, erosion, and weathering affect the Earth			8.4B.3	Describe the geologic column
6.4B.4	Describe how soil is formed				
6.4B.5	Explain why the story of a flood is important to man's creation				
6.4B.6	Explain what a fossil is				
6.4B.7	Describe different types of dinosaurs				
6.4B.8	Describe the geologic column				
4C	Universe and the Solar System	4C	Universe and the Solar System	4C	Universe and the Solar System
6.4C.1	Identify God as Creator/Sustainer of the universe	7.4C.1	Compare the biblical account of Creation with the Big Bang Theory	8.4C.1	Compare and contrast the theories of special creation, their assumptions, and their supporting evidence
		7.4C.2	Explain how the study of astronomy supports the concept of a creator	8.4C.2	Identify theories of origins, their associated assumptions, and their supporting evidence
		7.4C.3	Describe the life cycle of stars	8.4C.3	Explain why the biblical story of the flood is important to Christianity
		7.4C.4	Compare and contrast the types of galaxies	8.4C.4	Describe Darwin's assumptions and explanation of how life evolved on Earth
		7.4C.5	Describe the U.S. space program and its accomplishment	8.4C.5	Describe views regarding Earth's age
		7.4C.6	Know how the Earth's position relative to the Sun affects Earth		
		7.4C.7	Identify the make-up of the Solar system including the planets, moons, asteroids, meteors, and comets		
4D	Careers and Service	4D	Careers and Service	4D	Careers and Service
6.4D.1	Investigate careers and service opportunities related to Earth and space science	7.4D.1	Investigate careers and service opportunities related to Earth and space science	8.4D.1	Investigate careers and service opportunities related to Earth and space science

STRAND 5: HEALTH
KINDERGARTEN – 8TH GRADE

Fundamental concepts and principles of health science include the study of individual and community health, behaviors that affect health and resources designed to assist individuals and communities in maintaining good health

KINDERGARTEN		GRADE 1		GRADE 2	
5A	Health Promotion and Disease Prevention	5A	Health Promotion and Disease Prevention	5A	Health Promotion and Disease Prevention
K.5A.1	Explain how habits affect personal and family health	1.5A.1	Describe how personality, relationship, and self-concept, affect mental and emotional health	2.5A.1	Explain how habits affect personal and family health
5B	Health Information, Products, and Service	5B	Health Information, Products, and Service	5B	Health Information, Products, and Service
K.5B.1	Explain how proper nutrition is related to good health	1.5B.1	Explain how proper nutrition is related to good health	2.5B.1	Explain how proper nutrition is related to good health
K.5B.2	Identify health resources	1.5B.2	Know how to locate the use of community health resources	2.5B.2	Know how to locate the use of community health resources
5C	Reducing Health Risks	5C	Reducing Health Risks	5C	Reducing Health Risks
K.5C.1	Identify safety hazards and ways to prevent injuries/accidents	1.5C.1	Identify safety hazards and ways to prevent injuries/accidents	2.5C.1	Identify safety hazards and ways to prevent injuries/accidents
		1.5C.2	Identify sources of diseases and how they may be prevented	2.5C.2	Identify sources of diseases and how they may be prevented
5D	Influences on Health	5D	Influences on Health	5D	Influences on Health
K.5D.1	Understand that God’s unconditional love leads to good health	1.5D.1	Identify important personal values	2.5D.1	Identify important personal values
		1.5D.2	Explain God’s plan for family units	2.5D.2	Explain God’s plan for family units
		1.5D.3	Understand that God’s unconditional love leads to good mental and emotional health	2.5D.3	Understand that God’s unconditional love leads to good mental and emotional health
5E	Using Communication Skills to Promote Health	5E	Using Communication Skills to Promote Health	5E	Using Communication Skills to Promote Health
K.5E.1	Demonstrate compassion and respect of self and others	1.5E.1	Demonstrate compassion and respect of self and others	2.5E.1	Demonstrate compassion and respect of self and others
K.5E.2	Demonstrate refusal/negotiation skills	1.5E.2	Demonstrate refusal/negotiation skills	2.5E.2	Demonstrate refusal/negotiation skills
K.5E.3	Identify emotions and share feelings in appropriate ways	1.5E.3	Describe how the behavior of family and peers affects communication	2.5E.3	Describe how the behavior of family and peers affects communication
		1.5E.4	Identify emotions and share feelings in appropriate ways	2.5E.4	Identify emotions and share feelings in appropriate ways
5F	Setting Goals for Good Health	5F	Setting Goals for Good Health	5F	Setting Goals for Good Health
K.5F.1	Understand the value of biblical principles to health	1.5F.1	Understand the value of biblical principles in making life style choices	2.5F.1	Understand the value of biblical principles in making life style choices
		1.5F.2	Develop an action plan for a healthy life style	2.5F.2	Develop an action plan for a healthy life style
5G	Health Advocacy	5G	Health Advocacy	5G	Health Advocacy
K.5G.1	Develop an awareness of physically and mentally challenged persons	1.5G.1	Develop an awareness of physically and mentally challenged persons	2.5G.1	Develop an awareness of physically and mentally challenged persons
K.5G.2	Analyze various communication	1.5G.2	Analyze various communication methods to express health information	2.5G.2	Analyze various communication methods to express health information
5H	Careers and Service	5H	Careers and Service	5H	Careers and Service
K.5H.1	Investigate careers and service opportunities related to health	1.5H.1	Investigate careers and service opportunities related to health	2.5H.1	Investigate careers and service opportunities related to health

