COMMONWEALTH OF THE BAHAMAS

MINISTRY OF EDUCATION

PRIMARY SCIENCE CURRICULUM GUIDELINES

GRADES 3-4

DEPARTMENT OF EDUCATION
JUNE 2010

GOVERNMENT OF THE COMMONWEALTH OF THE BAHAMAS

PRIMARY SCIENCE CURRICULUM GUIDELINES

A COMPONENT OF EDUCATION DEVELOPMENT PROGRAMME

PRODUCED BY THE SCIENCE & TECHNOLOGY SECTION
DEPARTMENT OF EDUCATION
JUNE 2010

MINISTRY OF EDUCATION
PRIMARY SCIENCE CURRICULUM GUIDELINES
GRADES 3 – 4 (REVISED 2010)
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SECTION A

MESSAGE FROM MINISTER OF EDUCATION

MESSAGE FROM ACTING ASSISTANT DIRECTOR OF EDUCATION (SCIENCE AND TECHNOLOGY SECTION)

What helps students to develop a scientific outlook, are the processes to which they are exposed in the classroom. Science, therefore, should not be merely a study of finite answers but rather an application of processes that aid in discovering and learning about the world in which we live.

If our education system is to keep pace with scientific advancement, our students must be exposed to an effective and comprehensive science education programme which presents opportunities for them to become actively involved in experiments, discovery and at the same time obtain the requisite knowledge, skills and attitudes necessary to compete both locally and globally in a scientific and technological society.

For this to be realized, the development and implementation of model science curricula, strengthening the capacity of teachers and providing adequate science instructional supplies and facilities are paramount.

Science teachers are therefore challenged to inspire, stimulate divergent thinking and provide the means for students to investigate based on what they know as well as what they wish to discover.

With each of us giving of and performing at our best, our students should be able to achieve our goal, which is, to develop competent citizens to provide an efficient and effective workforce needed to advance scientific careers and professions so as to improve the quality of life for all.

ACKNOWLEDGEMENTS

The development and production of the Revised Primary Science Curriculum Guidelines was made possible through the collaborative efforts of many.

Our thanks and gratitude are extended to Mrs. Leanora Archer, Deputy Director of Education (Curriculum and Development) for her support and pointed guidance. Mr. Hamblin Newbold for assisting with the editing of this document. The contributions of the Science Standards and Benchmarks by Dr. Davis who provided a point of reference that assisted in aligning the Primary Science Curriculum Guidelines with Science Standards Globally.

Dr. Karen St. Cyr ( ) for her support and collaborative efforts in the integration of Garden-Base Learning.

The following persons are singled out for special commendations for the part they played in bringing to fruition this curriculum revision exercise:

- Mrs. Barbara Dorsett, Acting Education Officer for Primary Science, for her commitment and dedication as Chairperson of the Curriculum Production Team.
- Ms. Portia Sweeting, Director of Education of Bahamas National Trust, who begun the process as Facilitator during the initial fact-finding activities for the curriculum.
- The High School Science Team led by Ms. Louis Barry, Education Officer for High School Sciences.
- Charlotte Brown, Dorothy Rolle, Terry Deveaux, Joan Knowles, Ronique Curry, Vernay Henfield, Vanessa Turnquest, Carolyn Dorsett, Marcia Musgrove, Danielle Braithwaite, Joyce Darville, Sheena Williams, Marsha Bartlett, Bernadette Beneby and Nicola Bowe, Konya Bascom, members of the Curriculum Production Team, for their input and support.
- The Primary Science Co-ordinators and Curriculum Workshop groups on Abaco, Andros, Bimini, Cat Island, Eleuthera, Exuma, Grand Bahama, Long Island and New Providence for their suggestions and input to the Data Collection exercise.
- Ms. Patrice Kemp for her clerical expertise.
- Ms. Portia Sweeting, Danielle Brathwaite, Charlotte Brown and the Science Coordinators on New Providence for assisting with the editing of this document.

SECTION B

VISION, MISSION STATEMENT BROAD OBJECTIVES

VISION

To ensure that all persons in the Commonwealth of The Bahamas develop physically, mentally, socially and spiritually in order to function responsibly and productively in an increasingly dynamic, technological and complex society.

MISSION STATEMENT

To provide opportunities for all persons in The Bahamas to receive the education and training that will equip them with the necessary knowledge, skills, beliefs and attitudes required for work and life in a democratic society, guided by Christian values.

BROAD OBJECTIVES

The team responsible for effecting the necessary revisions to the *Primary Science Curriculum* holds the view that the curriculum should achieve two broad **objectives**:

- Provide courses of study that challenge participants to acquire interdisciplinary skills and academic standards consistent with emerging global workforce requisites while simultaneously promoting self-confidence, character strengthening, creativity and personal initiative.
- Improve the use of technology in the teaching/learning process.

RATIONALE, OVERREACHING GOAL, SUB-GOALS, OBJECTIVES

RATIONALE

To provide opportunities that expose and engage students in The Bahamas in acquiring scientific knowledge, attitudes and skills which will enhance critical thinking, problem-solving and organizational skills. In so doing, students will be able to participate in varied scientific and technological careers in the global environment, as well as realize the impact that they make on the natural world and appreciate the need for its sustainability.

OVERARCHING GOAL

To empower individuals to become critical thinkers, problem-solvers, visionaries, scientifically and technologically literate citizens who appreciate, interpret and conserve the natural and physical environment.

SUB-GOALS

- To enable students to solve problems using the scientific method.
- To provide experiences which will help students develop analytical and evaluative skills thus enabling them to become critical thinkers.
- To assist students in the application of scientific knowledge and principles to stimulate their creative expressions.
- To expose individuals to scientific knowledge and technological advances to they will be able to function effectively in the world in which they live.
- To enable students to formulate, present and defend arguments based on facts.
- To promote an appreciation for the safe and sustainable use of resources.

OBJECTIVES

- Correctly and safely use materials and scientific equipment.
- Identify problems and apply the scientific method to solve them.
- Collect, interpret and process data to generate information.
- Communicate information.
- Recognize scientific relationships.
- Apply scientific principles and concepts to daily life in order to make responsible and wise decisions.
- Apply scientific and technological principles and concepts to daily life in order to make responsible and wise decisions.
- Pursue new scientific knowledge.
- Design, conduct and evaluate scientific investigations.
- Demonstrate critical thinking by responding to “what if” scenarios (situation analysis).
- Appreciate and utilize environmental conservation strategies.

SCOPE AND SEQUENCE

and

UNIT/ TOPIC ALLOCATION

PRIMARY SCIENCE CURRICULUM
SCOPE AND SEQUENCE

STRAND 1: LIFE SCIENCE **GRADES: 1-6**

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.

LIFE

Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
Characteristics of Organisms	**Characteristics of Organisms**	**Characteristics of Organisms**	**Characteristics of Organisms**	**Characteristics of Organisms**	**Characteristics of Organisms**
1. A1 Observe human models and Identify body parts. (external only) 1. A2 Observe human models to identify sense organs. 1. A3 Experiment to describe functions of sense organs. 1. A4 Observe models and compare growth development in humans. 1. A5 Experiment with manipulatives to demonstrate habits which support good health. 1. A6 Infer results from poor health habits. 1. A7 Describe the basic needs of living things. (plants/animals) 1. A8 Investigate/explain the uses of plants and animals.	1. A1 Observe and conduct research about animals in the environment. 1. A2 Observe/explain what is a Habitat? 1. A3 Explore selected habitats to observe and examine a variety of animals. 1. A4 Compare body coverings of animals. 1. A5 Observe animal parts to predict how they function/move. 1. A6 Predict and infer what animals need for survival. 1. A7 Compare animal habitats using visuals/field areas.	1. A1 Observe a variety of organisms to determine which are vertebrates. 1. A2 Observe/investigate animals to classify them according to their characteristics. 1. A3 Observe organisms to describe the traits common to vertebrates. 1. A4 Observe a variety of organisms to describe and identify vertebrate vectors. 1. A5 Observe a variety of organisms to compare mammals to birds and reptiles to fish and amphibians. 1. A6 Infer how body parts and body coverings of vertebrates help them survive. 1. A7 Experiment with specimens of animal body coverings to determine their function. 1. A8 Experiment with materials which imitate mouth parts of animals to determine their diet.	1. A1 Compare Vertebrates and Invertebrates 1. A2 Investigate and record traits common to all invertebrates. 1. A3 Classify invertebrates based on body parts and covering. 1. A4 Observe the main traits of insects and spiders. 1. A5 Compare insects and spiders using models. 1. A6 Compare the life cycles of mosquitoes and cockroaches. 1. A7 Analyze how insects use mimicry and camouflage for survival.	1. A1 Communicate traits common to all invertebrates using technology/pictures/ specimens. 1. A2 Observe a variety of invertebrates (models/ visuals) to identify their characteristics. (mollusks, crustaceans and stinging cell animals) 1. A3 Observe organisms (visuals/models) to identify vertebrate and invertebrate vectors. 1. A4 Analyze the impact of vectors on the society and infer ways to eliminate them. 1. A5 Investigate the behaviour of animals and infer their adaptive method.	1. A1 Observe and describe the structure of a cell in organisms (plant/animal). 1. A2 Compare plant and animal cells. 1. A3 Observe plant and animal cell parts and record their functions. 1. A4 Classify four types of fungi by their traits. 1. A5 Observe/investigate a variety of invertebrates and classify them as sponges, echinoderms and worms. 1. A6 Compare the traits of sponges, echinoderms and worms.

STRAND 1: LIFE SCIENCE — GRADES: 1-6

LIFE

Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
Structure and Functions in Living Systems	**Structure and Functions in Living Systems**	**Structure and Functions in Living Systems**	**Structure and Functions in Living Systems**	**Structure and Functions in Living Systems**	**Structure and Functions in Living Systems**
1. B1 Classify living and nonliving things. 1. B2 Classify plants and animals according to their traits/ characteristics. 1. B3 Compare traits/ characteristics of plants and animals.	1. B1 Observe organisms to identify the basic parts of the human skeleton. 1. B2 Communicate the importance of the skeleton using models/visuals. 1. B3 Compare skeletons of various animals. 1. B4 Observe and record a variety of muscles in the body using visuals/models. 1. B5 Infer and communicate the importance of muscles in the body. 1. B6 Infer how poor health habits affect personal and family health. 1. B7 Predict the basic needs of plants for survival. 1. B8 Observe a live plant to record its parts.	1. B1 Use visuals to observe the parts of the digestive system. 1. B2 Communicate the function of the digestive system. 1. B3 Experiment to explain how food is broken down as it passes through the digestive system. 1. B4 Infer how proper nutrition is related to good health. 1. B5 Observe/Predict appropriate exercises and food choice to develop a healthy lifestyle. 1. B6 Observe the six main food groups, and explain the nutrients found in each group. 1. B7 Identify health resources, and communicate their function. 1. B8 Observe plants to identify their parts.	1. B1 Observe the parts and explain the function of the respiratory system. 1. B2 Observe the main parts of the nervous system and communicate its importance. 1. B3 Identify the main parts and the importance of the nervous system. 1. B4 Infer risk factors to health and communicate how these risks may be reduced. 1. B5 Analyze safety procedures for natural disasters. 1. B6 Compare seed and non-seed plants. 1. B7 Classify plants with flowers and plants with cones according to their traits. 1. B8 Compare monocots and dicots. 1. B9 Experiment and describe seed germination.	1. B1 Observe models to identify parts of the skeletal system. 1. B2 Research to explain functions of the skeletal system. 1. B3 Predict and communicate the importance of the muscular system. 1. B4 Compare skeletal and muscular systems. 1. B5 Infer how poor eating habits affect health. 1. B6 Experiment to explain the process of photosynthesis. 1. B7 Classify and record indigenous plants of The Bahamas and their uses. 1. B8 Hypothesize/Investigate the medicinal value of plants. 1. B9 Predict ways to conserve plants.	1. B1 Observe parts of the circulatory system and communicate its function. 1. B2 Observe and identify the four chambers of the heart and its function. 1. B3 Observe the Immune system and communicate its function/importance. 1. B4 Predict risk factors to health and communicate how these risks may be reduced. 1. B5 Infer how negative habits affect the immune system. 1. B6 Use specimen of flowers to observe and label the parts and explain their function. 1. B7 Research to communicate the life cycle of a flower. 1. B8 Compare the growth patterns of plants.

STRAND 1: LIFE SCIENCE — GRADES: 1-6

LIFE

Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
Structure and Functions in Living Systems	**Structure and Functions in Living Systems**	**Structure and Functions in Living Systems**	**Structure and Functions in Living Systems**	**Structure and Functions in Living Systems**	**Structure and Functions in Living Systems**
	1. B9 Classify and compare a variety of fruit seeds.	1. B9 Experiment with plant parts and describe their functions. 1. B10 Experiment with seeds to communicate various growth pattern.	1. B10 Observe and describe indigenous flowering plants in The Bahamas.		1. B9 Observe a variety of plants to conclude their adaptive methods for survival. 1. B10 Experiment to discover the needs of plants for growth.
Organisms and the Environment	**Organisms and the Environment**	**Organisms and the Environment**	**Organisms and the Environment**	**Organisms and the Environment**	**Organisms and the Environment**
1. C1 Observe and infer where plants/animals live. 1. C2 Compare homes of animals. 1. C3 Research and predict ways in which plants and animals help each other. 1. C4 Observe environment to infer what are vectors, where they live, and their effect on humans.	1. C1 Observe pictures/ models to identify plant and animal habitats. Infer how these habitats help the animals and plants. 1. C2 Predict how habitats can be harmed and protected. 1. C3 Research to observe what are vectors. 1. C4 Predict where specific vectors live. 1. C5 Infer how vectors can be eliminated.	1. C1 Observe living and nonliving things in a garden (ecosystem). 1. C2 Observe a variety of model gardens (pictures/real) to communicate and compare types of gardens. (e.g. vegetable/ flower) 1. C3 Experiment with seeds to create several containerized gardens. 1. C4 Use ruler/tape to measure growth of seedlings/ record growth development.	1. C1 Observe/Investigate food chains and food webs in ecosystems and communicate their function. 1. C2 Compare the relationship among producers, consumers and decomposers. 1. C3 Observe/Research plants and animals that live in the pine forests, coral reefs and mangroves. 1. C4 Hypothesize the effect on organisms when a pine forest is damaged. 1. C5 Observe/Investigate organisms in coral reefs and communicate its importance.	1. C1 Infer why plants, decomposers and animals (organisms) are found in ecosystem. 1. C2 Compare food chains and food webs. 1. C3 Communicate the relationship of predator, prey and scavenger. 1. C4 Predict/Research what are resources. 1. C5 Analyze why water, energy and electricity are resources. 1. C6 Infer ways to use resources wisely.	1. C1 Research to define “biomes”. 1. C2 Infer/Investigate why plants/animals live in certain biomes. 1. C3 Compare weather factors and organisms in several biomes. 1. C4 Predict the results of natural disasters on the environment. 1. C5 Analyze the effects of human activities on the environment.

STRAND 1: LIFE SCIENCE						GRADES: 1-6
	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
	Organisms and the Environment	**Organisms and the Environment**	**Organisms and the Environment**	**Organisms and the Environment**	**Organisms and the Environment**	**Organisms and the Environment**
L I F E			1. C5 Observe rocky and sandy shores to identify living and nonliving parts. 1. C6 Observe a variety of ecosystems to identify home of conch, grouper, lobster and hutia. 1. C7 Infer what threats affect endangered animals (e.g. grouper). 1. C8 Communicate the laws that protect endangered animals (e.g. grouper).	1. C6 Observe and investigate the four types of mangroves. 1. C7 Communicate the importance of mangroves to our Islands.	1. C7 Predict the importance of preserving National parks.	1. C6 Classify organisms (plants and animals) as endangered or extinct. 1. C7 Infer ways to avoid plants/animals from becoming endangered.

PRIMARY SCIENCE CURRICULUM
SCOPE AND SEQUENCE

STRAND 2: EARTH AND SPACE SCIENCE **GRADES: 1-6**

Fundamental concepts and principles of Earth and space science are related to the origin, Structure and physical phenomena of the Earth and the Universe.

EARTH AND SPACE

Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
Properties and Structure of Earth's Systems	**Properties and Structure of Earth's Systems**	**Properties and Structure of Earth's Systems**	**Properties and Structure of Earth's Systems**	**Properties and Structure of Earth's Systems**	**Properties and Structure of Earth's Systems**
2. A1 Infer what the earth is made up of (e.g. land water and air). 2. A2 Observe/Explain land forms found on earth. (e.g. hills, mountains, valleys) 2. A3 Research and observe several bodies of water on Earth (e.g. ponds, lakes, oceans). 2. A4 Investigate appropriate ways to care for the earth. 2. A5 Experiment to explain how hills are formed.	2. A1 Observe rocks and minerals to identify their traits. 2. A2 Compare a variety of rocks. 2. A3 Compare rocks and minerals. 2. A4 Experiment to communicate some uses of rocks and minerals.	2. A1 Investigate to identify Earth's resources 2. A2 Observe Earth's natural resources and their uses. 2. A3 Infer the importance of natural resources to the survival of people. 2. A4 Experiment to show the various types of pollution. 2. A5 Analyze the sources of air, water, and land pollution. 2. A6 Infer ways to prevent pollution. 2. A7 Investigate the role of students as environmental stewards. 2. A8 Predict ways to care for Earth's resources.	2. A1 Identify and describe the three layers of the earth. 2. A2 Experiment to describe the effects of weathering and erosion on earth. 2. A3 Investigate to identify Ocean resources. 2. A4 Investigate the movement of the ocean water and how it is affected by the moon. 2. A5 Infer what is ocean pollution/examine its effect on organisms in the ocean.	2. A1 Predict resources found in the ocean. 2. A2 Predict which pollutants affect the ocean and how pollution affects marine life. 2. A3 Infer the importance of conserving the ocean. 2. A4 Infer what are fossils and compare types of fossils. 2. A5 Analyze the process of fossil formation. 2. A6 Hypothesize how scientists know which fossils are the oldest.	2. A1 Identify and compare the layers of the Earth. 2. A2 Infer what natural resources are and where they are located. 2. A3 Observe the environment to compare weathering and erosion. 2. A4 Observe the environment to distinguish between air, land and water pollution. 2. A5 Predict ways to prevent pollution. 2. A6 Classify resources as renewable or nonrenewable.

STRAND 2: EARTH AND SPACE SCIENCE GRADES: 1-6

EARTH AND SPACE

Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
Changes in the Earth and Sky	**Changes in the Earth and Sky**	**Changes in the Earth and Sky**	**Changes in the Earth and Sky**	**Changes in the Earth and Sky**	**Changes in the Earth and Sky**
2. B1 Explain how seasons affect weather. 2. B2 Predict and record weather conditions using basic weather instruments. 2. B3 Investigate career and service opportunities related to weather.	2. B1 Predict weather conditions by observing the sky. 2. B2 Observe the immediate environment and communicate the kinds of weather experienced in The Bahamas. 2. B3 Observe weather instruments and their uses. 2. B4 Hypothesize the different ways in which weather affects people.	2. B1 Experiment to explain the water cycle and its relationship to weather and climate. 2. B2 Interpret diagrams to explain the changes that occur at each phase of the water cycle. 2. B3 Experiment to describe how clouds are formed. 2. B4 Research and classify clouds according to their traits. 2. B5 Analyze weather conditions associated with different types of clouds.	2. B1 Predict "What is meteorology?" 2. B2 Observe layers in the earth's atmosphere. 2. B3 Experiment to show the properties of air. 2. B4 Predict and communicate the elements which contribute to weather. 2. B5 Compare weather and climate. 2. B6 Experiment with weather instruments to determine their use. (thermometer wind vane) 2. B7 Analyze the sun's effect on Earth.	2. B1 Research to define "atmosphere". 2. B2 Analyze layers of the atmosphere. 2. B3 Analyze conditions that change weather. 2. B4 Infer how weather changes affect people. 2. B5 Experiment with weather instruments to describe their function. (rain gauge, wind sock)	2. B1 Observe tools that measure factors of weather. 2. B2 Observe and describe factors that make up weather. 2. B3 Compare traits/ characteristics of storms/hurricanes. 2. B4 Measure weather conditions using a barometer, a hydrometer and an anemometer. 2. B5 Interpret and record weather data. 2. B6 Compare weather and climate.

STRAND 2: EARTH AND SPACE SCIENCE — GRADES: 1-6

EARTH AND SPACE

Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
Universe and the Solar System	**Universe and the Solar System**	**Universe and the Solar System**	**Universe and the Solar System**	**Universe and the Solar System**	**Universe and the Solar System**
2. C1 Observe objects in the solar system. 2. C2 Distinguish between day and night.	2. C1 Describe the differences between the moon and Earth. 2. C2 Identify the source of moonlight. 2. C3 Analyze changes in the moon. 2. C4 Infer what is a constellation. 2. C5 Identify and compare common constellations.	2. C1 Experiment to explain the sun's position in relation to the Earth. 2. C2 Experiment to describe the motion of the Earth around the sun. 2. C3 Experiment to explain the terms orbit, revolve and rotate. 2. C4 Predict what causes seasons. 2. C5 Investigate to explain seasonal changes.	2. C1 Research to communicate the order of the eight planets. 2. C2 Research to classify the planets as inner and outer planets. 2. C3 Compare the inner planets and the outer planets. 2. C4 Create a scale model of the distances between planets.	2. C1 Observe and communicate the make up of the Solar System. 2. C2 Investigate to compare planets. 2. C3 Compare rotation and revolution. 2. C4 Communicate how the sun benefits the earth and other planets. 2. C5 Compare and analyze objects in space. – asteroids, comets, meteors and meteoroids.	2. C1 Compare the atmosphere of the planets. 2. C2 Hypothesize which planets are susceptible to life. 2. C3 Observe equipment used to study objects in space. 2. C4 Analyze distances between planets. 2. C5 Analyze safety precautions for astronauts in space.

PRIMARY SCIENCE CURRICULUM
SCOPE AND SEQUENCE

STRAND 3: PHYSICAL SCIENCE **GRADES: 1-6**

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.

	Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
PHYSICAL	**Properties and Changes in Matter**	**Properties and Changes in Matter**	**Properties and Changes in Matter**	**Properties and Changes in Matter**	**Properties and Changes in Matter**	**Properties and Changes in Matter**
	3. A1 Classify objects according to their physical properties such as size, color and shape. 3. A2 Experiment to identify how matter changes state, size, color and shape. 3. A3 Compare physical changes in matter.	3. A1 Analyze forms and properties of matter. 3. A2 Observe tools used to measure matter. 3. A3 Experiment to determine what is volume. 3. A4 Observe a variety of solids to communicate which is lighter or heavier. 3. A5 Compare the weights of solids using a balance/scale.	3. A1 Experiment with materials to identify matter as solids, liquids and gases. 3. A2 Compare characteristics of solids, liquids and gases to classify them. 3. A3 Investigate how matter changes from one form to another. 3. A4 Examine objects to communicate the physical properties of matter. 3. A5 Compare forms and properties of matter using measuring utensils. 3. A6 Experiment to discover the length volume and mass of objects using metric units.	3. A1 Investigate, using a variety of materials to identify properties of matter. 3. A2 Investigate physical changes in matter. 3. A3 Compare physical properties and physical changes in matter. 3. A4 Use a balance to measure and record the mass of objects. 3. A5 Experiment with measuring instruments (graduates or measuring cups) to measure the volume of matter (varied materials).	3. A1 Classify matter as a substance or a mixture. 3. A2 Compare substances and mixtures. 3. A3 Experiment to explain how mixtures can be separated. 3. A4 Experiment to explain what is a solution. 3. A5 Compare solutes and solvent. 3. A6 Experiment to separate solutes. 3. A7 Compare mixtures and solutions.	3. A1 Analyze physical properties in matter. 3. A2 Experiment to explain physical changes in materials. 3. A3 Experiment and record chemical changes in substances. 3. A4 Measure and graph physical properties of matter. 3. A5 Observe chemicals that will cause changes in matter. 3. A6 Compare physical and chemical changes in matter.

STRAND 3: PHYSICAL SCIENCE GRADES: 1-6

PHYSICAL

Grade 1	Grade 2	Grade 3	Grade 4	Grade 5	Grade 6
Forces and Energy	**Forces and Energy**	**Forces and Energy**	**Forces and Energy**	**Forces and Energy**	**Forces and Energy**
3. B1 Compare pushes and pulls. 3. B2 Experiment to identify poles of a magnet. 3. B3 Experiment to find out which objects (materials) a magnet will attract/repel.	3. B1 Infer why the sun is the greatest source of energy on Earth. 3. B2 Identify other sources of light besides the sun. 3. B3 Investigate traits of the sun and communicate its importance. 3. B4 Infer, why water is a source of energy/ explain its use. 3. B5 Experiment to explain the wind as a source of energy. 3. B6 Predict what would happen if there was no water on Earth. 3. B7 Hypothesize ways in which we can conserve water. 3. B8 Experiment with magnets and explain what they do. 3. B9 Classify materials according to their magnetic force.	3. B1 Experiment to discover the sources of energy. 3. B2 Experiment to define fuels. 3. B3 Experiment to communicate how fossil fuels are formed. 3. B4 Analyze the uses of energy from fossil fuels. 3. B5 Predict which materials will transfer electricity. 3. B6 Experiment with magnets to observe the properties of varied materials. 3. B7 Investigate the term conservation and explain its importance. 3. B8 Analyze and share ways to conserve energy.	3. B1 Experiment with materials to conclude what is force, work and motion. 3. B2 Measure and record pulls using a spring scale. 3. B3 Use charts to interpret data recorded on pushes and pulls. 3. B4 Analyze work and infer how (work) it is related to force. 3. B5 Experiment to explain what a simple machine is. 3. B6 Observe objects as wedges or inclined planes. 3. B7 Communicate what is energy conservation. <u>Technology</u> 1. Describe ways technology is used to explore the ocean.	3. B1 Investigate Energy and compare various forms of Energy. 3. B2 Experiment to explain what is work. 3. B3 Compare potential and kinetic energy. 3. B4 Infer how heat affects temperature. 3. B5 Investigate how energy changes. 3. B6 Analyze the impact of technology on forms of energy. 3. B7 Investigate compound/ complex machines that use the lever and screw to help us do work 3. B8 Communicate the importance of conserving energy.	3. B1 Experiment with magnets to Abate the poles and the magnetic field. 3. B2 Experiment to record the relationships between motion, speed and direction. 3. B3 Experiment to show how a simple circuit works. 3. B4 Observe objects and materials to discover the effects of friction on them. 3. B5 Experiment to identify pulleys, wheels and axels. 3. B6 Analyze how forces affect everyday living. 3. B7 Experiment to conclude how pulleys, wheels and axels make work easier.

UNIT/ TOPIC ALLOCATION
GRADE: 1

SECTION	STRAND	TOPICS	DURATION (Hours)
LIFE SCIENCE	**Characteristics of Organisms**	1. HUMAN BODY – SENSE ORGANS	
		a. Body Parts	✓30 mins. __45 mins. __60 mins.
		b. Function of Body Parts	✓30 mins. __45 mins. __60 mins.
		c. Sense Organs	✓30 mins. __45 mins. __60 mins.
		d. Function of Sense Organs	✓30 mins. __45 mins. __60 mins.
		e. Stages of Human Development	✓30 mins. __45 mins. __60 mins.
		f. Physical Changes in Human Development	✓30 mins. __45 mins. __60 mins.
		g. Keeping Healthy	✓30 mins. __45 mins. __60 mins.
		h. Keeping Clean	✓30 mins. __45 mins. __60 mins.
	Living and Nonliving things	2. WHAT ARE LIVING THINGS?	
		a. Needs of Living Things	✓30 mins. __45 mins. __60 mins.
		b. Uses of Plants and Animals	2x30 mins. __45 mins. __60 mins.
		c. Animals as Pets and Animals That Help People Work	✓30 mins. __45 mins. __60 mins.
		3. LIVING AND NONLIVING THINGS	
		a. Living and nonliving things	✓30 mins. __45 mins. __60 mins.
		b. Similarities of Living and Nonliving Things	✓30 mins. __45 mins. __60 mins.
		c. Plants and Animals	✓30 mins. __45 mins. __60 mins.
		d. Homes of Plants and Animals	✓30 mins. __45 mins. __60 mins.
		e. Plants Parts	✓30 mins. __45 mins. __60 mins.
		f. Animal Parts	✓30 mins. __45 mins. __60 mins.
		g. Plants and Animals Help Each Other	✓30 mins. __45 mins. __60 mins.
		h. Harmful Animals-Vectors	✓30 mins. __45 mins. __60 mins.

UNIT/ TOPIC ALLOCATION
GRADE: 1

SECTION	STRAND	TOPICS	DURATION (Hours)
EARTH SCIENCE	**Properties and structure of Earth's Systems**	4. THE EARTH	
		a. Our Earth	✓30 mins. __45 mins. __60 mins.
		b. Landform – Hills and Valleys	✓30 mins. __45 mins. __60 mins.
		c. Landforms – Plains and Mountains	✓30 mins. __45 mins. __60 mins.
		d. Natural Resources	✓30 mins. __45 mins. __60 mins.
		e. Saving Natural Resources	✓30 mins. __45 mins. __60 mins.
		f. Uses of Water	✓30 mins. __45 mins. __60 mins.
		5. WEATHER AND SEASONS	
		a. Different Types of Weather	✓30 mins. __45 mins. __60 mins.
		b. Weather Changes	✓30 mins. __45 mins. __60 mins.
		c. Weather Instruments	✓30 mins. __45 mins. __60 mins.
		d. Types of Clouds	✓30 mins. __45 mins. __60 mins.
		e. Seasons	✓30 mins. __45 mins. __60 mins.
	Universe and the Solar System	6. CHANGES IN THE SKY	
		a. The Sun	✓30 mins. __45 mins. __60 mins.
		b. Looking at the Sky	✓30 mins. __45 mins. __60 mins.
		c. Day and Night	✓30 mins. __45 mins. __60 mins.
PHYSICAL SCIENCE		7. PROPERTIES AND CHANGES IN MATTER	
		a. Matter	✓30 mins. __45 mins. __60 mins.
		b. Physical Properties of matter	✓30 mins. __45 mins. __60 mins.
		c. Physical Changes in Matter	✓30 mins. __45 mins. __60 mins.
		8. FORCES AND ENERGY	
		a. Push and Pull	✓30 mins. __45 mins. __60 mins.
		b. Using Magnets	✓30 mins. __45 mins. __60 mins.
		c. Attract and Repel	✓30 mins. __45 mins. __60 mins.

UNIT/ TOPIC ALLOCATION
GRADE: 2

SECTION	STRAND	TOPICS	DURATION (Hours)
LIFE SCIENCE	**Characteristics of Organisms**	1. ANIMALS	
		a. Animals in the Environment	✓30 mins. __45 mins. __60 mins.
		b. Body Coverings and Parts	✓30 mins. __45 mins. __60 mins.
		c. How Animals Move	✓30 mins. __45 mins. __60 mins.
		d. What Animals need to Survive	✓30 mins. __45 mins. __60 mins.
		e. How Animals Get Food	✓30 mins. __45 mins. __60 mins.
		f. Animal Habitats	✓30 mins. __45 mins. __60 mins.
	Structure and Function of Living Systems	2. THE HUMAN BODY	
		a. The Skeleton	2x30 mins. __45 mins. __60 mins.
		b. The Muscles	2x30 mins. __45 mins. __60 mins.
		c. Keeping Your Bones and Muscles Healthy	✓30 mins. __45 mins. __60 mins.
		3. PLANTS	
		a. What plants Need to Grow	✓30 mins. __45 mins. __60 mins.
		b. Parts of the Plant	✓30 mins. __45 mins. __60 mins.
		c. Seeds	✓30 mins. __45 mins. __60 mins.
	Organisms and the Environment	4. HABITATS	
		a. Land Habitats – Schoolyard, Backyard	✓30 mins. __45 mins. __60 mins.
		b. Water Habitats – Pond, Lake, Seashore, Ocean	✓30 mins. __45 mins. __60 mins.
		c. Caring for Habitats	✓30 mins. __45 mins. __60 mins.
		d. Eliminating the Habitats of Vectors	✓30 mins. __45 mins. __60 mins.

UNIT/ TOPIC ALLOCATION
GRADE: 2

SECTION	STRAND	TOPICS	DURATION (Hours)
EARTH SCIENCE	**Properties and Structure of Earth**	5. EARTH'S RESOURCES a. Tocks and Minerals b. Uses of Rocks and Minerals	 ✓30 mins. __45 mins. __60 mins. ✓30 mins. __45 mins. __60 mins.
	Changes in the Earth and Sky	6. WEATHER CHANGES a. Weather in The Bahamas b. Weather Instruments c. How Weather Affects People	 ✓30 mins. __45 mins. __60 mins. ✓30 mins. __45 mins. __60 mins. 2x30 mins. __45 mins. __60 mins.
	Universe and the Solar System	7. CHANGES IN THE SKY 1. The Moon and its Changes 2. Constellations	 2x30 mins. __45 mins. __60 mins. 2x30 mins. __45 mins. __60 mins.
PHYSICAL SCIENCE	**Properties and Changes in Matter**	8. MEASURING MATTER **5.** What is Matter? **6.** Measuring Length and Mass **7.** How Much Can Things Hold?	 ✓30 mins. __45 mins. __60 mins. 2x30 mins. __45 mins. __60 mins. 2x30 mins. __45 mins. __60 mins.
	Forces and Energy	9. SOURCES OF ENERGY a. The Sun's Energy b. Wind Energy c. Energy from the Water d. Magnets	 ✓30 mins. __45 mins. __60 mins. ✓30 mins. __45 mins. __60 mins. ✓30 mins. __45 mins. __60 mins. 2x30 mins. __45 mins. __60 mins.

UNIT/ TOPIC ALLOCATION
GRADE: 3

SECTION	STRAND	TOPICS	DURATION (Hours)
LIFE SCIENCE	**Characteristics of Organisms**	1. VERTEBRATES	
		a. Definition/Characteristics/Traits	__30 mins. ✓45 mins. __60 mins.
		b. Vectors	__30 mins. ✓45 mins. __60 mins.
		c. Mammals and Birds	__30 mins. ✓45 mins. __60 mins.
		d. Reptiles, Fish, Amphibians	__30 mins. ✓45 mins. __60 mins.
		e. Body Parts/Function of Fish	__30 mins. ✓45 mins. __60 mins.
		f. Body Parts-Survival	__30 mins. ✓45 mins. __60 mins.
		2. DIGESTIVE SYSTEM	
		a. Parts of the Digestive System	__30 mins. ✓45 mins. __60 mins.
		b. Process of Digestion/Function	__30 mins. ✓45 mins. __60 mins.
		c. Proper Nutrition/Exercise	__30 mins. ✓45 mins. __60 mins.
		d. Food Groups	__30 mins. ✓45 mins. __60 mins.
		e. Health Resources	__30 mins. ✓45 mins. __60 mins.
	Structure and Function	3. PLANT PARTS AND FUNCTION	
		d. Plant Parts/Function	__30 mins. ✓45 mins. __60 mins.
		e. Function of Seeds	__30 mins. ✓45 mins. __60 mins.
		f. Seed Growth Patterns	__30 mins. ✓45 mins. __60 mins.
	Organisms and the Environment	4. ECOSYSTEMS	
		i. Living/non-living organisms in a garden	__30 mins. ✓45 mins. __60 mins.
		j. Types of Gardens	__30 mins. ✓45 mins. __60 mins.
		k. Experiment with seeds – Containerized with Seeds	__30 mins. ✓45 mins. __60 mins.
		l. Rocky and Sandy Shores	__30 mins. ✓45 mins. __60 mins.
		m. The Grouper – Coral Reefs (Home)	__30 mins. ✓45 mins. __60 mins.
		n. The Grouper – Protection/Laws	__30 mins. ✓45 mins. __60 mins.

UNIT/ TOPIC ALLOCATION
GRADE: 3

SECTION	STRAND	TOPICS	DURATION (Hours)
EARTH SCIENCE	**Properties and structure of Earth Systems**	5. Earth Materials a. Earth's Natural Resources – Uses b. Sources of air, water and land pollution c. Pollution prevention d. Environmental stewards – Care of Earth's Resources	 __30 mins. ✓45 mins. __60 mins. __30 mins. ✓45 mins. __60 mins. __30 mins. ✓45 mins. __60 mins. __30 mins. ✓45 mins. __60 mins.
	Changes in Earth and Sky	6. EARTH'S AIR AND WATER a. The Water Cycle b. How Clouds Form – Classify/Traits c. Weather Conditions – Types of Clouds	 __30 mins. ✓45 mins. __60 mins. __30 mins. ✓45 mins. __60 mins. __30 mins. ✓45 mins. __60 mins.
	Universe and the Solar System	7. THE EARTH a. The Earth – Relation to Sun b. Motion of Earth	 __30 mins. ✓45 mins. __60 mins. __30 mins. ✓45 mins. __60 mins.
		8. SEASONS a. Types of Seasons b. Causes of Seasons	 __30 mins. ✓45 mins. __60 mins. __30 mins. ✓45 mins. __60 mins.

UNIT/ TOPIC ALLOCATION
GRADE: 3

SECTION	STRAND	TOPICS	DURATION (Hours)
PHYSICAL SCIENCE	**Properties and changes in matter**	9. MATTER a. States of Matter (solid, liquid, gas) b. Properties of Matter c. Changes in Matter d. Measuring Matter	 __30 mins. ✓45 mins. __60 mins. __30 mins. ✓45 mins. __60 mins. __30 mins. ✓45 mins. __60 mins. __30 mins. ✓45 mins. __60 mins.
	Forces and Energy	10. MATTER cont'd. a. Sources and Forms of Energy/Uses b. Define fuels c. How Fossil Fuels Form d. Transfer of Electricity e. Magnets – Objects Repel/Attract f. Magnets – Uses g. Conservation h. Ways to Conserve	 __30 mins. ✓45 mins. __60 mins. __30 mins. ✓45 mins. __60 mins. __30 mins. ✓45 mins. __60 mins. __30 mins. ✓45 mins. __60 mins. __30 mins. ✓45 mins. __60 mins. __30 mins. ✓45 mins. __60 mins. __30 mins. ✓45 mins. __60 mins. __30 mins. ✓45 mins. __60 mins.

UNIT/ TOPIC ALLOCATION
GRADE: 4

SECTION	STRAND	TOPICS	DURATION (Hours)
LIFE SCIENCE	Characteristics of Organisms	1. INVERTEBRATES	
		a. Vertebrates and Invertebrates	__30 mins. ✓45 mins. __60 mins.
		b. Traits of Invertebrates	__30 mins. ✓45 mins. __60 mins.
		c. Invertebrate Groups	__30 mins. ✓45 mins. __60 mins.
		d. Traits of Insects and Spiders	__30 mins. ✓45 mins. __60 mins.
		e. Life Cycle of Insects (mosquito and cockroach)	__30 mins. ✓45 mins. __60 mins.
		f. Animal Adaptations (mimicry and camouflage)	__30 mins. ✓45 mins. __60 mins.
	Structure and Function in Living Systems	2. THE HUMAN BODY AND HYGIENE	
		a. The Respiratory System	__30 mins. ✓45 mins. __60 mins.
		b. The Nervous System	__30 mins. ✓45 mins. __60 mins.
		c. Risk Factors to Health	__30 mins. ✓45 mins. __60 mins.
		d. Safety Procedures for Natural Disasters	__30 mins. ✓45 mins. __60 mins.
		3. PLANTS	
		a. Seed and Non-seed Plants	__30 mins. ✓45 mins. __60 mins.
		b. Seed Plants	__30 mins. ✓45 mins. __60 mins.
		c. Monocots and Dicots	__30 mins. ✓45 mins. __60 mins.
		d. Seed Germination	__30 mins. ✓45 mins. __60 mins.
		e. Indigenous Plants	__30 mins. ✓45 mins. __60 mins.
	Organisms and The Environment	4. CONSERVING ECOSYSTEMS	
		a. Food Chain and Web	__30 mins. ✓45 mins. __60 mins.
		b. Relationships in Ecosystems (producers, consumers and decomposers)	__30 mins. ✓45 mins. __60 mins.
		c. Pine Forests, Coral Reefs, Mangroves	__30 mins. ✓45 mins. __60 mins.
		d. Four Types of Mangroves	__30 mins. ✓45 mins. __60 mins.
		e. Importance of Mangroves	__30 mins. ✓45 mins. __60 mins.

UNIT/ TOPIC ALLOCATION
GRADE: 4

SECTION	STRAND	TOPICS	DURATION (Hours)
EARTH SCIENCE	**Properties and Structure of Earth**	5. CHANGES ON EARTH	
		a. The earth's Layers	__30 mins. ✓45 mins. __60 mins.
		b. Weathering and Erosion	__30 mins. ✓45 mins. __60 mins.
		c. Causes of Weathering	__30 mins. ✓45 mins. __60 mins.
		d. Ocean Resources	__30 mins. ✓45 mins. __60 mins.
		e. Movement of Ocean Water	__30 mins. ✓45 mins. __60 mins.
		f. Ocean Pollution	__30 mins. ✓45 mins. __60 mins.
	Changes in Earth and Sky	6. WEATHER	
		a. Meteorology	__30 mins. ✓45 mins. __60 mins.
		b. The Earth's Atmosphere	__30 mins. ✓45 mins. __60 mins.
		c. Properties of Air	__30 mins. ✓45 mins. __60 mins.
		d. Elements of Weather	__30 mins. ✓45 mins. __60 mins.
		e. Weather and Climate	__30 mins. ✓45 mins. __60 mins.
		f. Measuring Weather Conditions (temperature and wind direction)	__30 mins. ✓45 mins. __60 mins.
		g. The Sun's effect on Earth	__30 mins. ✓45 mins. __60 mins.
	Universe and The Solar System	7. EXPLORING THE PLANTS	
		a. The Planets	__30 mins. ✓45 mins. __60 mins.
		b. The Inner and Outer Planets	__30 mins. ✓45 mins. __60 mins.
		c. Scale Model of Planets	__30 mins. ✓45 mins. __60 mins.

UNIT/ TOPIC ALLOCATION
GRADE: 4

SECTION	STRAND	TOPICS	DURATION (Hours)
PHYSICAL SCIENCE	**Properties and Changes in Matter**	8. MATTER CHANGES	
		a. Properties of Matter	__30 mins. ✓45 mins. __60 mins.
		b. Physical Changes in Matter	__30 mins. ✓45 mins. __60 mins.
		c. Physical Properties and Physical Changes in Matter	__30 mins. ✓45 mins. __60 mins.
		d. Measuring Matter (mass and volume)	__30 mins. ✓45 mins. __60 mins.
	Forces and Energy	9. MAKING WORK EASIER	
		a. Force, Work and Motion	__30 mins. ✓45 mins. __60 mins.
		b. Measuring Force (pushes and pulls)	__30 mins. ✓45 mins. __60 mins.
		c. Simple Machines	__30 mins. ✓45 mins. __60 mins.
		d. Wedges and Inclined Planes	__30 mins. ✓45 mins. __60 mins.
		e. Energy Conservation	__30 mins. ✓45 mins. __60 mins.
		10. TECHNOLOGY	
		a. Technology in the Ocean	__30 mins. ✓45 mins. __60 mins.

UNIT/ TOPIC ALLOCATION
GRADE: 5

SECTION	STRAND	TOPICS	DURATION (Hours)
LIFE SCIENCE	**Characteristics of Organisms**	1. <u>INVERTEBRATES</u> <u>Crustaceans</u> a. Common traits of invertebrates b. Characteristics and identification of crustaceans c. Impact on the Bahamian economy and laws that preserve the spiny lobster	 __30 mins. __45 mins. ✓60 mins. __30 mins. __45 mins. ✓60 mins. __30 mins. __45 mins. ✓60 mins.
		2. <u>Mollusks</u> a. Characteristics identification and classification of mollusks and the queen conch and our economy b. Stinging Cell Animals	 __30 mins. __45 mins. ✓60 mins. __30 mins. __45 mins. ✓60 mins.
		3. <u>Vectors (Insect)</u> a. Definition, identification and characteristics b. Diseases, treatment and elimination of vectors	 __30 mins. __45 mins. ✓60 mins. __30 mins. __45 mins. ✓60 mins.
		4. <u>How Animals meet their needs</u> a. Instincts and Learned behavior b. Animals that migrate and hibernate	 __30 mins. __45 mins. ✓60 mins. __30 mins. __45 mins. ✓60 mins.