STRAND 5: HEALTH

GRADE 3		GRADE 4		GRADE 5	
5A	Health Promotion and Disease Prevention	5A	Health Promotion and Disease Prevention	5A	Health Promotion and Disease Prevention
3.5A.1	Describe how personality, relationship, and self-concept affect mental and emotional health	4.5A.1	Identify risk factors to health and how these risks may be reduced	5.5A.1	Describe how personality, relationship, and self-concept affect mental and emotional health
5B	Health Information, Products, and Service	5B	Health Information, Products, and Service	5B	Health Information, Products, and Service
3.5B.1	Identify helpful and harmful drugs and their effects	4.5B.1	Identify helpful and harmful drugs and their effects	5.5B.1	Describe situations requiring professional health services
3.5B.2	Understand the proper use of medicines	4.5B.2	Understand the proper use of medicines	5.5B.2	Explain the appropriate first aid procedures to follow in emergencies
5C	Reducing Health Risks	5C	Reducing Health Risks	5C	Reducing Health Risks
3.5C.1	Define positive and negative stress and how it relates to decision-making	4.5C.1	Define positive and negative stress and how it relates to decision-making	5.5C.1	Define eating disorders and how they affect health
3.5C.2	Identify safety procedures for natural disasters	4.5C.2	Identify safety procedures for natural disasters	5.5C.2	Explain the physical and emotional consequences of drug use
5D	Influences on Health	5D	Influences on Health	5D	Influences on Health
3.5D.1	Identify important personal values	4.5D.1	Identify important personal values	5.5D.1	Identify important personal values
3.5D.2	Analyze how media and other sources influence health behaviors	4.5D.2	Analyze how media and other sources influence health behaviors	5.5D.2	Describe God's plan for human sexual behavior
3.5D.3	Identify how friends and peers influence our health choices	4.5D.3	Identify how friends and peers influence our health choices	5.5D.3	Understand that God has provided guidelines (natural laws)
5E	Using Communication Skills to Promote Health	5E	Using Communication Skills to Promote Health	5E	Using Communication Skills to Promote Health
3.5E.1	Demonstrate compassion and respect of self and others	4.5E.1	Demonstrate compassion and respect of self and others	5.5E.1	Demonstrate compassion and respect of self and others
3.5E.2	Demonstrate refusal/negotiation skills	4.5E.2	Demonstrate refusal/negotiation skills	5.5E.2	Demonstrate strategies to manage conflict
3.5E.3	Describe how the behavior of family and peers affects communication	4.5E.3	Describe how the behavior of family and peers affects communication	5.5E.3	Demonstrate effective verbal and non-verbal communication
3.5E.4	Identify emotions and share feelings in appropriate ways	4.5E.4	Identify emotions and share feelings in appropriate ways		
5F	Setting Goals for Good Health	5F	Setting Goals for Good Health	5F	Setting Goals for Good Health
3.5F.1	Understand the value of biblical principles in making life style choices	4.5F.1	Understand the value of biblical principles in making life style choices	5.5F.1	Understand the value of biblical principles in making life style choices
3.5F.2	Develop an action plan for a healthy life style	4.5F.2	Develop an action plan for a healthy life style	5.5F.2	Describe the relationship between values and decision-making
3.5F.3	Develop an understanding of the value of the decision-making processes	4.5F.3	Develop an understanding of the value of the decision-making processes	5.5F.3	Develop an understanding of the value of the decision-making processes
5G	Health Advocacy	5G	Health Advocacy	5G	Health Advocacy
3.5G.1	Develop an awareness of physically and mentally challenged persons	4.5G.1	Develop an awareness of physically and mentally challenged persons	5.5G.1	Develop an awareness of physically and mentally challenged persons
3.5G.2	Analyze communication methods to express health information	4.5G.2	Analyze communication methods to express health information	5.5G.2	Identify barriers to the communication of ideas, feelings, and opinions about issues
5H	Careers and Service	5H	Careers and Service	5H	Careers and Service
3.5H.1	Investigate careers and service opportunities related to health	4.5H.1	Investigate careers and service opportunities related to health	5.5H.1	Investigate careers and service opportunities related to health