UNIT/ TOPIC ALLOCATION
GRADE: 5

SECTION	STRAND	TOPICS	DURATION (Hours)
LIFE SCIENCE	**Structure and Function in Living Systems.**	5. HEALTH a. Skeletal System b. Muscular System c. Personality, relationships and self concepts d. Investigating eating habits, disorders and their affect on growth and development	 __30 mins. __45 mins. ✓60 mins. __30 mins. __45 mins. ✓60 mins. __30 mins. __45 mins. ✓60 mins. __30 mins. __45 mins. ✓60 mins.
	Structure and Function of Living Systems.	6. PLANTS a. Photosynthesis b. Indigenous and Medicinal Plants c. Plant Conservation	 __30 mins. __45 mins. ✓60 mins. __30 mins. __45 mins. ✓60 mins. __30 mins. __45 mins. ✓60 mins.
	Organisms and the Environment	7. ECOLOGY a. Ecosystems and the interdependence of living and nonliving elements b. Predator, prey and scavengers as it relates to food chains and webs c. Water, fisheries and electricity as resources d. Preserving national parks of The Bahamas	 __30 mins. __45 mins. ✓60 mins. __30 mins. __45 mins. ✓60 mins. __30 mins. __45 mins. ✓60 mins. __30 mins. __45 mins. ✓60 mins.

UNIT/ TOPIC ALLOCATION
GRADE: 5

SECTION	STRAND	TOPICS	DURATION (Hours)
EARTH SCIENCE	**Properties and Structure of Earth's Systems**	8. EARTH a. Resources of the earth and oceans b. Pollutants, their affect on marine life, prevention and conservation of the oceans	 __30 mins. __45 mins. ✓60 mins. __30 mins. __45 mins. ✓60 mins.
		9. FOSSILS a. Description, formation and types of fossils	 __30 mins. __45 mins. ✓60 mins.
		10. THE ATMOSPHERE a. Layers of the atmosphere b. Conditions that change weather and its affect on people c. Measuring weather using a rain gauge and windsock	 __30 mins. __45 mins. ✓60 mins. __30 mins. __45 mins. ✓60 mins. __30 mins. __45 mins. ✓60 mins.
	Universe and the Solar System	6. SOLAR SYSTEM a. What is the solar system? b. Rotation and revolution c. The sun and other stars d. Benefits of the sun on the earth and other planets e. Other objects in space	 __30 mins. __45 mins. ✓60 mins. __30 mins. __45 mins. ✓60 mins. __30 mins. __45 mins. ✓60 mins. __30 mins. __45 mins. ✓60 mins. __30 mins. __45 mins. ✓60 mins.

UNIT/ TOPIC ALLOCATION
GRADE: 5

SECTION	STRAND	TOPICS	DURATION (Hours)
PHYSICAL SCIENCE	**Properties and Changes in Matter**	7. INVESTIGATING MATTER	
		a. Classification of matter	__30 mins. __45 mins. ✓60 mins.
		b. Substances and mixtures	__30 mins. __45 mins. ✓60 mins.
		c. Solutes and solvents	__30 mins. __45 mins. ✓60 mins.
	Forces and Energy	8. ENERGY	
		a. Potential and Kinetic Energy	__30 mins. __45 mins. ✓60 mins.
		b. Effects of forces on the motion of objects	__30 mins. __45 mins. ✓60 mins.
		c. Heat and temperature as forms of energy	__30 mins. __45 mins. ✓60 mins.
		d. Technology and forms of energy	__30 mins. __45 mins. ✓60 mins.
		e. Simple machines, the lever and screw	__30 mins. __45 mins. ✓60 mins.
		f. Conservation of energy	__30 mins. __45 mins. ✓60 mins.

UNIT/ TOPIC ALLOCATION
GRADE: 6

SECTION	STRAND	TOPICS	DURATION (Hours)
LIFE SCIENCE	**Characteristics of Organisms**	1. THE CELL	
		a. Parts and Functions	__30 mins. __45 mins. ✓60 mins.
		b. Compare plant and animal cell	__30 mins. __45 mins. ✓60 mins.
		2. FUNGI	
		a. Classify four types Harmful and helpful fungi	__30 mins. __45 mins. ✓60 mins.
		b. Harmful and helpful fungi	__30 mins. __45 mins. ✓60 mins.
		c. Growth of fungi	__30 mins. __45 mins. ✓60 mins.
		3. INVERTEBRATES	
		a. Traits of sponges	__30 mins. __45 mins. ✓60 mins.
		b. Traits of echinoderms	__30 mins. __45 mins. ✓60 mins.
		c. Kinds of worms	__30 mins. __45 mins. ✓60 mins.
	Structure and Functions in Living Systems	4. CIRCULATORY SYSTEM	
		a. Parts of the Circulatory System and label the heart	__30 mins. __45 mins. ✓60 mins.
		b. Function of the heart and blood vessels.	__30 mins. __45 mins. ✓60 mins.
		c. Risk factors that affect the Circulatory System	__30 mins. __45 mins. ✓60 mins.
		5. IMMUNE SYSTEM	
		a. Functions and parts of the immune system	__30 mins. __45 mins. ✓60 mins.
		b. Negative affects on the immune system	__30 mins. __45 mins. ✓60 mins.

UNIT/ TOPIC ALLOCATION
GRADE: 6

SECTION	STRAND	TOPICS	DURATION (Hours)
LIFE SCIENCE	**Structure and Functions in Living Systems**	6. FROM FLOWER TO FRUIT	
		a. Parts and Functions of a flower	__30 mins. __45 mins. ✓60 mins.
		b. Life cycle of a flower	__30 mins. __45 mins. ✓60 mins.
		c. Plant growth and responses	__30 mins. __45 mins. ✓60 mins.
		d. Plant adaptation	__30 mins. __45 mins. ✓60 mins.
	Organisms and the environment	7. BIOMES	
		a. Define biomes and infer why organisms live in certain biomes	__30 mins. __45 mins. ✓60 mins.
		b. Compare and contrast different biomes	__30 mins. __45 mins. ✓60 mins.
		8. ENVIRONMENTAL CHANGES CAUSING ENDANGERMENT OR EXTINCTION	
		a. Compare natural resources on the environment.	__30 mins. __45 mins. ✓60 mins.
		b. The effects of human activities on the environment	__30 mins. __45 mins. ✓60 mins.
		c. Endangered animals	__30 mins. __45 mins. ✓60 mins.
EARTH SCIENCE	**Properties and Structure of Earth**	9. WEATHERING AND EROSION	
		a. Forces of weathering and erosion	__30 mins. __45 mins. ✓60 mins.
		b. Wind, rain, heat, wave action, ice, snow, gravity.	__30 mins. __45 mins. ✓60 mins.
		c. Earthquakes, Volcanoes	__30 mins. __45 mins. ✓60 mins.
		d. Natural resources on Earth	__30 mins. __45 mins. ✓60 mins.
		e. Renewable and non renewable resources	__30 mins. __45 mins. ✓60 mins.

UNIT/ TOPIC ALLOCATION
GRADE: 6

SECTION	STRAND	TOPICS	DURATION (Hours)
EARTH SCIENCE	**Properties and Structure of Earth**	10. POLLUTION	
		a. Air Pollution	__30 mins. __45 mins. ✓60 mins.
		b. Land Pollution	__30 mins. __45 mins. ✓60 mins.
		c. Water Pollution	__30 mins. __45 mins. ✓60 mins.
		11. OIL, COAL AND NATURAL GAS	
		a. Compare coal, oil and natural gas	__30 mins. __45 mins. ✓60 mins.
		b. Advantages and Disadvantages of fossil fuels	__30 mins. __45 mins. ✓60 mins.
		c. Petroleum and Natural Gas	__30 mins. __45 mins. ✓60 mins.
	Changes in Earth and Sky	12. PREDICTING WEATHER	
		a. Factors of weather	__30 mins. __45 mins. ✓60 mins.
		b. Weather Instruments	__30 mins. __45 mins. ✓60 mins.
		c. Weather/Climate	__30 mins. __45 mins. ✓60 mins.
		13. STORMS	
		a. Compare traits of storms	__30 mins. __45 mins. ✓60 mins.
		b. Safety precautions during storms	__30 mins. __45 mins. ✓60 mins.
	Universe and the Solar System	14.	
		a. Surface and atmosphere of planets	__30 mins. __45 mins. ✓60 mins.
		b. planets susceptible to life	__30 mins. __45 mins. ✓60 mins.
		c. space equipment	__30 mins. __45 mins. ✓60 mins.
		d. vehicles to explore space	__30 mins. __45 mins. ✓60 mins.

UNIT/ TOPIC ALLOCATION
GRADE: 6

SECTION	STRAND	TOPICS	DURATION (Hours)
PHYSICAL SCIENCE	**Properties and Changes in Matter**	15. PHYSICAL PROPERTIES AND CHANGES a. What are physical changes in matter b. Use equipment to measure physical properties	 __30 mins. __45 mins. ✓60 mins. __30 mins. __45 mins. ✓60 mins.
		16. CHEMICAL PROPERTIES a. Record chemical changes in matter b. Chemicals that cause changes in matter c. Compare physical and chemical changes in matter	 __30 mins. __45 mins. ✓60 mins. __30 mins. __45 mins. ✓60 mins. __30 mins. __45 mins. ✓60 mins.
		17. MAGNETISM a. Locate poles and magnetic field	 __30 mins. __45 mins. ✓60 mins.
	Forces and Energy	18. MOTION AND FORCES a. Define motion/The relationship between motion, speed and direction	 __30 mins. __45 mins. ✓60 mins.
		19. A SIMPLE CIRCUIT a. How a simple circuit works	 __30 mins. __45 mins. ✓60 mins.

UNIT/ TOPIC ALLOCATION
GRADE: 6

SECTION	STRAND	TOPICS	DURATION (Hours)
PHYSICAL SCIENCE	**Forces and Energy**	20. FRICTION a. The effects of friction on certain materials	__30 mins. __45 mins. ✓60 mins.
		21. PULLEYS AND WHEEL AND AXEL a. How do simple machines make work easier	__30 mins. __45 mins. ✓60 mins.
		22. DEFINE ENERGY CONSERVATION a. Write ways that energy can be conserved	__30 mins. __45 mins. ✓60 mins.

STANDARDS AND BENCHMARKS

Summary of Science & Technology Standards

1. **Understands basic features of the Earth
2. **Understands basic Earth processes
3. **Understands essential ideas about the composition and structure of the universe and the Earth's place in it
4. **Knows about the diversity and unity that characterize life
5. **Knows the general structure, organization and functions of cells in organisms
6. **Understands how species depend on one another and on the environment for survival
7. **Understands basic concepts about the structure and properties of matter
8. **Understands energy types, sources and conversions, and their relationship to heat and temperature
9. **Understands motion and the principles that explain it
10. **Understands the nature of scientific knowledge and inquiry

STANDARD **UNDERSTANDS BASIC FEATURES OF THE EARTH

Benchmarks

Grade 1

- ***knows that Earth has several land forms (e.g. identifies hills, mountains, valleys and flatlands)
- *** knows that Earth has several bodies of water (e.g. identifies lakes, rivers and oceans, describes the characteristics of water)
- ***knows that soil is comprised of various materials (e.g. classifies soil according to its physical characteristics, identifies the living and non-living materials found in soil)
- ***knows that there are different types of rocks (***e.g. classifies rocks by their colour, shape and size)
- ***knows the characteristics of air
- *describes local natural habitats (e.g. ocean, lakes, trees)

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[a] The single asterisk (*) indicates that the following item has been adopted/adapted from the Ontario Model accessed at http://www.edu.gov.on.ca/eng/document/curricul/kinder/kinder.html

[b] The two asterisks (**) indicate that the following item has been adopted/adapted from the McRel Model: Kendall, J. S. & Marzano, R. J. (1997) Content knowledge: A compendium of standards and benchmarks for K-12 education. Aurora, Co: Mid-continent Regional Educational Laboratory, Inc.

[c] The three asterisks (***) indicate that the following item has been adopted/adapted from the Commonwealth of The Bahamas, Ministry of Education, 1997 Primary Science Curriculum Guidelines.

Grade 2

- **knows that Earth materials consist of solid rocks, soils, liquid water, and the gases of the atmosphere (***e.g. identifies features of the Earth, names landforms, identifies bodies of water)
- ***explains how rocks are alike and different (e.g. classifies rocks as sedimentary, igneous, and metamorphic)
- ***identifies bodies of water on the Earth
- ***understands that soil is comprised of various materials (e.g. concludes that different kinds of plants, animals, and rocks, make up different kinds of soil; describes different kinds of soil their composition and formation)
- ***describes changes in the sky as related to the sun, moon and stars

Grade 3

- ***understands the sun's importance to living things on the Earth
- ***understands how the movements of the Earth cause day, night and the seasons (***e.g. describes the way in which the sun seems to move across the sky each day, examines the relationship between how often the earth rotates and the length of day, describes the position of the sun in the sky at sunrise, noon and sunset)
- ***knows the composition of air (e.g. identifies the gas in the air that living organisms need, explains how one can tell that air is soil and water)
- ***understands that there are various types and forms of water on the Earth (e.g. identifies places where fresh water, salt water, icebergs and glaciers are found)

Grade 4

- ***understands that natural forces can change the land (e.g. describes the effects of water and wind on rocks and soil; describes the forces of erosion, a volcano, an earthquake; demonstrates an understanding of the factors— minerals, temperatures, forces— involved in the composition and formation of rocks)
- **knows that water can be a liquid or a solid and can be made to change from one form to the other, but the amount of water stays the same
- **knows that short-term weather conditions (e.g. temperature, rain, snow) can change daily, and weather patterns change over the seasons

Grade 5

- **knows that water is an importance resource (e.g. ***lists two resources that come from the oceans, ***explains why lakes and ponds are important, categorizes the various uses of water, uses the physical properties of water to describe or illustrate the water cycle, compares and contrasts fresh water and salt water environments, describes human impacts on the Earth's water resources)
- **knows the major differences between fresh and ocean waters
- **knows that air is a substance that surrounds us, takes up space, and moves around us as wind

Grade 6

- **knows that clouds and fog are made of tiny droplets of water
- **knows that water can change from one state to another (solid, liquid, gas) through various processes (e.g. freezing, condensation, precipitation, evaporation)
- **knows that night and day are caused by the Earth's rotation on its axis
- **knows that the Sun provides the light and heat necessary to maintain the temperature of the Earth

STANDARD *****UNDERSTANDS BASIC EARTH PROCESSES***

Benchmarks

Grade 1

- *identifies patterns and cycles in the natural world (e.g. pattern of petals on a flower; life cycle of a butterfly)
- *describes some natural occurrences, using his/her own observations (e.g. sprouting of seeds; opening of buds; ***weather conditions as sunny, cloudy, rainy, snowy, windy, hot, warm, cold)
- *demonstrates an understanding of changes that occur in daily and seasonal cycles and of how these changes affect the characteristics, behaviour, and location of living things
- *investigates changes that occur in a daily cycle and in a seasonal cycle (e.g. ***identifies spring, summer, autumn and winter as the four seasons)
- *describes how living things, including humans, adapt to and prepare for daily and seasonal changes

Grade 2

- *demonstrates an awareness of the forms in which water and air are present in the environment, and describes ways in which living things are affected by water and air (***e.g. describes weather changes and how they affect people, identifies seasons and how they affect what people wear)
- *investigates the visible effects of air and water in the environment
- *describes ways in which clean air and water are vital for meeting the needs of humans and other living things
- **knows that rocks come in many different shapes and sizes (e.g. boulders, pebbles, sand)

Grade 3

- *demonstrates an understanding of the similarities and differences between various soils and the effects of moving water on soils
- *investigates the components of various soils, and describes the effects of moving water on these soils
- *recognizes the dependence of humans and other living things on soil and recognizes its importance as a source of materials for making useful objects
- understands the concept of weather (***e.g. defines the term weather, defines the temperature and wind direction, describes weather conditions, classifies clouds according to how they look and the weather conditions with which they are associated)

Grade 4

- **knows that smaller rocks come from the breakage and weathering of bedrock and larger rocks
- **knows that rock is composed of different combinations of minerals
- *demonstrates an understanding of the physical properties of rocks and minerals and the effects of erosion on the landscape
- *investigates, tests and compares the physical properties of rocks and minerals and investigates the factors that cause erosion of the landscape
- *describes the effects of human activity (e.g. land development, building of dams, mine development, erosion-preventing measures) on physical features of the landscape, and examines the use of rocks and minerals in making consumer products

Grade 5

- **knows the composition and properties of soils (e.g. components of soil such as weathered rock, living organisms, products of plants and animals; properties of soil such as colour, texture, capacity to retain water, ability to support plant growth)
- *demonstrates an understanding of the major climatic factors and patterns associated with weather (e.g. describes the key features of a variety of weather conditions, identifies factors responsible for weather systems locally and globally)
- *investigates the major climatic factors associated with weather, and designs, constructs and tests a variety of instruments for recording various features of the weather (e.g. identifies and measures the factors that influence local weather, uses instruments to measure local weather conditions)
- *examines how weather forecasts influence decisions concerning human activity and how humans have adapted to a variety of weather conditions (e.g. describes the consequences of extreme weather conditions)

Grade 6

- *demonstrates an understanding of the patterns of change observable on Earth as a result of the movement of the different bodies in the solar system (e.g. solar and lunar eclipses, tides, phases of the moon, position of the constellations) and of the physical characteristics of the different components of the solar system;
- *investigates, using models and simulations, the relationship between the Sun, Earth, and Moon, the patterns of change observable on earth that result from the movement of these bodies, and the physical characteristics of the different components of the solar system (e.g. the Sun and planets, inner planets and outer planets)
- *describes technological and scientific advances that enable humans to study space, and explain how these advances have affected the quality of life on earth (e.g. lists the contributions that space exploration has made to everyday life)
- **knows how features on the Earth's surface are constantly changed by a combination of slow and rapid processes (e.g. weathering, erosion, and deposition of sediment caused by waves, wind, water, and ice; sudden changes in the landscape caused by landslides, volcanic eruptions, and earthquakes)
- **knows that fossils provide evidence about the plants and animals that lived long ago and the nature of the environment at that time

STANDARD **UNDERSTANDS ESSENTIAL IDEAS ABOUT THE COMPOSITION AND STRUCTURE OF THE UNIVERSE AND THE EARTH'S PLACE IN IT

Benchmarks

Grade 1

- ***knows the basic composition and structure of the universe (e.g. identifies the basic characteristics of the sun, observes that the earth gets light and warmth from the sun, identifies the moon and stars as objects in the night time sky, explains what causes day and night)

Grade 2

- **knows basic patterns of the Sun and Moon (e.g. the Sun appears every day, and the Moon appears sometimes at night and sometimes during the day; the Sun and Moon appear to move from east to west across the sky; the Moon appears to change shape over the course of a month)

Grade 3

- **knows that the stars are innumerable, unevenly dispersed, and of unequal brightness

Grade 4

- **knows that telescopes magnify distant objects in the sky (e.g. the Moon, planets) and dramatically increase the number of stars we can see (***e.g. understands the usefulness of telescopes in studying space

Grade 5

- **knows that the Earth is one of several planets that orbit the Sun, and the Moon orbits around the Earth (***e.g. identifies the position of earth relative to the sun, the moon and other planets, describes the movements of earth, discusses the relationship between a planet's orbit and the length of its year)

Grade 6

- **knows that the patterns of stars in the sky stay the same, although they appear to slowly move from east to west across the sky nightly, and different stars can be seen in different seasons (***e.g. lists the inner and outer planets of the solar system, describes and compares planets of the solar system, names the three types of bodies in the solar system)
- **knows that planets look like stars, but over time they appear to wander among the constellations (***e.g. relates the motions of a planet to a concept of night and day, describes and compares the major characteristics of the planets of the solar system)
- **knows that astronomical objects in space are massive in size and are separated from one another by vast distances (e.g., many stars are more massive than our Sun but so distant they look like points of light, ***identifies the distance of the Sun from Earth, ***explains why the Sun appears much brighter from earth than do other stars, ***analyses how a day on a planet can be longer than a year on another planet)

STANDARD **KNOWS ABOUT THE DIVERSITY AND UNITY THAT CHARACTERIZE LIFE

Benchmarks

Grade 1

- *knows the basic needs of animals and plants (e.g., the need for food, air, and water, ***identifies conditions that animals and plants need to grow)
- *investigates the characteristics and needs of animals and plants (***e.g. describes ways in which plants are alike and different, classifies things as living or non-living: growth, reproduction, and movement, measures and records plant growth--metric)
- *demonstrates awareness that animals and plants depend on their environment to meet their basic needs (***e.g. identifies foods that come from plants, identifies foods plants that must be processed before they are eaten, identifies animals that are used as a source of food, identifies animals that are used for clothing)
- *describes the requirements for good health for humans (***e.g. determines the requirements of healthy plants and healthy animals, describes habits that maintain good health, lists common illness caused by pests and vectors)

Grade 2

- *demonstrates an understanding of the similarities and differences among various types of animals and the ways in which animals adapt to different environmental conditions (***e.g., explains how animal body parts and other adaptations help them to live in their habitats)
- *investigates physical and behavioural characteristics and the process of growth of different types of animals
- *identifies ways in which humans can affect other animals

Grade 3

- **knows that plants and animals need certain resources for energy and growth (e.g. food, water, light, air)
- *demonstrates an understanding of the similarities and differences in the physical characteristics of different plant species and the changes that take place in different plants as they grow (e.g. describes structures that enable different plants to survive in different environments, compares and contrasts different types of plant life cycles)
- *investigates the requirements of plants and the effects of changes in environmental conditions on plants (e.g. describes how plants take in water, nutrients and light and the effect of these factors on them)
- *describes ways in which plants are important to other living things, and the effects of human activities on plants (e.g. suggests reasons for the endangerment or extinction of plant species, explain how animals interact with one another)
- **knows that some kinds of organisms that once lived on Earth have completely disappeared (e.g. dinosaurs, trilobites, mammoths, giant tree ferns, horsetail trees)
- **knows that plants and animals have features that help them live in different environments (e.g. compares and contrasts different types of animal life cycles, compares and contrasts plant and animal life cycles, describes structures that enable animals to survive in different environments)