STRAND 5: HEALTH

GRADE 6		GRADE 7		GRADE 8	
5A	Health Promotion and Disease Prevention	5A	Health Promotion and Disease Prevention	5A	Health Promotion and Disease Prevention
6.5A.1	Identify risk factors to health and how these risks may be reduced	7.5C.1	Explain the physical, emotional, intellectual, and social changes occurring at puberty	8.5A.1	Explain the physical, emotional, intellectual, and social changes occurring at puberty
5B	Health Information, Products, and Service	5B	Health Information, Products, and Service	5B	Health Information, Products, and Service
6.5B.1	Describe situations requiring professional health services	7.5B.1	Analyze the validity of health information, products, and services	8.5B.1	Analyze the validity of health information, products, and services
6.5B.2	Explain the appropriate first aid procedures to follow in emergencies	7.5B.2	Describe the prevention, detection, and treatment of communicable diseases	8.5B.2	Describe the prevention, detection, and treatment of communicable diseases
		7.5B.3	Analyze how media influences the selection of health information/products	8.5B.3	Analyze how media influences the selection of health information/products
5C	Reducing Health Risks	5C	Reducing Health Risks	5C	Reducing Health Risks
6.5C.1	Define eating disorders and how they affect health	7.5C.2	Determine and analyze hereditary health risks	8.5C.1	Determine and analyze hereditary health risks
6.5C.2	Explain the physical and emotional consequences of drug use	7.5C.3	Explain the consequences of premarital sex and ways to support a decision of abstinence	8.5C.2	Explain the consequences of premarital sex and ways to support a decision of abstinence
5D	Influences on Health	5D	Influences on Health	5D	Influences on Health
6.5D.1	Identify important personal values	7.5D.1	Identify important personal values	8.5D.1	Identify important personal values
6.5D.2	Describe God's plan for human sexual behavior	7.5D.2	Analyze the influence of technology on personal and family health	8.5D.2	Analyze the influence of technology on personal and family health
6.5D.3	Understand that God has provided guidelines (natural laws)	7.5D.3	Describe how cultural beliefs influence health behaviors and the use of resources	8.5D.3	Describe how cultural beliefs influence health behaviors and the use of resources
5E	Using Communication Skills to Promote Health	5E	Using Communication Skills to Promote Health	5E	Using Communication Skills to Promote Health
6.5E.1	Demonstrate compassion and respect of self and others	7.5E.1	Demonstrate compassion and respect of self and others	8.5E.1	Demonstrate compassion and respect of self and others
6.5E.2	Demonstrate conflict management skills	7.5E.2	Demonstrate conflict management skills	8.5E.2	Demonstrate conflict management skills
6.5E.3	Demonstrate effective verbal and non-verbal communication	7.5E.3	Demonstrate effective verbal and non-verbal communication	8.5E.3	Demonstrate effective verbal and non-verbal communication
5F	Setting Goals for Good Health	5F	Setting Goals for Good Health	5F	Setting Goals for Good Health
6.5F.1	Understand the value of biblical principles in making life style choices	7.5F.1	Understand the value of biblical principles in making life style choices	8.5F.1	Understand the value of biblical principles in making life style choices
6.5F.2	Describe the relationship between values and decision-making	7.5F.2	Describe the relationship between values and decision-making	8.5F.2	Describe the relationship between values and decision-making
5G	Health Advocacy	5G	Health Advocacy	5G	Health Advocacy
6.5G.1	Develop an awareness of physically and mentally challenged persons	7.5G.1	Develop an awareness of physically and mentally challenged persons	8.5G.1	Develop an awareness of physically and mentally challenged persons
6.5G.2	Identify barriers to effective communication of ideas, feelings, and opinions about issues	7.5G.2	Identify barriers to effective communication of ideas, feelings, and opinions about issues	8.5G.2	Identify barriers to effective communication of ideas, feelings, and opinions about issues
5H	Careers and Service	5H	Careers and Service	5H	Careers and Service
6.5H.1	Investigate careers and service opportunities related to health	7.5H.1	Investigate careers and service opportunities related to health	8.5H.1	Investigate careers and service opportunities related to health

STRAND 6: SCIENCE AND TECHNOLOGY

Fundamental concepts and principles of science and technology include the abilities to use and understand technology and its relationship to science

6A Abilities of Technological Skills

- 6A.1 Use technology to apply the scientific process
- 6A.2 Develop an understanding how to use the tools of technology
- 6A.3 Develop an ability to solve problems using technological design
- 6A.4 Use technology to create data in diagrams, charts, narratives, and graphs
- 6A.5 Use technology as a manipulative to discover science
- 6A.6 Use technology to analyze, create, and explore scientific themes, i.e. life science, earth science, health science, physical science
- 6A.7 Use technology to employ strategies to solve problems in the real world
- 6A.8 Use technology to collaborate in constructing technology-enhanced models, prepare publications, and produce other creative works

6B Understandings about Science and Technology

- 6B.1 Use technology to locate, collect, and evaluate scientific data from various sources
- 6B.2 Develop an understanding of the interrelationship of science and technology
- 6B.3 Use technology to evaluate and research scientific innovations
- 6B.4 Use technology to solve scientific problems and make informed decisions
- 6B.5 Use technology to enhance scientific knowledge, increase productivity, and promote creativity
- 6B.6 Understand the ethical and social issues with science and technology—beneficial and detrimental

6C Abilities to Distinguish Between Natural and Man-Made Objects

- 6C.1 Use technology to apply the scientific process
- 6C.2 Recognize the difference between natural and man-made objects
- 6C.3 Understand that many man-made objects have been developed to help people and society

STRAND 7: HISTORY AND NATURE OF SCIENCE

Fundamental concepts and principles of the history and nature of science include science as a human endeavor, what science is, and how our understanding of science has developed over time.

7A Science as a Human Endeavor	
7A.1	Appreciate that science involves the God-given gifts of reason, insight, energy, skill, and creativity
7A.2	Recognize that intellectual honesty, tolerance of ambiguity, skepticism, and openness to new ideas are essential to science
7A.3	Understand how people have contributed to the development and achievements of science
7A.4	Recognize that contributions to science have come and continue to come from people representing different genders, and diverse social, ethnic, and cultural backgrounds
7A.5	Understand that some scientists work in teams while others work alone, but all communicate extensively with others
7A.6	Recognize that science relies on people who have different abilities and areas of interest
7B Nature of Science	
7B.1	Recognize that scientists use a variety of science processes to formulate/test their explanations of nature
7B.2	Recognize that society and science respond to each other
7B.3	Recognize that a knowledge of God can aid in the understanding of science
7B.4	Scientific knowledge and active research is on going and never static
7B.5	Understand that different scientists, examining experimental results, might draw different conclusions from the data
7B.6	Recognize that questionings, skepticism, response to criticism and open communication are integral to the process of science
7C History of Science	
7C.1	In looking at the history of many peoples, one finds that scientists and engineers of high achievement are considered to be among the most valued contributors to their culture
7C.2	Tracing the history of science can show how difficult it is for innovators to break through the accepted ideas of their time and reach conclusions we currently take for granted