Grade 4

- ***distinguishes between living and non-living things (e.g. states characteristics)
- ***classifies different types of animals (e.g. distinguishes between vertebrates and invertebrates)
- ***classifies different types of plants (e.g. identifies seed plants, flowering plants, traits of conifers, non-seed plants)
- ***identifies living organisms that are neither plants or animals

Grade 5

- **knows different ways in which living things can be grouped (e.g. plants/animals; pets/non-pets; edible plants/non-edible plants) and purposes of different groupings
- **knows that fossils of past life can be compared to one another and to living organisms to observe their similarities and differences

Grade 6

- **knows that plants and animals progress through life cycles of birth, growth and development, reproduction and death; the details of these life cycles are different for different organisms
- **knows that the transfer of energy (e.g. through the consumption of food) is essential to all living organisms
- **knows the organization of simple food chains and food webs (e.g. green plants make their own food with sunlight, water, and air; some animals eat the plants; some animals eat the animals that eat the plants)
- *demonstrates an understanding of ways in which classification systems are used to understand the diversity of living things and the interrelationships among living things
- *investigates classification systems and some of the processes of life common to all animals (e.g. growth, reproduction, movement, response, and adaptation)
- *describes ways in which classification systems can be used in everyday life

STANDARD **KNOWS THE GENERAL STRUCTURE, ORGANISATION AND FUNCTIONS OF CELLS IN ORGANISMS

Benchmarks

Grade 1

- ***knows the importance and functions of the eyes, ears, tongue, skin, nose as sense organs
- ***knows the four main internal organs (e.g. identifies the heart, lungs, brain, and stomach)
- understands the connection between health and welfare (***describes habits that maintain good health)
- identifies the stages in the life cycle of a plant and of a pet or other animal
- demonstrates how plants and other organic material can be recycled back into the environment

Grade 2

- *describes changes in the appearance and activity of an animal as it goes through a complete life cycle (e.g., mealworm)
- *compares the life cycles of some animals that have similar life cycles (e.g. bee and butterfly) and some that have different life cycles (e.g., gerbil and butterfly)
- **knows that plants and animals closely resemble their parents
- *identifies constant traits (e.g. number of legs) and changing traits (e.g., weight) in animals as they grow, and compares the appearance of young and mature animals of the same species
- *investigates physical and behavioural characteristics and the process of growth of different types of animals
- ***evaluates the importance of the five senses (e.g. describes the basic structure and function of the organs involved in hearing and speech, relates the nature of sound to hearing, describes ways to protect his/her hearing and speech organs from damage)

Grade 3

- **knows that differences exist among individuals of the same kind of plant or animal
- **knows that animals require air, water, food, and shelter; plants require air, water, nutrients, and light
- *demonstrates an understanding of the similarities and differences in the physical characteristics of different plant species and the changes that take place in different plants as they grow
- *identifies the major parts of plants (e.g. seeds, stem, pistil) and describe their basic functions
- *describes, using his/her observations, the changes that plants undergo in a complete life cycle (e.g. from the germination of a seed to the production of flowers or fruit)
- *compares the life cycles of different kinds of plants (e.g. plants that grow from bulbs or from seeds)
- *identifies traits that remain constant in some plants as they grow (e.g. leaf shape, leaf size, flower colour)

Grade 4

- understands that all living things are composed of cells
- identifies the characteristics of various single-celled organisms
- knows that dietary habits and behaviour are related to an organism's health
- knows that the life processes of an organism are related to its use of nutrients, water, and oxygen
- describes the changing requirements of organisms as they grow

Grade 5

- *demonstrates an understanding of the structure and function of the respiratory, circulatory, digestive, excretory, and nervous systems, and the interactions of organs within each system
- *investigates the structure and function of the major organs of the respiratory, circulatory, digestive, excretory, and nervous systems
- *demonstrates an understanding of factors that contribute to good health

Grade 6

- **knows that many characteristics of an organism are inherited from the parents of the organism (e.g., eye colour in human beings, fruit or flower colour in plants), and other characteristics result from an individual's interactions with the environment (e.g. people's table manners, ability to ride a bicycle)
- **knows that each plant or animal has different structures which serve different functions in growth, survival, and reproduction (e.g., humans have distinct structures of the body for walking, holding, seeing, and talking)
- identifies the similarities and differences in plant and animal cells
- analyses the effects of micro-organisms on other organisms
- describes the human body's various defences against harmful micro-organisms

STANDARD *****UNDERSTANDS HOW SPECIES DEPEND ON ONE ANOTHER*** *AND ON THE ENVIRONMENT FOR SURVIVAL*

Benchmarks

Grade 1

- *demonstrates awareness of the need for recycling (e.g. ***describes ways in which people can protect the places where plants and animals live (reuse, recycle)
- *demonstrates an understanding of and care for the natural world
- ***describes ways in which people can harm the places where plants and animals live (pollution, encroachment)
- ***describes ways in which plants and animals habitats depend on each other

Grade 2

- **knows that living things are found almost everywhere in the world and that distinct environments support the life of different types of plants and animals
- *knows the concepts of a habitat and community

Grade 3

- *knows the factors that could affect habitats and communities of plants and animals (e.g. ***identifies sources of air and water pollution and how it can be eliminated, explains how recycling is related to conservation)
- *investigates the dependency of plants and animals on their habitat and the interrelationships of the plants and animals living in a specific habitat
- *describes ways in which humans can change habitats and the effects of these changes on the plants and animals within the habitats

Grade 4

- ***defines natural resources and gives examples
- ***identifies ways to avoid pollution
- *understands the concepts of habitat and community, and identifies the factors that could affect habitats and communities of plants and animals (e.g., ***describes ways in which groups of animals live in a neighbourhood)
- *investigates the dependency of plants and animals on their habitat and the interrelationships of the plants and animals living in a specific habitat
- *describes ways in which humans can change habitats and the effects of these changes on the plants and animals within the habitats.

Grade 5

- **knows that the behaviour of individual organisms is influenced by internal cues (e.g. hunger) and external cues (e.g., changes in the environment), and that humans and other organisms have senses that help them to detect these cues
- **knows that an organism's patterns of behaviour are related to the nature of that organism's environment (e.g., kinds and numbers of other organisms present, availability of food and resources, physical characteristics of the environment)
- ***understands the concept of an ecosystem (e.g. explains the interdependence of living and non-living parts of an ecosystem, identifies the three different groups in an ecosystem, lists the importance of producers, consumers and decomposers to the ecosystem, explains how living things in an ecosystem form a community)

Grade 6

- **knows that changes in the environment can have different effects on different organisms (e.g. some organisms move in, others move out; some organisms survive and reproduce, others die)
- **knows that all organisms (including humans) cause changes in their environments, and these changes can be beneficial or detrimental (***e.g., defines the term pollution, defines the term conservation, lists ways to conserve our national resources)

STANDARD **UNDERSTANDS BASIC CONCEPTS ABOUT THE STRUCTURE AND PROPERTIES OF MATTER

Benchmarks

Grade 1

- *distinguishes between objects and materials (e.g. scissors are objects and they can be made of metal and/or plastic), and identifies and describes the properties of some materials (e.g. flexibility of plastic, hardness of wood)
- *investigates the properties of materials and makes appropriate use of materials when designing and making objects (***e.g., identifies materials that are used to make mixtures, describes how things change when you mix them)
- *describes the function of specific materials in manufactured objects that he/she and others use in daily life

Grade 2

- *demonstrates an understanding of the properties of familiar liquids (e.g. vinegar, detergent, water, oil) and solids (e.g., sugar, salt, sand), and of interactions between liquids and between liquids and solids
- *investigates the properties o-f and interactions between liquids and between liquids and solids, and identifies the types of objects or materials that can be used to contain liquids and solids (e.g. a plastic bowl will hold a liquid or a solid but a paper towel will only hold a dry solid)
- *identifies and describes ways in which we use our knowledge of liquids and solids in making useful objects and in living in our environment (***e.g., evaluates the importance of the five senses, estimates the length mass and volume of objects, compares relative sizes of objects, measures the length, mass and volume of different objects)
- **knows that different objects are made up of many different types of materials (e.g., cloth, paper, wood, metal) and have many different observable properties (e.g. colour, size, shape, weight; ***describes and classifies objects by size shape colour, weight, texture, and weight, ***compares objects using size, shape, colour, weight, texture)

Grade 3

- **knows that things can be done to materials to change some of their properties (e.g., heating, freezing, mixing, cutting, dissolving, bending), but not all materials respond the same way to what is done to them (***e.g., compares some characteristics of solids, liquids and gases, classifies solids, liquids and gases that are used daily)
- *demonstrates an understanding of the properties of materials that can be magnetised or charged and of how materials are affected by magnets or static electric charges

- *identifies and describes, using his/her observations, ways in which static electric charges are made in everyday materials, as well as different types of interactions that take place both between charged materials and between magnetised materials
- *identifies familiar uses of magnets and give examples of static electric charges that are created in the home or at school

Grade 4

- *demonstrates understanding that certain materials can transmit, reflect, or absorb light or sound
- *investigates materials that transmit, reflect, or absorb light or sound and use their findings in designing objects and choosing materials from which to construct them
- *explains why materials that transmit, reflect, or absorb light and/or sound are used in a variety of consumer products

Grade 5

- *demonstrates an understanding of the three states of matter and of changes in state (***e.g., identifies the three states of matter, explains the physical properties of matter, explains the physical changes in matter)
- *investigates common changes of state (e.g., melting, freezing, condensing, evaporating) and make informed choices about materials when finding solutions to problems in designing and constructing objects
- *identifies the properties that make different materials useful in everyday products and discuss the environmental impact of their use

Grade 6

- **knows that objects can be classified according to their properties (e.g., magnetism, conductivity, density, solubility)
- **knows that materials may be composed of parts that are too small to be seen without magnification
- **knows that properties such as length, weight, temperature, and volume can be measured using appropriate tools (e.g., rulers, balances, thermometers, graduated cylinders)
- **knows that materials have different states (solid, liquid, gas), and some common materials such as water can be changed from one state to another by heating or cooling
- **knows that the mass of a material remains constant whether it is together, in parts, or in a different state
- *demonstrates an understanding of the properties of air (e.g., air and other gases have mass) and explains how these can be applied to the principles of flight
- *investigates the principles of flight and determine the effect of the properties of air on materials when designing and constructing flying devices
- *identifies design features (of products or structures) that make use of the properties of air, and give examples of technological innovations that have helped inventors to create or improve flying devices

STANDARD **UNDERSTANDS ENERGY TYPES, SOURCES, AND CONVERSIONS, AND THEIR RELATIONSHIP TO HEAT AND TEMPERATURE

Benchmarks

Grade 1

- *demonstrates an understanding of ways in which energy is used in daily life (***e.g., identifies sources of heat, identifies sources of light)
- *investigates some common devices and systems that use energy and ways in which these can be controlled manually
- describes different uses of energy at home, at school and in the community, and suggests ways in which energy can be conserved (***e.g., identifies ways that heat changes things: melting, cooking)

Grade 2

- *demonstrates an understanding of the movement of air and of water as sources of energy
- *designs and constructs devices that are propelled by moving air or moving water
- *identifies wind and moving water as renewable sources of energy and determine the advantages and disadvantages of using them
- **knows that the Sun supplies heat and light to Earth

Grade 3

- **knows that heat can be produced in many ways (e.g., burning, rubbing, mixing substances together; ***identifies the sources of heat energy; ***identifies materials through which heat moves quickly)
- **knows that electricity in circuits can produce light, heat, sound, and magnetic effects
- *demonstrates an understanding of how movement is caused by forces and by energy that is stored and then released (***e.g., describes the direction in which heat moves; compares the ways light behaves as it passes through materials; describes how sound energy moves)
- *investigates how different forces affect the operation of everyday devices, and designs and constructs devices that use a form of energy to create controlled movement (***e.g., identifies what causes sound energy)
- identifies objects, devices, and systems in everyday life that are affected by forces and movement and explains in what ways they are useful to us (***e.g., identifies forms of energy and describes one use of each form)

Grade 4

- *demonstrates an understanding of the characteristics and properties of light and sound (***e.g., gives the definition of sound and vibrate; explains the causes of sound; explains how sound travels; defines the term light; gives examples of sources of light; describes how light travels)
- *investigates different ways in which light and sound are produced and transmitted, and designs and makes devices that use these forms of energy
- *identifies technological innovations related to light and sound energy and how they are used and controlled at home and in the community, and determines how the quality of life has been affected by these innovations Journey

Grade 5

- *demonstrates an understanding of the importance of conservation of energy in relation to the wise use of renewable and non-renewable energy sources
- *designs and constructs devices that use a form of energy to meet a specific need or want, and investigates how the energy is transferred to a specified output
- *evaluates the reasons for conserving natural resources and identifies possible ways of conserving energy

Grade 6

- **knows that heat is often produced as a by-product when one form of energy is converted to another form (e.g., heat is produced by mechanical and electrical machines)
- **knows that heat can move from one object to another by conduction and that some materials conduct heat better than others (***e.g., defines the term static electricity; describes how objects become negatively charged; describes what happens during an electric discharge)
- **knows the organisation of a simple electrical circuit (e.g., battery or generator, wire, a complete loop through which the electrical current can pass; ***defines the term electric current, ***compares conductors and insulators, ***makes electrical circuits)
- *demonstrates understanding that electrical energy can be transformed into other forms of energy
- *designs and constructs a variety of electrical circuits and investigates ways in which electrical energy is transformed into other forms of energy
- *identifies uses of electricity in the home and community and evaluates the impact of these uses on both our quality of life and the environment

STANDARD **UNDERSTANDS MOTION AND THE PRINCIPLES THAT EXPLAIN IT

Benchmarks

Grade 1

- *demonstrates awareness that structures have distinctive characteristics
- *designs and makes structures that meet a specific need
- *demonstrates understanding of the characteristics of different structures and of ways in which they are made, and recognises and uses some systems in the home or at school

Grade 2

- *describes the position and movement of objects, and demonstrates an understanding of how simple mechanisms enable an object to move (***e.g., identifies and describes simple machines and explains their uses; describes forces used to move objects; identifies types of forces)
- *designs and makes simple mechanisms, and investigates their characteristics
- *recognises that different mechanisms and systems move in different ways, and that the different types of movement determine the design and the method of production of these mechanisms and systems
- **knows that the position and motion of an object can be changed by pushing or pulling

Grade 3

- **knows that vibrating objects produce sound
- **knows that light travels in a straight line until it strikes an object
- **knows that the position of an object can be described by locating it relative to another object or the background
- **knows that things move in many different ways (e.g., straight line, zigzag, vibration, circular motion)
- *demonstrates an understanding of the factors that affect the stability of objects
- *designs and makes structures that include mechanisms and that can support and move a load, and investigate the forces acting on them
- *describes, using their observations, systems involving mechanisms and structures, and explain how these systems meet specific needs and how they have been made
- **knows that magnets can be used to make some things move without being touched (e.g., classifies materials as magnetic or non-magnetic; demonstrates the properties of magnetic attraction and repulsion; describes various kinds of magnets and their force fields; creates a magnet)
- **knows that things near the Earth fall to the ground unless something holds them up

Grade 4

- *demonstrates an understanding of the characteristics of pulleys and gears
- *designs and makes pulley systems and gear systems, and investigates how motion is transferred from one system to another
- *identifies ways in which different systems function, and identifies appropriate criteria to be considered when designing and making such systems

Grade 5

- *demonstrates an understanding of the effect of forces acting on different structures and mechanisms (***e.g., defines the term force; describes the ways force can affect the motion of an object)
- *designs and makes load-bearing structures and different mechanisms, and investigates the forces acting on them (***e.g., explains how a machine makes doing a task easier)
- *evaluates the design of systems that include structures and mechanisms, and identifies modifications to improve their effectiveness
- **knows that electrically charged material pulls on all other materials and can attract or repel other charged materials (***e.g., describes the conditions under which electric charges produce a magnetic field; defines the term electromagnetism; makes electromagnets; describes how a magnet can produce an electric current; identifies the charges of protons and electrons in atoms)
- **knows that magnets attract and repel each other and attract certain kinds of other materials (e.g., iron, steel)

Grade 6

- **knows that the pitch of a sound depends on the frequency of the vibration producing it
- **knows that light can be reflected, refracted, or absorbed

- **knows that an object's motion can be described by tracing and measuring its position over time
- **knows that when a force is applied to an object, the object either speeds up, slows down, or goes in a different direction (***e.g., defines term buoyant force; defines the term inertia; explains that a force is needed to overcome inertia)
- **knows the relationship between the strength of a force and its effect on an object (e.g., the greater the force, the greater the change in motion; the more massive the object, the smaller the effect of a given force)
- *demonstrates an understanding of different kinds of motion-linear, rotational, reciprocating, oscillating (***e.g., defines the term motion, differentiates between three types of motion)
- *designs and makes mechanical devices, and investigates how mechanisms change one type of motion into another and transfer energy from one form to another
- *identifies modifications to improve the design and method of production of systems that have mechanisms that move in different ways
- **knows that the Earth's gravity pulls any object toward it without touching it (***e.g., defines the term gravity; defines the term weight in relation to gravity; compares and contrasts magnetic force and the force of gravity)

STANDARD **UNDERSTANDS THE NATURE OF SCIENTIFIC KNOWLEDGE AND INQUIRY

Benchmarks

Grade 1

- *identifies familiar technological items and describes their use in daily life (e.g., telephone, videocassette recorder)
- *uses familiar technology appropriately (e.g., overhead projectors, cassette recorders, computers)
- *makes things using a variety of tools and techniques (e.g., hammer, screwdriver, glue, stapler)

Grade 2

- **knows that learning can come from careful observations and simple experiments
- **knows that tools (e.g., thermometers, magnifiers, rulers, balances) can be used to gather information and extend the senses
- **knows ways that technology is used at home and school (e.g., paging systems, telephones, VCR's)
- **knows that most things are made of parts and they may not work if some parts are missing
- **knows that when parts are put together, they can do things that they couldn't do by themselves
- **understands how some elements or components of simple systems work together (e.g., parts of a bicycle)

Grade 3

- **knows that in science it is helpful to work with a team and share findings with others
- **knows that scientific investigations generally work the same way in different places and normally produce results that can be duplicated

- **knows that new tools and ways of doing things affect all aspects of life, and may have positive or negative effects on other people
- **knows that objects occur in nature; but people can also design and make objects (e.g., to solve a problem, to improve the quality of life)
- **knows that tools can be used to observe, measure, make things, and do things better or more easily
- **knows that people are always inventing new ways to solve problems and get work done (e.g., computer is a machine that helps people work and play)
- **creates and tests a simple linear system (e.g., a production line process for making sandwiches)

Grade 4

- **knows that technologies often have costs as well as benefits and can have an enormous effect on people and other living things
- **knows areas in which technology has improved human lives (e.g., transportation, communication, nutrition, sanitation, health care, entertainment)

Grade 5

- **knows that new inventions often lead to other new inventions and ways of doing things
- **categorises items into groups of natural objects and designed objects
- **identifies a simple problem that can be solved using technology
- **knows that people have invented and used tools throughout history to solve problems and improve ways of doing things
- **knows that when things are made up of many parts, the parts usually affect one another
- **knows that things that are made of parts may not work well if a part is missing, broken, worn out, mismatched, or misconnected
- **identifies the relationships between elements (i.e., components, such as people or parts) in systems

Grade 6

- **knows that scientific investigations involve asking and answering a question and comparing the answer to what scientists already know about the world
- **knows that scientists use different kinds of investigations (e.g., naturalistic observation of things or events, data collection, controlled experiments), depending on the questions they are trying to answer
- **plans and conducts simple investigations (e.g., makes systematic observations, conducts simple experiments to answer questions)
- **uses simple equipment and tools to gather scientific data and extend the senses (e.g., rulers, thermometers, magnifiers, microscopes, calculators)
- **knows that good scientific explanations are based on evidence (observations) and scientific knowledge
- **knows that scientists make the results of their investigations public; they describe the investigations in ways that enable others to repeat the investigations
- **knows that scientists review and ask questions about the results of other scientists' work
- **knows that different people may interpret the same set of observations differently
- **knows constraints that must be considered when designing a solution to a problem (e.g., cost, materials, time, space, safety, scientific laws, engineering principles, construction techniques, appearance, environmental impact, what will happen if the solution fails)

- **implements proposed solutions using appropriate tools, techniques, and quantitative measurements
- **evaluates a product or design (e.g., considers how well the product or design met the challenge to solve a problem; considers the ability of the product or design to meet constraints), and makes modifications based on results
- **assembles, disassembles, and tests systems (e.g., in logo programming, using paper and pencil designs)
- **knows that although the same scientific investigation may give slightly different results when it is carried out by different persons, or at different times or places, the general evidence collected from the investigation should be replicable by others
- **knows that people of all ages, backgrounds, and groups have made contributions to science and technology throughout history
- **knows that although people using scientific inquiry have learned much about the objects, events, and phenomena in nature, science is an ongoing process and will never be finished
- **knows that scientists and engineers often work in teams to accomplish a task

LEARNER OUTCOMES
GRADES: 1 – 6

	GRADE 1	GRADE 2	GRADE 3	GRADE 4	GRADE 5	GRADE 6
LIFE SCIENCE	Identify body parts (external) of humans.	Identify a variety of animals in your environment.	Define the term vertebrates.	Distinguish between vertebrates and invertebrates.	Describe traits common to all invertebrates.	Identify and describe parts of the cell and their functions.
	Describe the functions of external body parts. (legs, arms, torso, head)	Group animals by body coverings and parts.	Classify vertebrates according to their characteristics.	Describe traits common to all invertebrates.	Describe the characteristics common to crustaceans.	Differentiate between plant and animal cell (microscope).
	Infer and identify the five sense organs in the human body.	Describe how animals move from place to place.	Describe the traits common to vertebrates.	Identify five invertebrate groups.	Identify invertebrates that are crustaceans.	Observe plant and animal cell parts and record their functions.
	Describe the functions of the five sense organs.	Identify things animals need for survival.	Identify and describe vectors that are vertebrates.	Identify the main traits of insects and spiders.	Explain the impact of crustaceans on the Bahamian economy.	Use specimen or pictures to classify four types of fungi by their traits.
	Explain how the senses work together to tell us about our surroundings/ environment/ world.	Describe ways that animals get food.	Compare mammals to birds.	Compare traits of insects and spiders.	Research the laws that govern the preservation and conservation of the spiny lobster.	Distinguish between harmful and helpful fungi.
	Identify the stages in human development.	Define the term habitat.	Compare reptiles, fish and amphibians.	Describe the life cycle of mosquitoes and cockroaches.	Explain the characteristics of mollusks.	Compare and contrast the growth of fungi to the growth of plants.
	Describe physical changes that occur at each stage of development.	Compare animal habitats.	Observe and describe body parts of fish and their functions.	Investigate how insects use mimicry and camouflage	Identify invertebrates that are mollusks.	Research and describe traits common to all sponges.
	Compare physical abilities of infants, children, and adults	Identify the parts of the skeleton.	Infer how body parts of vertebrates help them survive.	Identify the main parts of the respiratory system.	Classify mollusks as no shell, one shell and two shell types.	Describe the traits of echinoderms.
	Describe habits that help people stay healthy.	Explain the functions of the skeleton.	Observe visuals or models to identify the parts of the digestive system.	Demonstrate the importance of the respiratory system.	Explain the impact of the queen conch on the Bahamian economy	Research to distinguish between different kinds of worms.