Science Scope And Sequence Matrix

Physical Science

Life Science

Earth and Space Science

Health

**STRAND 2: PHYSICAL SCIENCE
SCOPE AND SEQUENCE K – 8**

2A	<i>PROPERTIES AND CHANGES OF PROPERTIES IN MATTER</i>	K	1	2	3	4	5	6	7	8
Chemistry										
	Acids/Bases									•
	Chemical Bonds									•
	Chemical Reactions									•
	Compounds and Mixtures			•		•				•
	Matter	•	•	•	•	•		•		•
	Atoms and Elements		•	•	•	•		•		•
	Characteristics/Classification							•		•
	Periodic Table							•		•
	Properties and Changes in Matter			•		•		•		•
2B MOTIONS AND FORCES										
Force and Motion										
	Energy			•	•		•		•	
	Potential and Kinetic Energy	•		•	•		•		•	
	Force		•	•	•		•		•	
	Friction		•	•	•		•		•	
	Gravity		•	•	•		•		•	
	Magnetic		•	•	•		•		•	
	Mechanical						•		•	
	Motion	•	•	•	•		•		•	
	Acceleration, Speed, Velocity						•		•	
	Inertia				•		•		•	
	Laws of Motion	•	•	•	•		•		•	
	Work and Power	•	•	•	•		•		•	
	Machines	•	•	•	•		•		•	
2C TRANSFER OF ENERGY										
Electricity										
	Cells and Batteries		•	•	•	•		•		
	Circuits		•	•	•	•		•		
	Electricity – Current/Static			•	•	•		•		
	Generators and Motors							•		
	Magnets		•	•	•			•		
Energy and Waves										
	Electromagnetic Waves			•	•	•	•			
	Electromagnetic Spectrum			•			•			
	Heat		•	•	•	•	•			
	Light and Color	•	•	•	•	•	•			
	Lasers/Fiber Optics				•	•	•			
	Lenses and Mirrors				•	•	•			
	Radiation						•			
	Mechanical Waves						•			
	Sound Waves	•	•	•	•	•	•			
	Wave Behavior			•	•		•			
	Wave Structure						•			
2D CAREERS AND SERVICE										
		•	•	•	•	•	•	•	•	•

**STRAND 3: LIFE SCIENCE
SCOPE AND SEQUENCE K-8**

3A <i>CHARACTERISTICS OF ORGANISMS</i>	K	1	2	3	4	5	6	7	8
Living vs. Non-Living	•	•	•	•		•		•	
Classification of Living Organisms				•		•		•	
Kingdom – Animals									
Characteristics						•			
Invertebrates	•	•							
Sponges, Cnidarians, Worms	•							•	
Echinoderms, Mollusks, Arthropods	•							•	
Vertebrates		•							
Fish, Reptiles, Amphibians						•			
Birds, Mammals						•			
Kingdom – Fungi								•	
Kingdom – Monera								•	
Kingdom – Plants									
Characteristics					•				•
Vascular/Non-vascular Plants									•
Flowering Plants/Non-Flowering Plants									•
Kingdom – Protists								•	
3B <i>ORGANISMS AND THE ENVIRONMENT</i>									
Ecology									
Communities/Populations				•	•				•
Environmental Issues	•	•	•	•	•				•
Food Chains and Food Webs	•	•	•	•	•	•		•	•
Natural Resources	•	•	•	•	•				•
3C <i>STRUCTURE AND FUNCTION IN LIVING SYSTEMS</i>									
Cells									
Characteristics				•	•	•	•	•	
Processes						•	•	•	
Structure						•	•	•	
Cells/Tissues/Organs				•	•		•		
Types				•	•	•	•	•	
Human Body									
Body Systems									
Circulatory/Respiratory System			•	•	•		•		
Digestive/Excretory System		•	•	•	•		•		
Integumentary System							•		
Immune System							•	•	
Skeletal/Muscular System				•			•		
Nervous System/Sense Organs	•	•	•	•			•		
Kingdom – Plants									
Plant Processes									•
Photosynthesis		•	•	•	•				•
Transpiration and transportation									•
Structure/Function (Leaf, Root, Stem)		•	•	•	•				•

3D	REPRODUCTION AND HEREDITY								
Genetics/Inheritance									
	DNA, Genes, and Chromosomes						•	•	
	Human Genetics							•	
	Inheritance Patterns							•	
Human Body									
	Growth and Development						•	•	
	Conception to Birth						•	•	
	Puberty and Adolescence						•	•	
	Reproductive System						•	•	
Kingdom – Animals									
	Growth and Development (life cycles)	•	•	•	•	•			•
Kingdom – Plants									
	Flowering Plants	•	•	•	•	•			
	Life Cycle	•	•	•	•	•			•
	Non-Flowering Plants	•	•	•	•	•			
	Life Cycle	•	•	•	•	•			•
	Plant Processes		•	•	•	•			
	Pollination/Germination	•	•	•	•	•			•
3E	REGULATION AND BEHAVIOR								
Kingdom – Animals									
	Behavior			•			•	•	•
	Migration		•	•		•	•		•
Kingdom – Plants									
	Responses	•	•	•					•
3F	DIVERSITY AND ADAPTATIONS OF ORGANISMS								
Adaptation (Behavioral, Structural, and Physiological)				•	•		•		•
Diversity			•	•	•	•	•		•
	Biological								•
	Ecosystem				•				•
Endangered Species			•	•	•	•			•
Genetic Variation									•
Natural Selection									•
3G	CAREERS AND SERVICE	•	•	•	•	•	•	•	•

STRAND 4: EARTH AND SPACE SCIENCE
SCOPE AND SEQUENCE K-8

4A <i>PROPERTIES AND STRUCTURE OF EARTH'S SYSTEMS</i>	K	1	2	3	4	5	6	7	8
Earth Materials									
Earth's Structure	•	•	•	•	•		•		
Energy Resources				•	•		•		•
Minerals and Rocks	•	•	•	•			•		
4B <i>CHANGES IN EARTH AND SKY</i>									
Changing Surface									
Earthquakes and Volcanoes			•		•		•		
Plate Tectonics			•		•		•		
Weathering and Erosion			•		•		•		
Earth's Air and Water									
Atmosphere	•	•	•	•		•			
Structure	•	•	•	•		•			
Water Cycle	•	•	•	•		•			
Climate		•		•		•			•
Oceanography	•	•	•			•			
Currents, Tides, and Waves						•			
Marine Environments				•	•	•			
Resources				•	•	•			
Seasons	•	•	•	•	•	•			
Weather	•	•	•	•	•	•			
Geologic Time									
Creation							•		•
Flood/Ice Age							•		•
Fossils	•	•	•	•	•		•		•
Dinosaurs	•	•	•	•	•		•		•
Geologic Column									•
4C <i>UNIVERSE AND THE SOLAR SYSTEM</i>									
Astronomy and the Universe									
Origin of the Universe			•	•				•	
Solar System	•	•	•	•	•			•	
Asteroids, Comets, Meteors				•				•	
Inner Planets				•				•	
Earth	•	•	•	•	•			•	
Moon	•	•	•	•	•			•	
Outer Planets	•	•	•	•	•			•	
Sun	•	•	•	•	•			•	
Space Exploration		•	•	•	•			•	
Telescopes			•	•	•			•	
Stars and Galaxies								•	
Galaxies		•	•	•	•			•	
Stars		•	•	•	•			•	
Constellations	•	•	•	•	•			•	
Life Cycle								•	
4D <i>CAREERS AND SERVICE</i>									
	•	•	•	•	•	•	•	•	•

STRAND 5: HEALTH SCOPE AND SEQUENCE K-8

5A	<i>HEALTH PROMOTION AND DISEASE PREVENTION</i>	K	1	2	3	4	5	6	7	8
	Health Habits/Practices	•		•						
	Health Risks/Prevention					•	•	•		
	Risk Factors (inherited and environmental)						•	•	•	•
	Mental/Emotional Growth						•	•	•	•
	Personality/Self-Concept		•		•		•	•	•	•
5B	<i>HEALTH INFORMATION</i>									
	Health Resources	•	•	•	•	•	•	•	•	•
	Products/Services				•	•	•	•	•	•
	First Aid						•	•		
	Injury						•	•		
	Disaster Preparation/Response						•	•		
	Communicable Diseases								•	•
	Helpful/Harmful Drugs				•	•				
	Nutrition and Good Health	•	•	•						
	Dietary Guidelines	•	•	•						
	Intervention Services						•	•		
	Child Abuse						•	•		
	Suicide Prevention						•	•		
5C	<i>REDUCING HEALTH RISKS</i>									
	Abstinence								•	•
	Disease Prevention		•	•						
	Drug Abuse						•	•		
	Eating Disorders						•	•		
	Personal Health Assessment								•	•
	Safety Hazards	•	•	•	•	•				
	Stress Positive/Negative				•	•				
5D	<i>INFLUENCES ON HEALTH</i>									
	God's Plan	•	•	•						
	Family		•	•			•	•		
	Natural Laws						•	•		
	Health Influences									
	Culture								•	•
	Media/Technology				•	•			•	•
	Peers				•	•				
	Values		•	•	•	•	•	•	•	•
5E	<i>USING COMMUNICATIONS SKILLS TO PROMOTE HEALTH</i>									
	Emotional Interactions	•	•	•	•	•				
	Compassion/Respect	•	•	•	•	•	•	•	•	•
	Conflict Management						•	•	•	•
	Cultural Communication		•	•	•	•				
	Negotiation/Refusal Skills	•	•	•	•	•				
	Verbal/Non-Verbal Communication						•	•	•	•
5F	<i>SETTING GOALS FOR GOOD HEALTH</i>									
	Decision Making									
	Biblical Principles	•	•	•	•	•	•	•	•	•
	Skills/Processes		•	•	•	•	•	•	•	•
5G	<i>HEALTH ADVOCACY</i>									
	Awareness of the Physically/Mentally Challenged	•	•	•	•	•	•	•	•	•
	Communication Barriers						•	•	•	•
	Communication Methods	•	•	•	•	•				
	Communicate Health Issues		•	•	•	•	•	•	•	•
5H	<i>CAREERS AND SERVICE</i>	•	•	•	•	•	•	•	•	•

Science Process

SCIENCE PROCESS

Source: *The American Association for the Advancement of Science*

BASIC SKILLS

1. Observing. Observation is an objective process of gathering data or facts through the use of one or more of the five senses – hearing, sight, touch, taste, and smell. The five senses are used to find out about objects and events, their characteristics, properties, differences, similarities, and changes.
 - * *Observations are recorded.*
2. Classifying. Classification is the process of sorting or grouping objects on the basis of observable traits. When objects share a common characteristic, they are said to form a set.
 - * *Lists, tables, or charts are generated.*
3. Measuring. Measuring is the process of expressing the amount of an object in quantitative terms, or comparing an object to a standard (metric units, time, student-generated frames of reference).
 - * *Measurements are to be recorded in an orderly and systematic fashion with labeled units of measure. Charts, graphs, or tables can be generated manually or with a computer.*
4. Inferring. Inferring is an inventive process in which an assumption of cause is generated to explain an observed event. Inferring takes place when we arrive at a conclusion or guess based on what we observe or already know.
 - * *More than one inference may be presented to explain an observation.*
5. Predicting. Predicting deals with projecting events based upon a body of information. It is a belief based on what will occur based upon present knowledge and understandings, observations, and inferences. The nature of the skill of predicting is to be able to identify a trend in a body of data and then to project that trend in a way that can be tested. Predicting takes place when you tell what you think will happen.
 - * *A prediction should be followed by a written or oral explanation to clarify ideas and reveal any misconceptions or missing information.*
6. Interpreting. Interpreting is arriving at explanations, inferences, or hypotheses from data that has been placed in a data table or graph.
7. Communicating. This process refers to the systematic reporting of data and may be oral, written, or mathematical. It should organize ideas using appropriate vocabulary, graphs,

other visual representation, and mathematical equations. The purpose of the communication skills is to represent information in such a way that the maximum amount of data can be reviewed with an eye toward discovering inherent patterns of association.