	GRADE 1	GRADE 2	GRADE 3	GRADE 4	GRADE 5	GRADE 6
LIFE SCIENCE	Identify foods that help to keep the body healthy.	Describe the location of the skeleton in the body.	Experiment to communicate how food is broken down.	Identify the main parts and the importance of the Nervous System.	Analyze ways to preserve and conserve the queen conch.	Examine a variety of invertebrates and classify them as sponges, echinoderms and worms.
	Infer what happens if your body is not kept clean.	Identify muscles in the body.	Investigate to explain the functions of the digestive system.	Identify risk factors to health and how they may be reduced.	Explain the characteristics of stinging-cell animals.	Identify parts of the Circulatory System.
	Identify the things living things need to stay alive.	Explain the function of muscles.	Infer how proper nutrition is related to good health.	Identify safety procedures for natural disasters.	Identify invertebrates that are stinging-cell animals.	Discuss and label a simple diagram of a heart.
	Identify and describe ways people use plants and animals.	Demonstrate how muscles work.	Investigate appropriate exercises and food to develop a healthy lifestyle.	Investigate plants with seeds and without seeds.	Define the term vector.	Investigate and describe the function of the heart.
	Name animals that are sources of food, clothing and shoes.	Explain how healthy habits affect your bones and muscles.	Identify the seven main food groups, and explain the nutrients found in each group.	Classify plants with flowers and plants with cones.	Identify invertebrate vectors.	Research and identify the blood vessels in the circulatory system.
	Name plants that people eat.	Experiment to tell what plants need to grow.	Identify health resources.	Compare monocots and dicots.	Describe characteristics of invertebrate vectors. (insects)	Investigate and identify risk factors to health and how these may affect the circulatory system.
	Identify animals used as pets and animals that help people work.	Observe plants to identify plant parts.	Observe plants to identify parts using hand lens.	Predict which of two seeds will germinate first.	Explain how vectors affect the health and well-being of Bahamians.	Research and describe the functions of the Immune System.
	Classify living and nonliving things.	Identify seeds from various plants.	Experiment with plant parts and describe their functions.	Compare the growth rate of two plant specimens.	Describe diseases caused by invertebrate vectors and their treatments.	Explain how negative habits affect the Immune System.
	Compare living and nonliving things.	Classify seeds according to color, size and shape.	Investigate to describe the function of seed parts.	Identify and describe indigenous flowering plants in The Bahamas.	Discuss ways to eliminate vectors.	Identify risk factors to health and how these risks may be reduced.
	Identify the two main groups of living things.	Compare seeds from various plants.	Experiment with seeds to describe its growth patterns.	Define food chain and web.	Explain instincts that help animals meet their needs.	Observe specimens of flowers to identify the parts of a flower, and explain its function.

	GRADE 1	GRADE 2	GRADE 3	GRADE 4	GRADE 5	GRADE 6
LIFE SCIENCE	Compare traits of plants and animals.	Identify plants and animals that live in the schoolyard.	Investigate to describe the function of seed parts.	Distinguish between producers, consumers and decomposers.	Explain two examples of learned behaviour.	Research and explain the life cycle of a flower. (plant)
	Identify places where plants and animals live.	Identify plants and animals that live in their backyard.	Experiment with seeds to describe its growth patterns.	Create a food chain and web. Identify plants and animals that live in the pine forests, coral reefs and mangroves.	Differentiate between instinct and learned behaviour.	Predict and experiment to discover the needs of plants for growth.
	Explain how plant parts help them to live in different places.	Identify plants and animals that live in ponds and lakes.	Investigate living and non-living things in a garden ecosystem.	Hypothesize the effect on organisms when a pine forest is damaged.	Identify animals that migrate and hibernate.	Investigate and compare the growth patterns of different plants.
	Explain how body parts and coverings help animals live where they do.	Identify plants and animals that live on the seashore and in the ocean.	Observe a variety of model gardens (visuals) or real to identify types of gardens. (Vegetable, flower).	Explain how a coral reef differs from other ecosystems.	Identify parts of the skeletal system.	Experiment to show how plants respond to their environment.
	Describe ways plants and animals help each other.	Describe ways that people can harm habitats.	Experiment with seeds to create a containerized vegetable garden.	Explain the importance of coral reefs.	Explain the function of the skeletal system.	Explore a variety of plants to conclude their adaptive method for survival.
	Infer what are vectors and where they live.	Describe ways that people can protect and preserve habitats.	Use ruler to measure the growth of seedlings.	Identify the four types of mangroves.	Explain why different parts of the bone are important.	Investigate to define what a biome is.
	Discuss ways to prevent breeding.	Identify vectors and discuss why they are harmful.	Investigate the rocky and sandy shores to identify living and non-living parts.	Communicate characteristics of each type of mangrove/ Identify organisms found in this ecosystem.	Infer how proper nutrition and exercise are related to good skeletal health.	Research and infer why organisms live in certain biomes.
		Identify places where specific vectors live/ Explain why they live in these places.	Observe and classify plants and animals of rocky and sandy shores' using hand lens.	Infer the importance of mangroves.	Explain the functions of the muscular system.	Compare and contrast the tropical rain forest to the deciduous forest.
		Describe ways to eliminate the habitats of vectors.	Compare a vegetable garden and garden/farm. Compare rocky and sandy shores.		Identify parts of the muscular system and explain its function.	Research and compare the results of natural disasters on the environment.

	GRADE 1	GRADE 2	GRADE 3	GRADE 4	GRADE 5	GRADE 6
LIFE SCIENCE			Observe a coral reef ecosystem to identify the home of the grouper.		Classify muscles as skeletal, smooth and cardiac.	Communicate and summarize the effects of human activities on the environment.
			Research information on the grouper to explain why they are endangered.		Explain why muscles must work in pairs.	Research and identify animals (organisms) in The Bahamas that are endangered.
			Investigate to infer what threats affect the grouper.		Demonstrate how skeletal and muscular systems work together.	
			Research and discuss laws that protect the grouper.		Infer how proper nutrition rest and sleep are related to good muscular health.	
					Describe how personality, relationship and self-concept affect mental and emotional health.	
					Investigate eating habits, disorders and how they affect health.	
					Explain how good eating habits enhance healthy growth and development.	
					Describe the process photosynthesis.	
					Identify indigenous plants of The Bahamas. Identify medicinal plants and their uses.	

	GRADE 1	GRADE 2	GRADE 3	GRADE 4	GRADE 5	GRADE 6
LIFE SCIENCE					Describe ways to conserve plants.	
					Define ecosystem.	
					Explain the interdependence of living and nonliving elements of an ecosystem.	
					Identify three different groups (predator/prey and scavenger) in an ecosystem.	
					Explain components of food chains and food webs.	
					Define resources.	
					Identify water, fisheries and electricity as resources.	
					Describe ways to conserve resources.	
					Define preservation.	
					Explain the importance of preserving national parks.	

EARTH SCIENCE	GRADE 1	GRADE 2	GRADE 3	GRADE 4	GRADE 5	GRADE 6
	Recognize that earth is made up of land, water and air.	Compare and contrast rocks and minerals.	Investigate to identify Earth's natural resources and their uses.	Identify the three layers of the Earth.	Define earth resources.	Identify and compare the layers of the earth.
	Differentiate among bodies of water on earth.	Classify rocks and minerals according to color, size and shape.	Communicate the importance of natural resources to the survival of people.	Describe the Earth's layers.	Identify ocean resources.	Infer what natural resources are and where they are located.
	Compare and contrast a variety of landforms.	Explain some uses of rocks.	Investigate the sources of air, water, and land pollution.	Describe weathering and erosion.	Identify pollutants and explain how they affect marine life.	Classify resources as renewable or nonrenewable.
	Investigate how hills are formed.	Explain some uses of minerals.	Investigate to discover ways to prevent pollution.	Identify the causes of weathering.	Suggest strategies that avoid polluting the ocean.	Investigate the environment to distinguish between air, land and water pollution,
	List examples of natural resources.	Describe weather in The Bahamas.	Communicate the role of students as environmental stewards.	Identify ocean resources.	Explain ways to conserve the ocean.	Research and compare coal, oil and natural gas.
	Explain how reducing, reusing and recycling can save natural resources.	Identify instruments used to measure weather conditions.	Research ways to explain to care for earth's resources.	Investigate the movement of the ocean water and how it is affected by the moon.	Define fossil.	Research to compare/explain advantages and disadvantages of fossil fuels.
	Identify ways water can be used.	Describe ways weather affects people.	Explain the water cycle and its relationship to weather and climate.	Infer what is ocean pollution/ examine its effect on organisms in the ocean.	Describe the process of fossil formation.	Research and identify factors of weather.
	Explain the different types of weather.	Explain precautions that can be taken before and during bad weather conditions for safety.	Interpret diagrams to explain changes that occur at each phase of the water cycle.	Define Meteorology.	Distinguish between types of fossils.	Manipulate/look at pictures of models of weather instruments to identify them and explain how they work.
	Observe and record weather changes using weather instruments.	Describe the differences between the moon and Earth.	Experiment to describe how clouds are formed.	Describe the Earth's atmosphere.	Define atmosphere.	Explain the difference between weather and climate.
	Observe clouds and their changes.	Analyze the source of moonlight.	Classify clouds according to their traits.	Investigate the properties of air.	Describe the layers of the atmosphere.	Observe the environment and visuals to differentiate between weathering and erosion.

EARTH SCIENCE

GRADE 1	GRADE 2	GRADE 3	GRADE 4	GRADE 5	GRADE 6
Name the different seasons.	Describe changes in the moon.	Investigate to describe weather conditions associated with different types of clouds.	Describe the elements of Weather.	Identify conditions that change weather.	Research and identify the forces that cause weathering and erosion.
Identify weather conditions associated with each season.	Define the term constellation.	Experiment with models to demonstrate Earth's position in relation to the sun.	Distinguish between weather and climate.	Describe how weather changes affect people.	Research to compare the traits/characteristics of storms.
Identify and describe the sun and other stars.	Examine common constellations.	Experiment to describe the motion of the earth around the sun.	Measure water at various temperatures.	Measure rainfall using a rain gauge.	Investigate and record safety precautions during a storm.
Discuss the importance of the sun.		Experiment to explain the terms orbit, revolve ad rotate.	Measure wind direction.	Measure the speed of the wind using a windsock.	Collect data to compare and contrast the surface and atmosphere of the planets.
Name natural objects seen in the daytime and nighttime sky.		Interpret visuals to show various seasons.	Demonstrate the sun's effect on Earth.	Explain what the solar system is.	Hypothesize which planets are susceptible to life.
Explain the difference between day and night.		Investigate to discover what causes seasons.	Record the order of the eight planets.	Identify bodies in the solar system.	Research to identify equipment used to study objects in space.
			Classify the planets as inner and outer planets.	Differentiate between rotation and revolution of planets.	Investigate and identify pictures of vehicles used to explore the universe safely.
			Distinguish between inner and outer planets.	Record the differences between the years on each planet.	
			Create a scale model of the distances between planets.	Explain how the sun benefits the earth and other planets.	
				Identify other stars.	
				Identify and describe other objects in space.	

PHYSICAL SCIENCE	GRADE 1	GRADE 2	GRADE 3	GRADE 4	GRADE 5	GRADE 6
	Classify objects according to their physical properties such as size, colour, shape and texture.	Define the term matter.	Experiment with manipulatives to identify matter as solids, liquids and gases.	Observe and identify properties of matter.	Explain how matter is classified.	Manipulate objects to identify physical properties.
	Experiment to identify how matter changes state, size, colour, shape and texture.	Describe characteristics of solids, liquids and gases.	Investigate concrete models to compare some characteristics of solids, liquids and gasses.	Investigate physical changes in matter.	Differentiate between substances and mixtures.	Predict and experiment to explain physical changes in objects. Manipulate equipment used to measure physical properties of matter.
	Experiment to describe physical changes in matter.	Classify objects into groups of solids, liquids and gases.	Classify models into solids, liquids and gasses.	Compare physical properties and physical changes in matter.	Define solution.	Experiment and record chemical changes in objects and substances.
	Compare pushes and pulls.	Examine and identify the tools used to measure matter.	Experiment to show how matter changes from one form to another.	Measure the mass of objects.	Identify solutes and solvents in substances.	Investigate chemicals to identify some that will cause changes in matter.
	Observe and identify poles of a magnet.	Estimate the length and mass of objects.	Investigate objects to observe the physical properties of matter, forms and properties of Matter.	Measure the volume of different matter.	Define energy.	Research to distinguish between a physical change and a chemical change.
	Experiment to find out which objects (materials) a magnet will attract/repel.	Measure the length and mass of objects.	Experiment to discover the length, volume and mass of objects.	Define force, work and motion	Differentiate between potential and kinetic energy.	Experiment to compare and measure matter.
		Predict how much various size containers can hold.	Interpret the metric table to identify metric units used to measure length, volume and mass.	Compare the force of pushing and pulling.	Describe the effects of forces on the motion of an object.	Experiment with magnets to locate the poles and the magnetic field.
		Experiment to discover how much various size containers can hold.	Experiment with a graduate to measure the volume of liquids and solids.	Measure pulls using a spring scale.	Identify forms of energy.	Manipulate objects to infer the relationships between motion, speed and direction.

PHYSICAL SCIENCE

GRADE 1	GRADE 2	GRADE 3	GRADE 4	GRADE 5	GRADE 6
	Identify the forms of energy provided by the sun.	Investigate to discover the sources of energy.	Interpret data recorded on pushes and pulls.	Explain the differences between heat and temperature.	Experiment to explain how a simple circuit works.
	Describe the uses of energy provided by the sun.	Research information to define fuels.	Investigate work and infer how (work) it is related to force.	Explain how energy can be changed into other forms.	Investigate objects and materials to discover the effects of friction on them.
	Describe the uses of energy provided by wind.	Investigate to discover how fossil fuels are formed.	Conclude what a simple machine is.	Discuss the impact of technology on forms of energy.	Research to identify pulleys and wheel and axle.
	Describe the uses of energy provided by water.	Interpret information on the uses of energy from fossil fuels.	Identify various objects as wedges or inclined planes.	Define simple machines.	Experiment to conclude how pulleys and wheel and axles make work easier.
	Predict which objects are attracted to magnets.	Investigate the different forms of energy.	Communicate how wedges are related to inclined planes.	Identify compound machines that use the lever and screw to help us do work.	Investigate and describe ways in which energy can be conserved.
			Discuss energy conservation.	Explain the importance of conserving energy.	
	Experiment to discover which objects are attracted to magnets.	Communicate the various forms of energy and their uses.	Describe ways technology is used to explore the ocean.		
	Classify objects according to whether or not they are attracted to magnets.	Experiment to discover light heat, sound, electricity and their characteristics.			
	Experiment with magnets to discover which objects attract or repel.	Research information to identify objects that transfer electricity.			
		Research information on magnets and their uses.			
		Investigate and interpret pictures to identify conservation.			
		Analyze and share ways to conserve energy.			

Definition of Terms

Overarching Goal	This indicates the ultimate outcome of the Primary Science Curriculum document.
Sub-Goals	These six sub-goals are based on the three strands which form the framework for the curriculum.
Scope and Sequence	This is a table outlining objectives for each grade level showing the progression and overview of the work to be accomplished.
Scope of Work	It develops curriculum objectives with suggested content, activities, assessment and resources to facilitate and enhance the teaching/learning process.
Strand	The sections within a particular content area that may be clustered by topic or process. E.g. Life Science – 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.
Objectives	They are derived from goals. They specify in measurable and observable terms the content, skill and attitudes to be leaned by each student. Objectives are written in terms of what the student is expected to achieve.
Assessment	Ongoing processes which measure student understanding of specific learning targets or objectives. Instruments used to collect data and evaluate student performance.
Rubric	A prescribed set of instructions, criteria or rules that indicate the critical elements of a learning task.
Concept	A general idea derived or inferred from specific instances or occurrences.
Skills	Targeted proficiencies; technical actions and strategies.

SECTION C

The Curriculum / Scope of Work

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.

CURRICULUM GUIDELINES
GRADE 3
SCOPE OF WORK

TOPIC: VERTEBRATES **STRAND 1: CHARACTERISTICS OF ORGANISMS**

LIFE SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
1. Define the term vertebrates.	Animals with backbones are called **vertebrates**. A backbone is a row of bones in the back of an animal. Scientists classify animals with backbones into five groups. These five groups are **mammals, birds, reptiles, amphibians** and **fish**.	1. Examine paper bag and sock puppets with a model of a spine at the back. Then make paper bag puppets that are vertebrates. a. Use a straw, and a string about 12" long. b. Cut the straw into 6 equal parts. Thread the sting through the straw pieces. Tape the ends of the string to the ends of the straw. The straw with the string represents the backbone of the animal. Practice bending the straw pieces, to model the backbone. Tape the straw model to the back of the paper bag or sock puppet. Test the puppet to feel the backbone. Draw conclusions about the animals with backbones.	*Harcourt Science* Bk. 2 *Harcourt Science* Bk. 3 *Science Horizons* Bk. 2 *Science Horizons* Bk. 3 www.usoe.k12.ut.us/CURR/1science/scieroo/...living/2.htm www.kidport.com/grade5/science/Vertebrates.htm www.biology4kids.com:Vertebrtes www.biology4kids.com/files/vert_main.html	I. Create a vertebrate mural. Make drawings or collect pictures of the various vertebrates. Write a few sentences to describe what a vertebrate is.
2. Classify vertebrates according to their characteristics.		2. Using plastic animals or picture cards, have students classify animals as Vertebrate and Invertebrate. Discuss similarities and differences.	*Harcourt Science* Bk. 3 www.usoe.k12.ut.us/CURR/1science/scieroo/...living/2.htm	II. Match the animals' group names to their characteristics.
3. Describe the traits common to vertebrates.		3. Find more pictures of animals that are vertebrates. Look for traits that are the same. Share.	*Science Horizon* Bk. 3 www.biology4kids.com/files/vert_main.html	III. Review Activity *Harcourt Science* Bk. 3, p. A57 E.g.: 1. Name a mammal that lives in water. How does it breathe?

CURRICULUM GUIDELINES
GRADE 3
SCOPE OF WORK

TOPIC: VERTEBRATES **STRAND 1: CHARACTERISTICS OF ORGANISMS**

LIFE SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
		4. Vertebrate Charades – A Student acts out a vertebrate and the other students try to guess what it is. 5. Pin an animal on the students back. With his back to all students. He can ask only yes or no questions to discover his identity.		2. What two features of birds are most often used to classify them? Why? (Write/illustrate your answers using drawings/pictures)
4. Identify and describe vectors that are vertebrates.	Vectors are animals that spread or transmit germs and diseases. Some vertebrate vectors include rats, mice and bats. There are two types of rats – the roof rat (black rat) and the Norway rat (brown rat). Wherever food and shelter are plentiful there you will find the Norway rat. Rats breed in garbage refuges, sewers, old warehouses, back alleys and other places where there is an abundance of food. The Norway rat lives in burrows underground and inside walls. The roof rat climbs and can be found in upper levels of buildings. Food contamination occurs from urine and feces of rats. Rat carry a lot of diseases some include bubonic plagues and salmonella.	1. Make posters to persuade people to discard of garbage properly to eliminate rats. Place posters in the school or community. 2. Invite a speaker from Environmental Health from the Vector Control Education Section to speak on the effects of Vectors on our society and ways to eliminate them. 3. Do a research to discover: which sites harbour vectors. Take pictures, make bar charts, tally charts.	www.vectorpest.com *Harcourt Science* Bk. 6 School Health & Family Life Education Curriculum Module – Reducing Pests and Insect Vectors. Environmental Health Education Division on Vector Control www.usoe.k12.ut.us/CURR/1science/scieroo/...living/2.htm www.kidport.com/grade5/science/Vertebrates.htm www.biology4kids.com:Vertebrtes www.biology4kids.com/files/vert_main.html	IV. Write a report on: How rodents (rats) affect The Bahamas (Include pictures and graphs). Also include: Methods used to eliminate them.

CURRICULUM GUIDELINES
GRADE 3
SCOPE OF WORK

TOPIC: VERTEBRATES **STRAND 1: CHARACTERISTICS OF ORGANISMS**

LIFE SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
	To keep rats away good sanitation is necessary; tightly closed garbage containers are essential. Bats also carry disease. Bats spread the disease called rabies. Vampire bats lap up the blood of cattle horses, livestock and pigs. Both rats and bats are mammals.			
5. Compare mammals to birds.	**Mammals** are covered with **hair** or **fur**. They give birth to live young and feed them with milk. They use lungs to breathe. Humans, goats, sheep, lions, elephants, tigers, dog, cats, monkeys, rats, mice and elephants are mammals. **Birds** are covered with **feathers**. Feathers help to keep birds warm. Some feathers also help birds to fly. Birds have **wings** to help them fly. Like mammals, birds have **lungs** to help them breathe air. Many birds also care for their young for a while after they are born. Unlike most young mammals, young birds hatch from eggs. Birds have **beaks** to eat with. The shape of a bird's beak determines what they eat.	4. Have students bring in a pet mammal (dog, cat, or hamster) to compare it to the pet bird in the classroom. Work in groups to come up with similarities and differences of both. Designate a place in the school yard to go bird watching. Complete a field guide and checklist. 5. How do bones of a bird and mammal compare? Beef bone, chicken bone, balance, metric masses 1. Observe the inside of beef and chicken bone with hand lens. Find the moss.	*Science Horizon* Bk. 3 *Harcourt Science* Bk. 3 www.usoe.k12.ut.us/CURR/1science/scieroo/...living/2.htm www.kidport.com/grade5/science/Vertebrates.htm www.biology4kids.com:Vertebrtes www.biology4kids.com/files/vert_main.html	IV. Complete a Venn Diagram to compare mammals to birds. (www.teachervision.fen.com)

CURRICULUM GUIDELINES
GRADE 3
SCOPE OF WORK

TOPIC: VERTEBRATES **STRAND 1: CHARACTERISTICS OF ORGANISMS**

LIFE SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
	The shape of a bird's feet can be used to tell where birds live. Birds reproduce by laying eggs. They are warm blooded. This means that their body temperature stays the same.			
6. Compare reptiles, fish and amphibians.	Reptiles have dry scaly skin. They live mostly on land. They use lungs to breathe air. They lay eggs with thick leathery shells. Snakes, lizards, turtles, alligators, and crocodiles are reptiles. Most reptiles live on land. Most of the young are able to meet their needs as soon as they are born. There are three main groups of retiles: lizards and snakes are in one group. Their bodies have rows of scales that overlap. Alligators and crocodiles are another group. They live in water most of the time. They come out of the water to sun themselves. Tortoises and turtles make up the third group of reptiles. They are the only reptiles with shells. Tortoises live on land and turtles live in the water. Reptiles are cold blooded animals.	1. Observe tadpoles collected. Discuss the stages of growth over a period of time. Observe the pet turtle also in the classroom. Discuss similarities and differences. 2. Group pictures of reptiles into groups. Make a poster. a. Reptiles with scales that overlap. b. Reptiles with shells. c. Reptiles that live mostly in water. 3. Sequence pictures to show the life cycle of the frog. 4. Take a fieldtrip to Adastra Gardens, Adventure Learning Centre, or a local animal farm to observe Vertebrates in their environment. 5. Make a model to show the life cycle of the frog.	*Harcourt Science* Bk. 3 www.usoe.k12.ut.us/CURR/1science/scieroo/...living/2.htm www.kidport.com/grade5/science/Vertebrates.htm www.biology4kids.com:Vertebrtes www.biology4kids.com/files/vert_main.html	V. Complete a Venn Diagram to compare reptiles to amphibians. Reviews Activity *Harcourt Science* Bk. 3 p. A65 E.g.:1. What happens during the metamorphosis of a frog? 2. List three features that help fish live and move in water. 3. What do gills do? 4. Why do many amphibians stay near the water their whole lives?

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.

CURRICULUM GUIDELINES
GRADE 3
SCOPE OF WORK

TOPIC: VERTEBRATES **STRAND 1: CHARACTERISTICS OF ORGANISMS**

LIFE SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
	Amphibians have smooth moist skin. They lay eggs in water where their young hatch and remain until they are adults. A young frog is called a tadpole. Young amphibians do not look like their parents. As they grow their bodies change. Young amphibians breathe through gills while living in the water but grow lungs when they become adults. They are also able to take air through their skins. Frogs salamanders and newts are amphibians.	6. Picture Prompt – Tadpole to frog Write a story about the picture showing the stages of the frog from egg to adult. 7. Frog & Toads – Read and answer worksheet. Picture to label and questions. 8. Frog Quiz – 10 questions on the Life Cycle of a Frog. 9. Frog Life Cycle – Label the diagram. 10. Observe a video on the Life Cycle of a Frog. 11. Make models of – amphibians.	www.enchantedlearning.com/subjects/amphibians/books/froglifecycle www.kidzone.com *Science Horizon* Bk. 4 *Harcourt Science* Bk. 3 www.kiddyhouse.com/themes/frogs AtoZteacherstuff.com www.dltk-kids.com/animals/reptiles.html	V. Which trait is shared by most fish, amphibians, and reptiles? A. Fins B. Scales C. Eggs D. Legs Make up a Scavenger Hunt Sheet. This includes 10 questions for students to answer about the Vertebrates they will observe on the fieldtrip.
7. Observe and describe body parts of fish and their functions.	**Fish** live in water. They are covered with **scales** and have **fins**. Fins help them move through the water. Fish breathe through their **gills** and lay eggs. Fish are cold-blooded animals. **The Nassau Grouper** is one of the largest fish on the reef. It has (5) five dark brown bars on the body and, a dark band running from the snout, through the eye to the forehead side of the dorsal fin and a dark spot on the base of the tail fin.	1. Observe a fish in the class-room aquarium. Compare it to the reptile, and the amphibians. Visit Atlantis Aquarium observe various types of fish. 2. Clean a fish backbone and place it in a zippered baggie. Observe the bone, discuss how it helps the fish. 3. Label the fish body parts and function.	*Science Horizon* Bk. 4 *Harcourt Science* Bk. 3 *Treasures in the Sea* *Treasures in the Sea*	I. Label the parts of the fish. Complete Fish Body Parts and Functions Worksheet (*Treasures in the Sea*, p. 63 & 64) II. Grouper Adaptations Worksheet (*Treasures in the Sea*, p. 65) III. **Unit Connection** Draw a word web on a paper but use pictures in its place. Write the word vertebrate in the circle,

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TOPIC: VERTEBRATES **STRAND 1: CHARACTERISTICS OF ORGANISMS**

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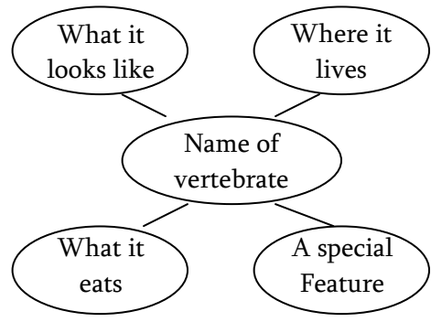
	It changes colour depending on the environment it is in. This helps to hide it so it can ambush fish to eat. Humans are the predators that have the biggest impact on the grouper populations.	4. Play the Pass the Part Game. Play a straw relay game to review parts of a fish. (grouper) Materials – Large illustration of the grouper – Paper to make circles (3") – Photocopy of Pass the Part Clues (p. 69) 8 ½" X 11" sheet of card stock or poster board; scissors, glue, masking tape; straw for each student. – Cut out clue boxes and mount them on poster board. Prior to game have students review the parts and function of the grouper. – Divide the class into two teams. Distribute straws and circles Practice picking up and passing circles by sucking on the straws. – Place clue cards and circles on the desk. On the wall or bulletin board hand the large grouper pictures. – Put a piece of tape behind each circle. After reading the clue the team member sucks up a circle with the answer to pass to the next team player; who sucks it onto his straw.	*Treasures in the Sea* *Treasures in the Sea* Model of fish	stemming from the word will be pictures that are examples of each vertebrate group. The names will be placed under each picture group. (Science Horizon Bk. 2, p. 55) Write two sentences about each vertebrate group. IV. Complete an animal web. 

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TOPIC: VERTEBRATES **STRAND 1: CHARACTERISTICS OF ORGANISMS**

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		This continues until the last person attaches the answer onto the large illustration in the correct place. Once all the clue parts are on the fish, the group which finishes first are the winners. 5. Make fish models Vertebrate Grab – A running game Read a statement that describes one or more vertebrate group. Kids must listen and try to figure out which group is being described. Call out a number. The child on each team with that number will run to the centre of the field or classroom and find the cut out of that vertebrate group, then run back to their team before being tagged. 6. PowerPoint Presentations on Vertebrates. Classification of Vertebrates Animal Kingdom Vertebrates Vertebrate Part I & II	www.enchantedlearning.com www.childfun.com/modulesinternet4classroomsi4c www.wolf.org/teacher Vertebrates & Invertebrates at www.pppst.com	V. Complete a Vertebrate Chart. **Class** / **Reptile** / **Amphibians** / **Fish** / **Bird** / **Mammals** Character-istics: Scales Cold Blooded Lay eggs Examples: Lizard Snake Turtle Movement: Slither Crawl Appearance: Rough Leathery Slow

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LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
8. Infer how body parts of vertebrates help them survive.	Animal's body parts help them to meet their needs. A bird's beak shape helps it to eat certain types of food. A bird's feathers and a mammal's fur help them to keep warm. Some mammals have sharp hairs or whiskers for protection. Scales on a fish help protect the fish from disease and from other animals in the water. A reptile's scales protect it from injury and from drying out. The overlapping scales on a snake helps the snake to move.	1. Experiment to show How Fur keeps mammals warm. (Can also be adapted to feathers of birds) **Materials** – 2 metal cans – Glue – Cotton batting – Hot water – 2 thermometers – Classroom clock **Procedure:** 1. Make a chart showing Time: Water Temperature in can with cotton; water temperature in can without cotton. (Three columns) 2. Spread glue around the outside of one can. Then put a thick layer of cotton around the can. Wait for glue to dry. Then fluff cotton with fingers. 3. Teacher fills both cans with hot water.	*Harcourt Science* Bk. 4 *Harcourt Science* Bk. 3 www.usoe.k12.ut.us/CURR/1science/scieroo/...living/2.htm www.kidport.com/grade5/science/Vertebrates.htm www.biology4kids.com:Vertebrtes www.biology4kids.com/files/vert_main.html *Science Horizon* Bk. 4	VI. Complete a chart to show how body parts of each animal help them survive. Animal / Body Part / How it Helps Bird / Feathers Wings / Bird / Beak / Mammal / Hair/Fur / Reptile / Scales / Fish / Scales / Amphibians / Skin /

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		4. Place a thermometer in each can. Record the temperature of the water. 5. Check the temperature of the water every 10 minutes for 30 minutes. Record temperatures on chart. Conclude that the can with cotton stayed hot longer. 2. **Experiment:** **Birds' Beaks and Food.** Investigate how the shape of a bird's beak is related to the food it eats. **Materials** Chopsticks/2 pencils Pliers Clothespin raisins Spoon birdseed Forceps paper plates Plastic worms or gummy worms – Cooked spaghetti – Cooked rice – Peanuts in shells – Water in a cup		

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LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
		Procedure: 1. Make a chart showing Food | Best Tool | Observation 2. Put tools on the side of the desk. Tools represent bird beaks. 3. Put one type of food in the middle of the desk at a time. Try picking up food with each types of beak 4. Test all beaks with all types of food. See which beak works best with which food. Record your observation in your chart. Draw Conclusions.		

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GRADE 3
SCOPE OF WORK

TOPIC: DIGESTIVE SYSTEM — **STRAND 1: STRUCTURE AND FUNCTION**

LIFE SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
1. Observe visuals or models to identify the parts of the digestive system.	The food we eat must be changed into nutrients before the body can use the energy stored in it. The digestive system is a group of organs that work together to change the food we eat into nutrients that the body can use.	1. Use a diagram to observe the parts of the digestive system.	*Science Horizon* Bk. 3 *Harcourt Science* Bk. 2 *Harcourt Science* Bk. 3	I. Label the digestive system. Complete a paragraph using vocabulary words to describe the process of the digestive system.
2. Experiment to communicate how food is broken down.	Digestion is changing complex foods into nutrients. Digestion starts in the mouth after the teeth break food into small pieces. Saliva is added to food to soften and change some food into nutrients. The food then passes along a tube called the esophagus, then into the stomach. In the stomach food is mixed with digestive juices. Food passes from the stomach to the intestines. As food moves along the intestines, the blood absorbs the digested food and water.	2. Observe a video/DVD on digestion to see the process. Complete a worksheet on this. 2a. Use puzzle pieces to construct the digestive system. 2b. Match the name label to each part of the digestive system.	*Harcourt Science* Bk. 4 www.youtube.com/watch?v=ONJzvZbdlqk *Science Horizon* Bk. 3	I. In cooperative groups have students create a travel brochure identifying the major parts of the digestive system showing the path food takes through the digestive system.
3. Investigate to explain the functions of the digestive system.		3. Concentration, word search, flashcards on digestive system.	www.quia.com	
4. Infer how proper nutrition is related to good health.	Nutrition is providing the body with chemicals called nutrients, that the body needs to stay healthy and to carry out its functions (do work). There are many different nutrients that the body needs.	1. Group food into the main food groups (Collect pictures of food). 2. Use Food Guide Drum to create a healthy diet.	*Science Horizon* Bk. 3 www.mypyramid.gov *Harcourt Science* Bk. 3 www.AtoZteacherstuff.com www.nutritionexplorations.org www.nutritionforkids.com www.educationworld.com	I. Place the name of the food group next to examples of foods. E.g. apple, banana, strawberries – Fruit b. Label pictures; write the group name under each one. Make balanced meals on paper plates by using magazine pictures.

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GRADE 3
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TOPIC: DIGESTIVE SYSTEM **STRAND 1: STRUCTURE AND FUNCTION**

LIFE SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
5. Investigate appropriate exercises and food to develop a healthy lifestyle.	To get the correct amount of nutrients, we need to eat a wide variety of foods. Foods are divided into groups according to the nutrients they contain. Meat contains proteins and minerals. Milk contains vitamins and minerals and carbohydrates. Proteins, minerals, carbohydrates and vitamins are nutrients. Nutrients are materials the body uses for making new tissue, protecting out systems and giving us energy. All the foods we eat make up our diet. A balanced diet includes all he nutrients the body needs. Eating a balanced diet helps us stay healthy. To eat a balanced diet we should eat foods from each of the food groups everyday. Another way to stay healthy is to exercise. Playing active games (swimming, running, climbing etc.) are good forms of exercise. Your muscles stay in shape and your heart and lungs work better with exercise. Your body also needs rest. Children need 8-10 hours of sleep.	3. Make a food wheel using paper plates and various pictures. 4. Plan menus with balanced meals. 5. Experiment: How can you show that there is iron in cereal?	*Science Horizon* Bk. 3	II. Create a Food Guide Drum using pictures and construction paper. III. Produce a brochure explaining the importance of the Digestive System.
6. Identify the seven main food groups, and explain the nutrients found in each group.		6. Make a poster to persuade others to eat healthy. 7. Make a web of Food Groups but use pictures instead of words. 8. Cut out pictures of various exercises to make a poster on "Keeping Fit". 9. Participate in various exercises in the classroom.	*Science Horizon* Bk. 3 *Harcourt Science* Bk. 3 *Harcourt Science* Bk. 4	I. Persuasive poster How to Eat Healthy II. Picture Web of Food Groups. III. Complete a worksheet:- Put an x on the picture that does not show proper health habits. Colour the pictures that show proper health habits. IV. Cut out pictures showing healthy habits – display on poster board or chart paper.

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LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
	A good night sleep helps your body store up energy for the next day. Developing healthful habits also keeps you fit. (E.g. washing hair, washing hands, before and after eating, cleaning nails, changing into clean clothes, all help you keep fit.)			
7. Identify Health Resources.	Health Resources include hospitals, clinics, doctors, nurses, chemists. A community nutritionist, a community counselor, dental services, school health service and other health service providers.	1. Cut out pictures of Health Resource /institutions and persons. Make a poster. Health Resource persons are invited to give advice and information on their discipline. Talks and demonstrations will take place.	*Nutrition Ed. In Pr. Schools* Bk. 2	i. Write a project on health resources and the importance to the community. i. Create a poster illustrating the importance of Health Resources. III. Write a report on the Health resource person that came to the school to share.

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SCOPE OF WORK

TOPIC: PLANTS PARTS AND FUNCTION – PLANTS **STRAND 1: STRUCTURE AND FUNCTION IN LIVING SYSTEMS**

LIFE SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
1. Observe plants to identify parts using hand lens.	Each part of a plant has its own function (job to do). Roots hold the plant in place and help to keep the soil from washing away. They also take in water and minerals from the soil for the plant. Some plants store food in their roots. Carrots, potatoes, yams beets and cassavas are examples of this. Stems support the plant and transport materials between the roots and leaves. They hold out the branches and leaves to catch the sunlight.	1. Pull up weeds, observe root hairs with a magnifying lens. Observe how soil clings to roots. 2. Observe two identical potted plants (Plant A & B). Gently remove the soil from plant A. Observe what happens to plant A. Now compare plant A to plant B. Remove the soil from plant B. Compare plant B to A. Turn plant A upside down in pot. Plant B remains right side up.	*Harcourt Science* Bk. 3 www.foodforeveryone.org/pdf/FFE_Chpt_8.pdf *Harcourt Science* Bk. www.saps.plantsci.com.ac.uk/primparts.htm www.its.guilford.k12.nc.us/webquests/plantquest/	I. Label the parts of a plant given. Complete sentences on the function of each part.
2. Experiment with plant parts and describe their functions.	Plants with green make food in their stems. Some plants also store food in their stems. Leaf is the part of the plant that makes food. A leaf has veins that carry water and nutrients. Leaves help keep the air clean by taking in carbon dioxide (Co_2) through small holes on the underside of the leaves, plants use carbon dioxide to make food. When plants make food they give off oxygen.	Pour 50 ml of water in both plant pots. Observe and record what happened in pot A and B for three days. Evaluate the results in pot A and B. 3. Experiment to show how water moves through a stem. Materials 3-1 Litre plastic bottles, water, food colouring 3 stalks of celery with leaves attached. 3. Make leaf rubbings using crayons.	*Harcourt Science* Bk. 3 www.foodforeveryone.org/pdf/FFE_Chpt_8.pdf *Harcourt Science* Bk. www.saps.plantsci.com.ac.uk/primparts.htm www.its.guilford.k12.nc.us/webquests/plantquest/ *Science Horizon* Bk. 4 *Harcourt Science* Bk. 3	I. Using a variety of (discarded) materials create a three dimensional plant. Attach plant parts and function to the plant, using clothes pins. (Write information on clothes pins using markers.)

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LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
3. Investigate to describe the function of seed parts.	A seed has three main parts. The seed coat, the embryo and the stored food. The seed coat protects the seed. The embryo is the baby plant or tiny plant inside the seed. The embryo feeds on the stored food until the seed grows leaves, which can make food.	1. Soak seeds. Place a seed on a paper towel. Open seed. Peel off the seed coat. Observe the tiny plant and the stored food. 2. Experiment Can a seed without a food supply form a plant? Place unopened seed; seed half with young plant only, in a plastic bag on a wet paper towel. Seal the bag. Observe. 3. Make a seed booklet. Colour and put together. 4. Make a seed poster, with various seeds used for the week. Label each seed. 5. Experiment II Investigate what seeds need to sprout. Use a variety of seeds, group them by size and shape. Make 3 bags of seeds. Cut paper towel, put a little water on hand towel, then place hand towel, and seeds in bags. Seal the bags. Label the bags 1, 2 and 3. Tape the bags to the inside of a window. Use hand lens to observe the seeds for 10 days.	*Science Horizon* Bk. 3 *Science Horizon* Bk. 3 *Harcourt Science* Bk. 3 www.foodforeveryone.org/pdf/FFE_Chpt_8.pdf *Harcourt Science* Bk. www.saps.plantsci.com.ac.uk/primparts.htm www.its.guilford.k12.nc.us/webquests/plantquest/ *Harcourt Science* Bk. 3 www.thegardenhelper.com/growingseeds.html *Harcourt Science* Bk. 3 www.britishcouncil.org/kids-stories.-luckyseed.htm *Growing Seeds* (Teacher's Guide) McGraw-Hill Book Company *Elementary Science Study*	I. Label the parts of the seed given. Complete a paragraph using vocabulary. II. Sequence the stages of growth of a seed.
4. Experiment with seeds to describe its growth patterns.	All seeds have a tiny plant (embryo) inside. For the tiny plant to grow into a tree, seeds need water, air, and warmth. When the tiny plant sprouts or grows out of the seed, this is called germination. When a seed sprouts, first a root grows down ward, then the stem grows upward through the soil. Then the leaves unfold. Plants also need nutrients from the soil. A plant also needs enough space to grow. As a plant gets bigger it forms flowers. Seeds are formed inside flowers.			

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TOPIC: PLANTS PARTS AND FUNCTION – PLANTS **STRAND 1: STRUCTURE AND FUNCTION IN LIVING SYSTEMS**

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LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
		6. Make up a chart showing seeds and Days. Write in next to each group of seeds what was observed each day. Discuss conclusions. 7. Make a list of twenty foods you eat that come from plants. Identify how many of these come from roots, stems, leaves, fruits, seeds and flowers. Make bar graph. 8. Hands on Science: Seeds What are parts of seeds Materials Several Pinto Beans 1 jar with lid Water Paper towel This experiment takes one day. a. Place beans in jar of water; close lid. b. Leave jar in a refrigerator or cool place overnight. c. Remove beans from jar and dry them. d. Carefully remove seed coat from a bean. Use your fingernails to split the bean open.	*Harcourt Science* Bk. 3 www.turnbacktogod.com stories	III. Cut pictures of the stages of a bean seed apart. Colour and put in order to make a seed booklet. IV. Create chart depicting steps in the experiment, chart conclusion also. V. Make graph strips to create a bar graph showing the growth of seeds as recorded. Glue these strips on a sheet of paper.

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LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
		Read: The Seed Story Answer questions **Other activities listed:** a. Venn Diagram on Plants (Comparing 2 plants – Flowering/ Non-Flowering b. Unscramble Plant words c. Word Search on Plants d. Vocabulary Sheet – Define 16 plant words e. Crossword Puzzle		I. Word Search about plants. II. Crossword puzzle. (questions pertaining to seeds and their growth patterns.