8. Hypothesizing. An hypothesis is a response or potential solution to a specific question or problem.

9. Experimenting. This is a systematic approach to problem solving. Usually experimenting is synonymous with the scientific method. The scientific method follows five basic steps:

Problem→Hypothesis→Predictions→Test of Predictions→Evaluation of Hypothesis

IMPLEMENTATION OF SCIENCE SKILLS

Process Skills	Students/Classroom	Scientists/Real World
Observe	use senses	use computers, microscopes, senses
Experiment	change something watch what happens	manipulate and control variables
Collaborate	with other in classroom	with other scientists
Record	science journals and notebooks	field notes, data sheets, computer
Measure	thermometers, lab equipment, etc.	scientific instruments
Sort/Classify	color, size, shape, weight	classification keys, field guides
Compare	Which one is biggest? Which one went the farthest?, etc.	change over time, change in conditions
Analysis and Sharing	Why did this happen? tell others...	data analysis tell others

Appendix

The Assessment Process

Assessment is a way of providing feedback to the various stakeholders in the education system and a way of communicating the expectations of that system to all concerned. Data generated through the process of assessment provides the students with feedback on how well they are meeting course expectations and teachers with feedback on how well students are learning. Assessment allows teachers to determine the effectiveness of the instructional strategies employed in the teaching process. Thus, effective assessment practices can drive both instructional strategies employed by the teachers and learning strategies that may be used by students.

National Science Education Standards identified four components of the assessment process: data use, data collection, methods to collect data, and users of data. These components can be combined in numerous ways and should be used to inform decision making and actions taken in science education. National Science Education Standards suggested the following changes in emphasis in assessment:

Less Emphasis on ...

Assessing what is easily measured

Assessing discrete knowledge

Assessing scientific knowledge

Assessing to learn what students do not know

Assessing only achievement

End-of-term assessment by teachers

Development of external assessment by experts alone

More Emphasis on...

Assessing what is most highly valued

Assessing rich, well-structured knowledge

Assessing scientific understanding and reasoning

Assessing to learn what students understand

Assessing achievement and opportunity to learn

Ongoing assessment by students of their work and that of others

Involvement of teachers in the development of external measurement

Assessing Student Learning

Assessing science through paper-and-pencil tests is akin to assessing a basketball player's skills by giving a written test. We may find out what someone knows about basketball, but we won't know how well that person plays the game.

(Hein and Price, 1994)

Instituting change in the classroom assessment program can be challenging. It is important for the classroom teacher to remember that new assessment strategies should be introduced slowly and carefully, being careful to maintain some traditional testing. A balance of traditional testing and alternative assessments will result in a more complete picture of student progress. In addition to traditional testing, the following assessment strategies have been used effectively in many science classrooms.

- Matched pre- and post-module assessments

- Embedded assessments
- Prediction activities
- Final assessments, such as hands-on assessments, paper-and-pencil tests, and science notebooks
- Informal assessments
- Documentation and record keeping

Matched Pre- and Post-Module Assessments

Pre- and post-module assessments serve two important functions. The first is to track how much students have learned during the unit. The latter enables the teacher to observe how the student's understanding of a subject has grown.

A pre-module assessment might include a teacher asking a question, assign an investigation, brainstorm, draw a picture, or perform a simple experiment at the beginning of the unit to determine how much a student knows about a given subject. As the class progresses through the unit, the teacher might refer to the pre-module assessment to further refine the teaching strategies. The post-module assessment would then be used as a way for the teacher to measure his or her teaching strategies.

Embedded Assessments

Embedded assessments are woven into the instructional sequence in the module. They may be part of the activities that naturally occur in a lesson or a logical extension of the lesson's central activity. Embedded assessment allows the teacher to obtain and record information about student learning.

Prediction Activities

A prediction activity allows the student to predict an outcome based on previous experience and knowledge of a subject. By asking students to make predictions at appropriate times, teachers can assess the science concepts their students have mastered and how well they can apply that knowledge to a new situation.

Final Assessments

Final assessments are used at the end of a science unit or module and can take many forms. Examples of final assessments are described below:

Hands-on Assessments

Hands-on assessments provide opportunity for teachers to observe how well students can perform an experiment similar to one they worked on during the module or unit. Through hands-on assessments, teachers see how students approach a problem, gather data, record results, and draw conclusions from their findings.

Teachers may also use stations to offer a series of tasks for students to complete. Students may work individually or collectively as a group.

Paper-and-Pencil Tests

Paper-and-pencil tests are questions used at the end of the unit to assess student knowledge. The questions can be pictorial or reflective. Pictorial questions evaluate how well a student can think through problems that require both the knowledge and the application of ideas to a new situation. Reflective questions evaluate how well students can express themselves in writing, as indicated by the way they respond to problem solving questions.

Science Notebooks

Students can be asked to prepare individual science notebooks that include all the observations and records generated during a module or unit. The notebooks may include stories and poems, record sheets, charts, tables, and graphs. Drawing also reveals what students have learned. Teachers should assess the level of detail, use of labels,

and quality of explanations accompanying the drawing. Notebooks also provide an effective way for students to keep records of what they have done in the module.