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TOPIC: ECOSYSTEMS **STRAND 1: ORGANISMS AND THE ENVIRONMENT**

LIFE SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
1. Investigate living and non-living things in a garden ecosystem.	An ecosystem is a place where living and non-living things interact with each other and depend on each other. Plants and animals are the living things in an ecosystem. The non-living things include rocks, soil, water and air.	1. Visit a garden and observe and record the names of all living and nonliving things present. Choose a method of presenting your findings to the rest of the class.		I. Make a chart labeled: Living Non-Living Place names of organisms and other things under each heading. E.g. **Living**: Plants, Animals **Non-Living**: Rocks, Soil, Water, Air
2. Observe a variety of model gardens (visuals) or real to identify types of gardens. (Vegetable, flower).	A vegetable garden is a garden that grows vegetables and other plants useful for human consumption in contrast to a flower garden that exists for aesthetic purposes. It typically includes a compost heap, and several plots of divided areas of land, to grow various types of plants. A containerized garden could be made from a box covered with plastic; an old tire or big pots, large food cans, wooden boxes, pails, washtubs, and flower pots. Vegetables such as carrots, radishes, lettuce, tomatoes and peppers are perfect for container gardens.	1. Experiment with seeds to create a containerize vegetable garden. 2. As plants sprout use a ruler to measure the growth of seeds. Record results. (Plant seeds that grow quickly)	Technology Link: About.com: Gardening	II. Answer true and false questions about each ecosystem. Write a letter to your parents convincing them to grow a vegetable garden in their backyard. Give at least three reasons.
3. Experiment with seeds to create a containerized vegetable garden.		1. Draw a Venn diagram to compare the vegetable garden and garden/farm. 2. Make a picture collage showing pictures of the rocky shore on one side and sandy shore on next side. 3. Choose the type of container to grow vegetables in the classroom. Put holes at the bottom or use Styrofoam to soak up excess water. Place soil with peat mix and fertilizer pellets. Add seeds. Water daily.	Technology Link: About.com: Gardening	III. Keep a garden journal to record steps taken from Day 1. Record growth of seeds. Take or draw pictures for the journal.
4. Use ruler to measure the growth of seedlings.				

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LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
5. Investigate the rocky and sandy shores to identify living and non-living parts. 6. Observe and classify plants and animals of rocky and sandy shores, using hand lens. 7. Compare a vegetable garden and garden/farm. Compare rocky and sandy shores.	The rocky and sandy shores are ecosystems. Animals and plants that live in these ecosystems can withstand ocean water rising tides and other harsh conditions. Some animals you would find are: Starfish, crabs, periwinkle, whelks. Some plants you would find are: tiny grass, sea oats, seaweeds, algae	1. Go on a field-trip to a beach to observe and discuss the rocky and sandy shore ecosystems. (Use hand lens) 2. Make models of animals that live on the rocky and sandy shores. 3. Draw and colour pictures of plants that live on the rocky and sandy shores. 4. Make models of rocky and sandy shores. Rocky and Sandy Shores 5. Animal "I Spy" a. Print out the poster of animal habitats. b. Put on your "detective hat" and see how many creatures, you can spot or identify on the poster. c. Online Field Guide Find out more about the animals and plants of coastal and beaches and dunes. d. Colouring Pages Print out pictures of animals on the sandy shore. Make a coloruing book.	A Field Guide to the rocky and sandy shores (Bahamas National Trust) www.mbayaq.org	I. Make models of rocky and sandy shore ecosystems. I. Use Venn Diagrams to compare rocky and sandy shore ecosystems.

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TOPIC: ECOSYSTEMS **STRAND 1: ORGANISMS AND THE ENVIRONMENT**

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8. Observe a coral reef ecosystem to identify the home of the grouper.	The grouper lives in the coral reef. They often rest on the seafloor under ledges, around caves and in crevices and cracks on the reef.	1. Take a tour of Atlantis' aquarium to observe the grouper. 2. Take a trip to the coral reef on the semi-submarine. 3. View a video about coral reefs. 4. Make a model of a coral reef in a shoe box.	*Treasures in the Sea* www.whoi.edu/oceanus/viewarticle.do Bahamas National Trust Resource Library *Harcourt Science* Bk. 4 www.aureliapress.com www.samoa.co.uk/reefs	I. Make a model of the Nassau Grouper. II. Coral Reef in a box-group activity.
9. Research information on the grouper to explain why they are endangered. 10. Investigate to infer what threats affect the grouper.	The grouper is endangered because they are exceptionally vulnerable to over-exploitation because of their spawning aggregation, which form in predictable areas and predictable times, and from which fish can be caught prior to reproduction.	1. Write a report on the effects of over fishing of the grouper. 2. Make a poster to encourage fishermen to obey the laws related to the grouper.	*Treasures in the Sea* Ministry of Agriculture and Fisheries wetpixel.com>…>TheGalley>ConservationandtheEnvironment	III. Report on the Threats to the Grouper. IV. Create a poster to persuade fisherman not to over fish and to obey laws governing fishing.

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LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
11. Research and discuss laws that protect the grouper.	Direct threats to grouper include uncontrolled fishing on spawning aggregations, spear fishing, and the capture of juveniles in mesh traps. Other threats are habitat destruction, coral breakage, siltation, run off, dredging, sewage, and other contaminants harm coral reefs and nursery areas. To protect the Nassau Grouper a closed season from December to February was established. This protects the grouper when they gather in spawning aggregations and are the most vulnerable. Other measures are: marine parks and reserves where fishing of the grouper is prohibited; enforcement of the minimum legal harvest size of three pounds.	3. Invite a speaker from The Department of Fisheries to talk about the Grouper Laws.	Bahamas National Trust The Government of The Bahamas – Department of Fisheries www.bahamas.gov.bs/bahamasweb2/.../ Department of Agriculture and Fisheries www.laws.bahamas.gov.bs/statutes/stature_CHAPTER_242.htm/ www.bahamasb2b.com/news/story.php?title=bahamas...grouper	V. Write a story titled: Why I Should Protect The Grouper. VI. Create an illustrated comic strip explaining the importance of protecting the grouper.

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

CURRICULUM GUIDELINES
GRADE 3
SCOPE OF WORK

TOPIC: EARTH MATERIALS **STRAND 2: PROPERTIES AND STRUCTURE OF EARTH SYSTEMS**

EARTH SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
1. Investigate to identify Earth's natural resources and their uses.	A natural resource is something found in nature or earth that people can use to meet their needs. Natural resources include air, water, soil, plants, animals, minerals and fuels. Natural resources are used in many ways. Air is found above the earth's surface. Air is a mixture of gases. Oxygen is a gas found in the air that animals need to breath in. Plants need carbon dioxide gas from the air. Water is also needed by living things. Without water they would die. Water is found all over the earth. 75% of earth is water. There are two kinds of water on earth. Salt water and fresh water. Salt water can be found in the ocean. Fresh water can be found in rivers, ponds, streams and lakes. Some water on the earth is solid. Solid water is ice. At the North and South Poles it is always cold. The ice and snow do not melt. These are called glaciers and ice bergs. Soil is also used for growing crops and making bricks. Plants are used for food, furniture, paper and clothes. Minerals are used to make coins, furniture and jewelry.	1. Read textbooks, encyclopedias, visit the internet to define natural resources. 2. Make a web to show the various natural resources. 3. Use picture cards to match a product to the natural resource from which it came. 4. Experiment to show where air is found. Place a glass of water on the table. Observe bubbles in water. Bubbles prove that air is in water. 5. What things have air inside? Test 3 objects by placing them in water. 6. Experiment with two types of water salt and fresh water. 7. Make a chart headed: How People Use Resources. Under each resource, list as many ways as possible people use them. 8. Make poster or booklet. Cut out pictures which show people using natural resources (of each natural resource being used by people). Share ideas.	*Harcourt Science* Bk. 2 *Science Horizon* Bk. 3 *Harcourt Science* Bk. 3 *Science Horizon* Bk. 2 www.ecofriendlykids.co.uk/NaturalResourcesEarth	I. List natural resources found in the earth. II. Make a poster of Natural Resources. III. Fill in chart under each resource of 5 ways each resource can be used.

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CURRICULUM GUIDELINES
GRADE 3
SCOPE OF WORK

TOPIC: EARTH MATERIALS **STRAND 2: PROPERTIES AND STRUCTURE OF EARTH SYSTEMS**

EARTH SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
2. Communicate the importance of natural resources to the survival of people.	Natural resources are needed for the survival of people. People need air to breathe, air dries wet clothes, air fills tires on cars and balls. Air helps things to fly and hot air balloons to rise. Moving air which is wind can be changed into electricity. Winds turn the blade of a windmill which turns wheels to produce electricity. Water is needed for drinking, bathing, cleaning, washing clothes and dishes, swimming, boating and for transporting things on the ocean. Water is also used to make electricity at power plants. Minerals are used to make coins, furniture and jewelry. Fuels are used to run engines of cars, trucks etc, in factories, power companies and many other uses.	1. Have a discussion about why people need natural resources. 2. Work in groups. Each group covers a specific natural resource to display its importance to the survival of people – poster, brochure, song, rap, skit, poem. 3. Write a story on the topic, "What would happen if the world ran out of gas?" OR "What would happen if there was no more gas in the world?"	*Science Horizon* Bk. 2 *Harcourt Science* Bk. 2 *Harcourt Science* Bk. 3 *Science Horizon* Bk. 3 EEK – Environmental Education for Kids www.dnr.state.wi.us/org/caer/ce/eek www.wapa.gov/newsroom/pdf/hyfrobook.pdf	I. Grade group work on natural resources.
3. Investigate the sources of air, water, and land pollution.	Pollution is any unwanted matter that can be added to air, water or soil. Air pollution is caused when cars, trucks, and factories burn fuels. This can hurt people's lungs. Rain combines with air pollution and falls to the ground. This pollutes the land and water. When harmful materials are dumped into the water, this causes water pollution.	1. Take/find pictures of air, land and water pollution. Make a poster showing various forms of pollution. 2. How does an oil spill affect marine life? Experiment: Oil Feathers	*Harcourt Science* Bk. 3 *Harcourt Science* Bk. 2 *Science Horizon* Bk. 2 www.greenstudentu.com/encyclopedioypollution	I. Create a poster on sources of pollution and ways to avoid land pollution. Design an apparatus to clean up oil spills from water. Explain how this apparatus works.

CURRICULUM GUIDELINES
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TOPIC: EARTH MATERIALS **STRAND 2: PROPERTIES AND STRUCTURE OF EARTH SYSTEMS**

EARTH SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
		Liquid detergent Water Observe what happened to the feather. (Discuss how this would affect the birds flying ability.) Use detergent and fresh water to clean the feather. Place oil in water. Dip the feather into the water with oil.		
4. Investigate to discover ways to prevent pollution.	People can help keep the air clean. Use buses or trains instead of cars. They should not burn leaves or trash. They can keep the water clean by not dumping garbage into the water. They can keep the earth clean by having clean up campaigns regularly. They can make less trash by recycling or reusing things. **Reuse** means to use over again. People can recycle glass, paper, cans to make different things. Pollution in water and on land makes them dirty, unhealthy and unsafe for humans and other living things. These things that dirty the water , land or air are called pollutants.	1. Develop classroom, school, neighborhood clean ups on a regular basis. 2. People can make less trash by reusing and recycling – create useful items out of things that will usually be thrown away. 3. Beach Clean Up-Get students involved in Project Beach-to pick up trash examine the type of trash. (Beach Buddy) Dolphin Encounter 4. Take a survey of the type s of garbage collected in the classroom/school.	*Harcourt Science* Bk. 2 *Science Horizon* Bk. 2	I. Make a display showing how to prevent pollution. Graph data of garbage collected at school. (Using bar or circle graph)
5. Communicate the role of students as environmental stewards.			www.recycle.com/kidshtml	II. Write an essay about: My Role As An Environmental Steward.

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EARTH SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
	A steward is someone who is committed to caring for something that was given to him or her. Environmental stewards help to conserve our natural resources. Conservation is the wise use of resources. We can conserve resources like water and energy by using them only when necessary.	5. Recycling Round up (Soda cans recycling project) 6. Pollution Patrol – Keep track of garbage accumulation around school or neighborhood; take notes. Report to Environmental Health or School P.T.A.	www.home.howstuffworks.com	
6. Research ways to explain to care for earth's resources.	Recycling makes resources last longer. If aluminum is recycled, less aluminum, called bauxite, needs to be mined. If plastic is recycled less oil is needed to make new plastic. When paper is recycled fewer trees must be cut down. Recycling helps reduce pollution. Making products from recycled plastic and water cause less pollution.	1. Make it crystal clear. Experiment to show the best filters for cleaning dirty water. 2. Experiment Investigate items that can be recycled. Collect aluminum cans to be recycled to be sent to Waste not. (cans For Kids) 3. Investigate whether soil and sand can clean water. Put filter paper in a funnel rest it in a container. Add sand and soil to make a natural filter. Pour coloured water into your sand/soil. Filer. Observe. Does the sand/soil filter clean the coloured water? 4. Have a "Save the Earth" poster competition.	*Science Horizon* Bk. 2 Bahamas National Trust Dolphin Encounter Bahamas *Harcourt Science* Bk. 2 www.theteachersguide.com/earthdaylessonplans.htm	I. List ways to care for the water, air, and land. (Make a chart.) CARING FOR NATURAL RESOURCES Air: 1. 2. 3. Land: 1. 2. 3. Water: 1. 2. 3.

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CURRICULUM GUIDELINES
GRADE 3
SCOPE OF WORK

TOPIC: EARTH MATERIALS **STRAND 2: CHANGES IN EARTH AND SKY**

EARTH SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
1. Explain the water cycle and its relationship to weather and climate. 2. Interpret diagrams to explain changes that occur at each phase of the water cycle.	The process by which water changes form liquid into water vapour and returns to earth as rain, hail or show is called the water cycle. The first step in the cycle begins when the sun heats the water. The water then evaporates. This means that water changes form a liquid into a gas and rises into the air as water vapour. When the water vapour reaches cooler air it condenses, which means it changes from a gas to a liquid, then forms clouds. The drops of water in clouds join up until they are too heavy to float. Then, they fall to the ground as rain. Because the cycle repeats itself continuously, water is always being recycled.	1. Experiment: Investigate how fresh water and salt water evaporate Materials: – Masking tape-spoon – 4 identical jars – Measuring cup – Water - 2 jars lids – Salt – ruler a. Put a strip of masking tape down the side of each jar. b. Using the measuring cup, pour ½ cup water into each jar. Stir a spoonful of salt into 2 of the jars. Mark these with S. Mark the others F. c. Make a mark on each type to show how high the water is. Then put lids on one S jar and on F jar. d. Predict which jar the water will evaporate from first. Record. e. Place the jars in a sunny place. f. Observe jars for a week. Each day mark how high the water in each jar is. Draw conclusion. Water Cycle Discover how much water you use daily. Use the chart to indicate water usage and consider ways to conserve water.	*Harcourt Science* Bk. 2 *Harcourt Science* Bk. 3 *Science Horizon* Bk. 3 www.kidzone.ws/water/ www.learningscience.org/psc2dpropchangmatter.htm	I. Label a worksheet which shows the water cycle. Include: evaporation, condensation, precipitation. Also, answer questions about the water cycle.

CURRICULUM GUIDELINES
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TOPIC: EARTH MATERIALS **STRAND 2: CHANGES IN EARTH AND SKY**

EARTH SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
		2. Zip lock bags, coloured water, tape. a. Fill each bag halfway with water. Zip the bags closed. b. Tape one bag to a window in the sun. Tape the other bag to a window in the shade. c. After 30 minutes, observe both bags. Which bag shows more change? d. Infer what caused the change. 3. Make a model of the water cycle.	*Harcourt Science* Bk. 3 *Harcourt Science Trade Books* – "How Raindrops Fall"	
3. Experiment to describe how clouds are formed.	A cloud forms when water vapour in the atmosphere condenses (turns to tiny drops of water). Condensation happens when the water vapour rises, cods, and changes from a gas to liquid water. These drops of water in a cloud are so small they stay up in the air.	1. How to make a cloud model? Use a clean mayonnaise jar. Put 2 cm of water in jar. Drop match in. Cover quickly with cut balloon and secure with rubber band. Turn off lights. Use flashlight near the jar. Push down on balloon sheath for few secs. Pull up. A cloud forms.	www.schoolscience.rice.edu *Science Horizon* Bk. 2 *Harcourt Science* Bk. 3 www.physcialgeography.net/fundamentals/80.html www.infoplease.com/ce6/weather/AC857399.html	I. As an application of what they learned, each student could draw a picture of how a real cloud would form, and explain the effects the warm earth would have on cloud formation.
4. Classify clouds according to their traits. 5. Investigate to describe weather conditions associated with different types of clouds.	**Cirrus Clouds** are thin, feathery clouds that form high in the sky and bring rain or snow. **Cumulus Clouds** are big and fluffy and are usually associated with fair weather. **Stratus Clouds** look like a dull grey blanket. They form close to the ground and bring rain.	1. Go outside for several days and identify the different types of clouds seen. Make a group of the different clouds seen. Tell which were seen the most and the least. 2. Use cotton, glue and construction paper to form the different types of clouds. Glue cotton to construction paper and label each one. Explain the difference between rain clouds and thunderstorm clouds.	www.eo.ucar.edu/webweather/cloud3.htm/ Google: A to Z Teacher Stuff (Internet) Department of Meteorology – Bahamas	I. Grade the models of clouds. (Activity 2) Label each type of cloud.

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CURRICULUM GUIDELINES
GRADE 3
SCOPE OF WORK

TOPIC: EARTH MATERIALS **STRAND 2: UNIVERSE AND THE SOLAR SYSTEM**

EARTH SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
1. Experiment with models to demonstrate Earth's position in relation to the sun.	The sun is a star, it is a huge ball of hot, glowing gases that give off radiant energy like other stars. It is 1 million times larger than earth. The sun is in the centre of the solar system. Earth is the third planet from the sun. Earth has only one moon. A planet is a large body of rock or gas that orbits the sun. An orbit is the path an object takes as it moves around another object.	1. Experiment with a globe or a ball and a flashlight to assimilate the rotation of the Earth and how we get day and night.	Amazing–spacestsci.edu KidsAstronomy.com (games, puzzles, quiz) www.nasa.gov/audience/forkids/kidsclub Read: *What Makes Day & Night* by Franklyn Branley *Harcourt Science* Bk. 2	I. Write true or false beside each sentence. II. Answer questions on the content. After observing the sunset for a period of one week, create a flip book made from several small horizon drawings to animate the changing position of sunset.
2. Experiment to describe the motion of the earth around the sun.		Classroom.jc-schools.net/sci-units/earth.htm (Play Astro Bingo)	*Harcourt Science* Bk. 2 *Science Horizon* Bk. 3	
3. Experiment to explain the terms orbit, revolve and rotate.	Earth spins like a top. This is called **rotation**. Rotation is the spinning of an object on its axis. Earth's axis is an imaginary line that goes through the North Pole and South Pole. Earth rotates on its axis every 24 hours. One rotation takes a day. Earth also circles the sun. This is called a revolution. A revolution is the movement of earth around the sun. Earth makes one revolution around the sun every 365 ¼ days. One revolution takes Earth a year.	www.enchantedlearning.com/subjects/astronomy/moon/ (interactive activities)	*Science Horizon* Bk. 4 *Harcourt Science* Bk. 4	I. Match the word to its meaning. orbit revolution rotation axis ▪ Movement of earth around the sun ▪ Imaginary line through North and South Pole ▪ spinning of an object on its axis ▪ Path an object takes as it moves around another object. Have students make drawings that show the early morning, noon and late afternoon sun in the sky. Include the shadows that the objects in the drawing cast on the ground and to write the time of day in the lower right hand corner of the drawing.

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CURRICULUM GUIDELINES
GRADE 3
SCOPE OF WORK

TOPIC: EARTH MATERIALS **STRAND 2: UNIVERSE AND THE SOLAR SYSTEM**

EARTH SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
4. Interpret visuals to show various seasons. 5. Investigate to discover what causes seasons.	Earth has seasons because its axis is tilted. This means Earth is tipped to one side. The tilt changes the way the sunlight hits Earth at different times of the year. This changes the amount of light and heat Earth's surface gets. For part of the year the top of the axis (North Pole) points in the direction of the sun. This is summer in the northern half. During that time the south Pole points away from the sun. When Earth is in this position, it is winter in the southern half three months after summer starts.	Investigate how Earth's tilt causes seasons. Experiment: Materials Clear tape — meterstick graph paper — wooden block Large book — Black marker Flash light — Red marker 1. Tape the graph paper to the book. 2. Hold flashlight about 50 cm above the book. Shine the light straight down. The beam will make a circle on the paper. If the circle is bigger than paper bring the light closer. 3. Have a partner use the black marker to draw around the light beam on paper. 4. Observe the brightness of light on the squares. Record. 5. Keep the flashlight in the same position. Have a partner put a block under one end of the book and use the red marker to draw around the light on the paper. 6. Observe brightness on squares. Suppose the paper was Earth's surface and light was the sun. Which area would have warmer weather?	Harcourt Science Bk. 3 Harcourt Science Bk. 2 www.kidexplorers.com www.weatherquestions.com/what_causes_the_seasons www.youtube.com/watch?v=DuiQvPLWziQ www.ndbc.noaa.gov/educate/seasons.shtml	I. Identify each season – Write the name beside it. In groups, create trees for each season and present on a poster. I. Students describe and sequence the seasons, illustrate the weather that is associated with each season, and explain how the Earth's movement around the sun causes seasons.

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GRADE 3
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TOPIC: EARTH MATERIALS **STRAND 2: UNIVERSE AND THE SOLAR SYSTEM**

EARTH SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
		Experiment: Why do we have seasons? Materials Styrofoam ball Two pencils Flashlight 1. Stick a pencil through the middle of the ball, this represents Earth's axis. 2. With the other pencil, draw a line around the middle of the ball. This is the equator. Put the earth on the table. The axis should lean to the right. 3. Shine the flashlight on the left side of the earth. The light represents the sun. Place the light about 13 cm away. Observe where the light rays hit the ball. 4. Shine the light on the right side of the Earth. Where do the light rays hit the ball? Compare how the light hits the ball each time. Draw conclusions. How does this explain seasons in the northern half of the Earth?	*Harcourt Science* Bk. 3 See – A Look At Rotation How does day become night?	

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.