Informal Assessments

It is also beneficial to conduct informal assessments of student progress. Informal assessment might include reviewing written materials, observing students at work, and simply listening to students talk as you stroll around the classroom. By asking the right questions, teachers can uncover students' reasoning and the steps they used to solve problems. The questions that students ask can also provide valuable information about their understanding. Individual and group presentations also provide insight into student understanding or interpretation of concepts. Finally, questions posed by students following presentations can provide opportunities to gather important information.

Documentation and Record Keeping

One of the hardest parts of incorporating alternative assessments into the science program is developing an accurate record keeping system. Many teacher's guides include record keeping charts that help teachers focus on the goals of each assessment instrument.

The record keeping devices may include observation sheets, student worksheets, student profile charts, and evaluation rubrics. These devices provide a structure for teachers to use as they experiment with new assessment strategies and they can be adapted to suit the needs and record keeping styles of different teachers.

Rubrics

Rubrics offer the teacher an opportunity to evaluate the student's understanding of a scientific topic by levels of performance on certain criteria. A rubric can evaluate the depth, breadth, creativity, and conceptual framework of an essay, presentation, skit, poster, project, lab report, portfolio, etc. A rubric may be applied to numerous tasks in the classroom. Rubrics are scoring criteria that are:

- summative—provide information about a student's knowledge
- formative—provide information about a student's strengths and weaknesses
- evaluative—provide ways to create instruction that better fits each student's needs
- educative—provide students with an understanding of how they learn science

In the classroom, they can make assessment more meaningful, clarify expectations, and yield better feedback. Specifically, rubrics are matrixes that define what is expected in a learning situation. For the students, a rubric clarifies the often mysterious grade at the end of a unit, project, paper, or presentation by giving insight and direction about what is important about the science activity. There are two predominant types of rubrics; holistic and analytical.

Holistic Rubric

Proficient- 3 points	The student's project has a hypothesis, a procedure, collected data, and analyzed results. The project is thorough and the findings are in agreement with the data collected. There are minor inaccuracies that do not affect the quality of the project.
Adequate- 2 points	The student's project may have a hypothesis, a procedure, collected data, and analyzed results. The project is not as thorough as it could be; there are a few overlooked areas. The project has a few inaccuracies that affect the quality of the project.
Limited- 1 point	The student's project may have a hypothesis, a procedure, collected data, and analyzed results. The project has several inaccuracies that affect the quality of the project.

Analytical Rubric

Criteria	4 points	3 points	2 points	1 point
Has a plan for Investigation	The plan is thorough	The plan is lacking a few details	The plan is missing major details	The plan is incomplete and limited
Use of Materials	Manages all materials responsibly	Uses the materials responsibly most of the time	Mishandles some of the materials	Does not use materials properly
Collects the Data	Thorough collection	Some of the data	Major portions of the data are missing	The data collection consists of a few points

Constructing a Rubric:

- Know the goals for instruction—what are the learning outcomes?
- Decide on the structure of the rubric—holistic or analytical—what fits best for the task?
- Determine the levels of performance—are there levels of performance specific to each criterion?
- Share the rubric with your students—students should have an opportunity to see, discuss or even design the rubric prior to the performance or the science activity.

Adapted from "Design Your Own Rubric" by Julie Luft, *Science Scope*, February 1997

Examples of Rubrics

Holistic Rubric for Essay Questions		
Response	Criteria	Rating
Exemplary	Clarity of thought, Complete. Shows understanding of all processes, reasonable hypothesis or thoughtful questions, conclusions supportable by data, shows creativity, some graphic representation of data or concepts.	11
Competent	Clarity of thought, shows understanding of major processes, includes good hypothesis or questions, draws acceptable inferences and conclusions, may have graphic representations.	10
Minor Flaws	Completes the assignment, but explanations may be slightly ambiguous or unclear, may contain some incompleteness, inappropriateness, or unclearness in representation, hypothesis, understanding of processes or conclusions.	8
Nearly Satisfactory	Begins successfully, but omits significant parts or fails to complete, may misuse scientific terms, representations may be incorrect or omitted, incorrect or incomplete in analysis, inferences and conclusions.	6
Fails to complete	Assignment and explanation is unclear, or major flaws in concept mastery, incorrect use of scientific terms, inappropriate or omitted hypothesis.	4
Unable to begin effectively	Product does not reflect the assignment, does not distinguish what information is needed, restates the question without making an attempt at a solution.	2
No attempt	Does not begin assignment.	0

Analytical Rubric for Logs and Journal Writing		
Area of Product	Criteria	Rating
Daily entries	Regular daily entries	4
	Entries 90% of the time	3
	Entries 80% of the time	2
	Entries less than 80% of the time	1
Use of scientific language	Consistent, accurate usage of terms	4
	Adequate usage of scientific terms	3
	Occasional use with few errors	2
	No terms or frequent errors in usage	1
Application to the real world	Able to apply learning	4
	Usually finds practical application	3
	Occasionally relates to real life skills	2
	No practical application	1
Concept understanding	Shows understanding of key concepts	4
	Usually demonstrates understanding	3
	Inadequately demonstrates understanding	2
	Poor understanding of concepts	1
Clarity of thought	Well organized	4
	Adequate organization	3
	Limited organization	2
	Poor organization	1

Analytical Rubric for Contour Maps (Earth Science)		
Neatness	Map is crystal clear, no isolines touch or cross, no stray pen or pencil marks, and overall appearance shows care and attention to detail. Numbers are legible, yet unobtrusive, symbols are unmistakable.	3 points
	Map is clear, although signs of carelessness may appear. Isolines do not cross, and stray pencil marks are minimal or mostly erased. Numbers are legible, symbols conform with handout guidelines.	2 points
	Map lacks clarity. Isolines are nebulous, extraneous marks litter the page. Numbers are messy, symbols confusing.	1 point
	Map is an utter mess. No attempt at neatness is evident. Includes a blank page.	0 points
Completeness	Every isoline is present on map and clearly labeled. Proper lines are used for topographic elements, and symbols represent all known or discernible structures.	3 points
	Requires isolines are present, some labels may be missing. Most identifiable structures in landscape are represented by appropriate symbols.	2 points
	Some isolines missing, labels intermittent. Few structures are represented by the appropriate symbols.	1 point
	More isolines are missing than are present, labels rare to nonexistent. Symbols for other structures are not present whatsoever.	0 points
Accuracy	Map clearly corresponds to given landscape. Geologic formations are clearly identifiable, and distances between objects on map are directly related to reality.	3 points
	Map represents landscape. General contours are identifiable, although details may be slightly off. Distances are mostly consistent with reality.	2 points
	Map is a gross interpretation of reality. Hills and valleys exist, but shapes vary from given landscape. Distances between objects are only roughly proportional to given landscape.	1 point
	Are you sure you were mapping the landscape I gave you?	0 points

Joel Stachura, 1995

Holistic Rubric for Lab Write-Ups				
Frequent and proper use of scientific terminology appropriate for the lab.				
1 strongly disagree	2	3 somewhat agree	4	5 strongly agree
Data collection was within expected norms, explanations were given where they deviated.				
1 strongly disagree	2	3 somewhat agree	4	5 strongly agree
Conclusion is appropriate for the data collected and shows a strong grasp of the scientific concepts.				
1 strongly disagree	2	3 somewhat agree	4	5 strongly agree
Writing style shows neatness, grammatical correctness, and good spelling.				
1 strongly disagree	2	3 somewhat agree	4	5 strongly agree
The lab write up was complete with graphs and charts where appropriate. Check the parts present. Purpose _____ Materials List _____ Procedures _____ Data and Observations _____ Calculations _____ Questions _____ Conclusion _____				
1 strongly disagree	2	3 somewhat agree	4	5 strongly agree
The response to the questions were carefully thought out and well reasoned.				
1 strongly disagree	2	3 somewhat disagree	4	5 strongly agree

by Barbara Schaner

Laboratory Safety

An integral part of a successful science program is conducting laboratory experiments, activities, and investigations. Laboratory experiments, activities, and investigations can lead to accidents or injuries. Prevention is the best cure to reduce the possibility of such accidents or injuries. Preparation and planning is the key to laboratory safety.

Safety should be the first priority in preparation and planning every experiment, activity, and investigation. The teacher should provide an environment where laboratory safety is always considered. While it is not possible to anticipate every accident, a well planned experiment, activity, or investigation will minimize potential. Keys to safety in elementary school science are planning, management, and monitoring. Listed below are areas for consideration:

- Teachers should perform an experiment prior to class presentation to determine any inherent safety issues
- Teachers should model safety procedures at all times
- Teachers should supervise and monitor student behavior and enforce safety rules and procedures immediately
- Teachers must be present during the entire laboratory session
- Students should understand rules dealing with glassware, electrical equipment, chemicals, fire, sharp instruments, and eye safety
- Safety rules should be prominently posted in the classroom laboratory
- Appropriate protective equipment should be provided and worn as required (eye, hand, clothing, etc.)
- Teachers should be aware of student allergies
- Safety equipment should be immediately accessible in laboratory/classroom and in working order (eye station, fire extinguisher, ground-fault interrupters (GFI), first aid kit, etc.)
- Laboratory equipment should be cleaned or sanitized, age appropriate, and in working order
- Appropriate spacing, lighting, and ventilation should be considered based on each experiment
- Teachers should understand basic first aid rules, in case of injuries
- Proper storage of materials and equipment is required

Chemical Safety Hazards

Laboratory chemicals pose a potential hazard in the elementary science classroom. Most elementary school teachers are not formally trained in chemistry, yet chemicals are sometimes used in their science programs. Listed below are chemicals considered too hazardous for use in elementary science classrooms.

- Acids.** Acids such as hydrochloric, sulfuric, or nitric acid should not be used. Even diluted solutions of these acids can cause skin and eye burns. Two acids generally safe to use are vinegar or a weak citric acid solution. When working with acids, always wear chemical splash safety goggles.
- Asbestos.** Asbestos should not be used and should be discarded according to school system policy. Some forms of this mineral – commonly used in heat-proofing applications – is known to cause cancer.
- Bases.** Sodium hydroxide (lye) or potassium hydroxide is an extremely strong base. Even diluted solutions will irritate the skin, and if splashed in the eyes, may cause injury before one can begin to wash the eye out. For acid-base (pH) activities, the teacher should consider sodium bicarbonate (baking soda) when making a basic solution. When working with bases, always wear chemical splash safety goggles.

- d. **Mercury.** Mercury compounds should not be used in the elementary school classroom. Any thermometers or other instruments containing mercury have no place in the elementary classroom and should be properly disposed of. (Mercury thermometers can be identified by their silver-colored liquid.) When thermometers are needed, use alcohol-filled thermometers.
- e. **Smoke Generating Activities.** Smoke of any kind affects the lungs because smoke is composed of particles floating in the air. Any classroom demonstration that produces smoke should be done in a fume hood, near an exhaust fan, or outdoors with students upwind.
- f. **Other Chemicals.** Teachers should use only those chemicals that are approved for use in elementary classrooms.

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