CURRICULUM GUIDELINES
GRADE 3
SCOPE OF WORK

TOPIC: MATTER — **STRAND 3: PROPERTIES AND CHANGES IN MATTER**

PHYSICAL SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
1. Experiment with manipulatives to identify matter as solids, liquids and gases.	**Matter** is anything that has mass and takes up space. Matter is everywhere. The three states of matter are **solid, liquid** and **gas**. A solid takes up space and has a definite shape. It does not lose its shape. Liquids have volume that stays the same, but it can change its shape. A liquid takes the shape of its container. A gas does not have a definite shape. It takes the shape of the container. It fills empty spaces. A gas does not have a definite volume.	1. Put a number of objects on the table. Students observe objects to see if they take up space, have volume and a definite shape. Make three groups of objects - Solids, Liquids and Gases.	*Harcourt Science* Bk. 3 *Science Horizon* Bk. 3	I. Give students 10 pictures. They will write under the picture whether it is solid, liquid or gas. (Activity #3) II. Make a list of the breakfast and lunch items that were eaten the day before. Place them under Solid, Liquid, Gas.
2. Investigate concrete models to compare some characteristics of solids, liquids and gasses.		2. Cut out pictures of each kind of matter. Glue them under the correct state of matter: Solid, Liquid, Gas.	*Harcourt Science* Bk. 3	
3. Classify models into solids, liquids and gasses.		3. Making A Table Divide the table into Solids, Liquids and Gases. Look at pictures of objects given. Put then under the correct state of matter. E.g. book, pencil, rock. These are solids. 4. Experiment What can we find out about gases? Materials bowl of water clear plastic cup paper towel Procedure 1. Push paper towel tightly in the cup at the bottom. 2. Turn the cup upside down. Push it straight down in the water. 3. Lift the cup straight out the water.	"As A Matter of Fact" (Internet) (Categorizing items) www.abcteach.com *Houghton Mifflin Science* Bk. 4 Unit B *Science Horizon* Bk. 3 www.chem4kids.com:Matter	III. Create an item involving solid and liquid. Explain the function of the solid liquid and gas in this item.

CURRICULUM GUIDELINES
GRADE 3
SCOPE OF WORK

TOPIC: MATTER **STRAND 3: PROPERTIES AND CHANGES IN MATTER**

PHYSICAL SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
		4. Infer what happened. (The paper towel should be dry, because the air took up the space in the cup, when it was pushed down in the water.) 5. Investigating Liquids. Have a variety of containers with different shapes. Show students that the same amount of liquid is in each container but because of the different shapes one container may appear to have more than the other.		
4. Experiment to show how matter changes from one form to another.	Water can be a solid, gas or a liquid. Water as solid may be ice or snow. Water as gas is water vapour.	Experiment 1. How can water change? Materials: Ice Cubes Cloth Lamp Clock a. Discuss ways to make an ice cube melt faster. b. Plan an investigation for the two ways. c. Record the time it takes each ice cube is melt? d. Communicate to a classmate which way caused the ice to melt faster.	*Harcourt Science* Bk. 2 *Science Horizon* Bk. 2 *Houghton Mifflin Science* Bk. 4 www.chem4kids.com:Matter www.education.jlab.org/reading/properties_and_changes.html	I. Write a report on the findings of your experiment and share it with the class.

CURRICULUM GUIDELINES
GRADE 3
SCOPE OF WORK

TOPIC: MATTER **STRAND 3: PROPERTIES AND CHANGES IN MATTER**

PHYSICAL SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
		Experiment 2. How much liquid changes to a Gas? Procedure: a. Pour 100ml of water into a measuring cup. b. Put the measuring cup in the windowsill in the sun. c. After several days measure and record how much water is in the cup.		
5. Investigate objects to observe the physical properties of matter, forms and properties of Matter.	The physical properties of matter include its colour, size, shape and texture. A physical property is anything you can observe about an object using your senses. Matter can also break, bend, stretch and magnets attract objects with iron.	1. Physical Properties Investigate the properties of different objects. Make up a chart with columns for the object and each property, such as colour, dull, shiny, hard, soft, rough and smooth. Objects to be tested are: Penny Key Nickel Cotton Balls Marble Candy Students will show – How it Looks – How it Feels – How it Smells – How it Sounds	*Harcourt Science* Bk. 3 *Science Horizon* Bk. 3 www.slideshare.net/.../physical-properties-of-matter-presentation	I. Students will observe various objects in the classroom and give their physical Properties. E.g. ball – small, red, round, soft
6. Experiment to discover the length, volume and mass of objects.	Matter can be measured using a variety of instruments. Rulers, metersticks, measuring tapes are used to measure length. Length can be measured in meters and centimeters or in yards, feet and inches.	1. Use a metric ruler to measure the length of a desk, book, pencil. Use a meterstick to measure door, chalkboard etc.		I. Write which unit would be used to measure various items. E.g. 1 cup of water-millilitre or litre (Use all metric units)

CURRICULUM GUIDELINES
GRADE 3
SCOPE OF WORK

TOPIC: MATTER **STRAND 3: PROPERTIES AND CHANGES IN MATTER**

PHYSICAL SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
		2. Use measuring cups, beakers graduate cylinders and scales to discover the volume and mass of selected objects.		
7. Interpret the metric table to identify metric units used to measure length, volume and mass.	Scales and balances are used to measure mass. Mass is measured in grams and kilograms or in pounds and ounces.	2. Study the Table of Measurements. 3. Investigate the mass, and volume of objects. Materials – Balance – 3-C-cell batteries – 3-D-cell batteries – Clear plastic cup – Marker – Water masking tape – 3 containers (different sizes) Part A a. Place a C-cell battery in the pan on the left side of the balance scale. b. Put a D-cell battery in the pan on the right side. Record which battery is heavier. c. Add C-cells to the left side and D-cells to the right side until, the pans are balanced.	*Harcourt Science* Bk. 2 *Harcourt Science* Bk. 3 *Sliver Burdett Science* Bk. 4 www.HowtoReadaMetricRuler/eHow.com www.ehow.com	I. Match the tool to be used to measure certain objects. E.g. – mass of a book-balance scale – length of a shoe-ruler

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TOPIC: MATTER **STRAND 3: PROPERTIES AND CHANGES IN MATTER**

PHYSICAL SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
		Record the number of C-cells and D-cells you use. Activities using Metric E.g. Marine, Measurement, Length, Capacity and Mass worksheet.	www.thinkmetric.org.uk/ www.gpschools.com	I.
8. Experiment with a graduate to measure the volume of liquids and solids.	A graduated beaker is used to measure volume in units of milliliters and litres.	Part B Fill the Cup half full with water. Use a piece of tape to mark how high the water is in the cup. Predict how high the water will be in each container if you pour the water into it. Mark each prediction with a piece of tape. Write P (for Prediction) on the tape. c. Pour the water into the next container. Mark the height of the water with a piece of tape. Write A (for Actual) on the tape. d. 5. Repeat step 4 for each of the other containers. (Draw Conclusions)	*Harcourt Science* Bk. 3 *Science Horizon* Bk. 4 www.wisc-online.com/objects/index_tj.asp?objid=gch302 www.oakcreek.k12.wi.us/...Ruler%20and20graduate%20lab.pdf	II. Have students conduct a survey of which container can hold the most water. They can verify their predictions by measuring and comparing the amounts of water each container can hold, then graph and interpret the results.

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.

CURRICULUM GUIDELINES
GRADE 3
SCOPE OF WORK

TOPIC: MATTER **STRAND 3: FORCES AND ENERGY**

PHYSICAL SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
1. Investigate to discover the sources of energy.	All energy in the universe comes from the sun. Energy can occur in different forms. The food we eat, the gas we put in our cars and the electricity that lights our homes can all be traced back to the sun's energy. Plants need energy from the sun to make food. Heat from the sun warms everything on Earth. Fuels such as coal and oil, contain huge amounts of energy. Fuels can release energy that can be changed into electricity. Electricity can be made by using other kinds of energy found in nature, such as wind, moving water, oil or coal.	1. Collect pictures to show how the sun provides energy to Earth.	*Harcourt Science* Bk. 3 *Harcourt Science* Bk. 2 Energy Lesson Plans (Internet) www.eere.energy.gov/education	I. Organize pictures that show sources of energy. Then write how each is used on a daily basis.
2. Research information to define fuels.	Heat comes from sunlight and from burning things. Things that are burned and give heat are called **fuels**. Oil, gas, wood, and coals are kinds of fuels. All living organisms store energy. When they die, their bodies are slowly buried by soil. Over many years this material is pressed together until it turns into fuel, like oil or coal. This is called fossil fuel. Gasoline and heating oil are made from fossil fuels. To release the energy stored in fossil fuels, the fuels must be burned. Burning release heat that can be changed into other types of energy.		*Science Horizon* Bk. 2	
3. Investigate to discover how fossil fuels are formed.				
4. Interpret information on the uses of energy from fossil fuels.			*Harcourt Science* Bk.3	

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.

CURRICULUM GUIDELINES
GRADE 3
SCOPE OF WORK

TOPIC: MATTER **STRAND 3: FORCES AND ENERGY**

PHYSICAL SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
5. Investigate the different forms of energy.	Some forms of energy. Sound Energy, which can be heard. Light Energy can be heard/seen. Heat Energy can be felt. Mechanical Energy causes things to move. Electrical Energy allows an electric current to operate things like toasters.	1. Work in groups to find pictures of each type of each type of energy. Each group will cover one form. Make up a display to present to the class. 2. Investigate a way to get thermal energy. (Heat Energy) Materials: Metal — Small piece of wool Button — Sheet of paper Penny 1. Hold hands together. Palms touching. How do they feel? Record what you observed. 2. Predict what you will feel if you rub them together. Record. 3. Now rub hands together very fast for 10 seconds. Record observations. 4. Predict what will happen if a penny is rubbed on wool. Form an hypothesis. Rub button on wool for 10 secs. Record observation. 5. Rub penny with paper. Record observation. Draw conclusion.	*Science Horizon* Bk. 2 *Harcourt Science* Bk. 3	I. Place the form of energy under each picture. List two other things that use these forms of energy. Lesson Review 1 Science Horizon Bk. 2 p. 145

CURRICULUM GUIDELINES
GRADE 3
SCOPE OF WORK

TOPIC: MATTER **STRAND 3: FORCES AND ENERGY**

PHYSICAL SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
6. Communicate the various forms of energy and their uses. 7. Experiment to discover light heat, sound, electricity and their characteristics.	**Light Energy** Some objects give off their own light. The sun and stars give off light. People use light in many ways. We use lamps to read. A flashlight is used to find something when lights go off. **Heat Energy** Heat energy is used to change matter. People use heat to warm homes, take baths, wash dishes and clothes, to cook food, dry clothes and so on. **Sound Energy** People use sound energy to hear music, telephone, fire engines, ambulances police cars etc.	– Use a flashlight with different types of materials to see which things light passes through. Experiment: What Gets Hot? Materials: Wooden spoon, water Plastic spoon, plastic Metal spoon, cup w/handle 3 foam cups, Metal cup w/ Ceramic mug, handle 5. Fill three foam cups with water (hot). 6. Put one spoon in each cup. Wait one minute. – Make a musical instrument. Make a kazoo using a paper towel roll with a hole. Cover one side with wax paper. Secure with rubber band. – Listen to a sound tape to see how many sounds students can identify. – Make a list of objects in your home that use electricity to work.	*Harcourt Science* Bk. 3 *Science Horizon* Bk. 3 *Science Horizon* Bk. 4	I. Make a word map with all the forms of energy. Write 2 uses of each energy under its heading.
8. Research information to identify objects that transfer electricity.	Electricity is used for light and heat to run machines. Energy can be changed from one form to another. E.g. A toaster uses electricity, electricity is changed to heat. The heat toasts the bread.			

CURRICULUM GUIDELINES
GRADE 3
SCOPE OF WORK

TOPIC: MATTER **STRAND 3: FORCES AND ENERGY**

PHYSICAL SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
		7. Gently touch each spoon. Which one is hottest? Record how hot each spoon is-cool, warm, hot. 8. Next fill each cup with hot tap water. Wait one minute. Gently touch each handle. Which one is hottest? Record, Draw conclusions.		
9. Experiment with magnets to discover which objects attract or repel.	Magnets can move iron objects without touching them. A natural magnet is called a loadstone. Magnets come in various shapes:	Experiment: Which metals have magnetic properties? Materials: Magnet — Straight pin Penny — Scissors Piece of foil — Aluminum Paper clip Procedure: 1. Copy chart showing Name of Object Magnetic/Non-Magnetic. 2. Place the magnet next to the penny. Is the penny magnetic? Record. 3. Repeat step 2 for all the objects. Record results. Draw conclusions: Are metals attracted by a magnet? Which kinds are attracted by magnets?	*Harcourt Science* Bk. 3 Magnetic Activities (Internet) www.proteacher.com	I. Circle the objects that can be attracted to magnet. Make a chart Write: Object, Attract, Repel **Magnets** Object | Attract | Repel

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.

CURRICULUM GUIDELINES
GRADE 3
SCOPE OF WORK

TOPIC: MATTER **STRAND 3: FORCES AND ENERGY**

PHYSICAL SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
10. Research information on magnets and their uses.	A magnet has two ends called magnetic poles. A magnet has a north seeking pole (N) and a south seeking pole (S). Magnets are used to make electric motors and generators for telephones, lights, electric heat, television or computers, trains. Magnets hold things up or pick up small things sewing pins, electric can openers, holds things on the refrigerator.			I. Make a list of things that work with magnets. Find pictures to accompany words. E.g. Computers Television Radios Telephones
11. Investigate and interpret pictures to identify conservation.	Conservation is the wise use of resources. We can conserve our resources like energy and water by using them only when necessary and in needed amounts. Also, by recycling and avoiding the use of things that harm the environment.	1. Make slogans and posters to sensitize the public to the need for conservation. 2. Be a leak seeker. Look for water leaks at home. 3. List products that destroy the environment. Make a list of alternate products that can be used that will not harm the environment. – How much waste does your class throw away?	50 Simple Things Kids Can Do To Save The Earth *Harcourt Science* Bk. 3 Conservation – Water (Internet) www.greenbiz.com *Harcourt Science* Bk. 3	I. Write 5 ways to conserve: – Water – Trees – Energy

CURRICULUM GUIDELINES
GRADE 3
SCOPE OF WORK

TOPIC: MATTER **STRAND 3: FORCES AND ENERGY**

PHYSICAL SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
12. Analyze and share ways to conserve energy.		1. Make a chart showing items that were thrown away. E.g. cardboard and other paper; – Glass containers – Plastic containers – Plastic wrappings and bags; – Magazines and newspapers 2. Record the number of items that were thrown away. Total all things that were thrown away. Draw conclusion. How can your class recycle more? In cooperative groups, students will complete an Energy Checklist around the school. They will observe energy being conserved and put a tick in the space beside "conserved." If they observe energy being wasted, they will put an x in the space next to "wasted. Have students discuss the results of their survey. In groups, students will discuss ways to conserve energy in their school.		I. Have the students draw pictures and write a short paragraph on energy conservation for a bulletin board display.

CURRICULUM GUIDELINES
RADE 4
SCOPE OF WORK

TOPIC: INVERTEBRATES **STRAND 1: CHARACTERISTICS OF ORGANISMS**

LIFE SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
1. Distinguish between vertebrates and invertebrates. 2. Describe traits common to all invertebrates.	Animals that have a backbone are called **vertebrates**. All vertebrates have one thing in common, a **backbone**. Vertebrate groups include fish, mammals, reptiles, amphibians and birds. Animals without a backbone are called **invertebrates**. Most invertebrates have exoskeletons. An **exoskeleton** is a hard outer covering that protects an animal's body and gives it support. Some invertebrate groups include insects, spiders, mollusks, sponges spiny-skinned and worms.	1 & 2. Vertebrate or Invertebrate a. Label two trays Vertebrate and Invertebrate. b. Have students choose an animal picture card cut out/model of a box. Observe the picture or model. c. Place the card onto the correct tray. d. Tell one way in which the animals on each tray are similar or different.	*Harcourt Science* Bk. 4 *Science Horizons* Bk. 3 www.factmonster.com (Animal Groups)	I & II. Fold the paper in halves. Label the first half Vertebrates and the second half Invertebrates. Have the students place animals from the list under the correct heading. At the bottom of each section write one way the animals in each group are alike. Distribute worksheets of different animals to cut and paste on a blank sheet.
3. Identify five invertebrate groups.		3. Looking at Invertebrates. a. List several invertebrate groups on the chalkboard. e.g. insects b. Place the students into cooperative groups. Have them choose four pictures of invertebrates. c. Observe each picture. Look at the body parts and covering. d. On a sheet of paper record the name of the invertebrate and the types of body parts or covering it has. e. Use a table to classify each animal into one of the invertebrate groups listed on the chalkboard.		III. Have students observe pictures of different organisms in the various groups of invertebrates. Give each student a sheet of paper. Divide their paper into two sections labeled: Insects, Spiders. Write the names of the organisms under the correct heading.

CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: INVERTEBRATES **STRAND 1: CHARACTERISTICS OF ORGANISMS**

LIFE SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
4. Identify the main traits of insects and spiders. 5. Compare traits of insects and spiders.	Insects and spiders are invertebrates that belong to the group called **arthropods**. **Insects** have three body segments: head, thorax and abdomen, and six legs. **Spiders** have two body segments: head and abdomen and eight legs.	4. Go on a nature walk around the school. Collect insects and spiders in containers for observation. Use a hand lens. List three traits of insects and spiders. Compare and contrast them. (Be careful not to collect animals that bite and release after observation.) 5. Make models of insects and spiders using reusable materials. Write three sentences to describe your model.	*Science Horizons* Bk. 2 www.amonline.netau/spiders/diversity/what/difference.htm *Harcourt Science* Bk. 2	IV & V. Give the students materials that they will use to complete the body of an insect and a spider. Have the students paste/glue their completed insect and spider on a sheet of paper. Below the insect and spider write two sentences to tell how insects and spiders are alike and three sentences to tell how they are different.
6. Describe the life cycle of mosquitoes and cockroaches.	A **life cycle** is the order of the stages in an animal's growth. Some life cycles have more stages than others. The stages can look very different. The life cycles of some insects like the grasshopper and the **cockroach** go through three stages: **egg, nymph,** and **adult.** Other insects like the mosquito and the housefly go through four stages: **egg, larva, nymph** and **adult**.	6. Distribute pictures and sequence them to show the life cycle of mosquitoes and cockroaches. 6. Create a mobile of the life cycle of the mosquito or cockroach. a. Cut pictures of the stages of development in the life cycle of the insect from handouts, internet etc. b. Glue them on construction paper. c. Connect them with wire to form a circle. d. Hang the mobile from a plastic hanger using string.	www.uen.org/themepark/cycles/animal.shtml	VI a. Give each student a hand out showing pictures that represent the different stages of the life cycle of insects and spiders. b. Then distribute circular sheets of paper. c. Have the students cut and paste the pictures on the circular paper to correctly show the life cycle of an insect (on one circular paper) and the life cycle of a spider (on another circular paper). d. The students can colour the pictures and label each life cycle.

CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: INVERTEBRATES **STRAND 1: CHARACTERISTICS OF ORGANISMS**

LIFE SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
7. Investigate how insects use mimicry and camouflage.	Animals are designed to survive in their particular environment. They have special features called **adaptations** that allow them to live where they do. An adaptation is a body part, behaviour, covering or an action that helps an animal to survive in its environment. **Mimicry** is an adaptation in which an animal looks or sounds like another animal. **Camouflage** is an animal's colour, shape or pattern that helps it blend in with its environment.	7. Set up a display of animals (toy or plastic). Have students volunteer to choose an animal from the display. Each student will be asked a question related to an adaptation the animal has. E.g. Why does the giraffe have a long neck? Share answers with the class. 7. Blending In a. Design and draw a new kind of insect. b. Look around your classroom for different colours, shapes, and patterns that your insect could blend with and not be seen easily. c. When you have finished drawing your insect, cut it out. Your teacher will tell you when to "hide" your insect. Predict where your insect will be hardest to find. Put your insect in that place. See if others can find it.	*Harcourt Science* Bk. 4 *Silver Burdett Science* Bk. 4 *Houghton Mifflin Science Discovery Works* Bk. 3 *Science Horizons* Bk. 4 *Science Horizons* Bk. 4 www.gets.gc.k12.va.us/elementary/science3.htm (Animals on Defense) scienceray.comBiology>Zoology www.thewildones.org/Animals/camo.html	VII. Have students observe pictures of four organisms in the environment. On a folder sheet name each organism. Write an adaptation it has and how it uses it to meet its needs. Tell if the organism used camouflage or mimicry.

CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: INVERTEBRATES **STRAND 1: CHARACTERISTICS OF ORGANISMS**

LIFE SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
		7. Adaptation – mimicry Students work in pairs. Blind fold about six students. Provide the students with instruments to make a sound. (Each in the pair will have the same instrument sound.) Place students at strategic places in the classroom or outside. Each child will make the sound with their instrument until they find their partner who is also making the same sound. This is to show how babies and parents have adapted to each others sounds.		

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.

CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: THE HUMAN BODY AND HYGIENE — **STRAND 1: STRUCTURE AND FUNCTION IN LIVING SYSTEMS**

LIFE SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
1. Identify the main parts of the respiratory system.	The transport system that takes air into the body when we breathe is called the **respiratory system**. Air enters the body through the nose or mouth and goes down the **windpipe** or **trachea** into the lungs. In the lungs the air goes into air sacs called alveoli. The alveoli are at the ends of tiny air tubes. As blood passes through the lungs, it gives off carbon dioxide and takes in oxygen. The respiratory system and the circulatory system work together during respiration. The **diaphragm** is a dome-shaped muscle used in breathing. It is at the bottom of the lungs. When breathing in the diaphragm contracts.	1. The teacher will make an apron showing the outline of the respiratory system. One student will wear the apron. Other students will be given the parts (cut outs) of the respiratory system. The students will come up one at a time and attach the part correctly on the apron.	*Science Horizons* Bk. 4 *Harcourt Health and Fitness* Bk. 4 www.kidskonnect.com www.kidinfo.com/Health/Human_Body.html www.kidsbiology.com/hunan_biology/index.php	I & II. Each student will be given a list of the parts of the respiratory system and a diagram of the respiratory system. Use the words from the list to correctly label the parts of the respiratory system. Write one reason why the respiratory system is important. Make a model of the respiratory system and label its main parts. Write one reason why the respiratory system is important.
2. Demonstrate the importance of the respiratory system.		2. Conduct a breathing exercise. Sit in a chair and count how many breaths you take in 30 seconds. Exercise for two minutes. Stop and count how many breaths you take in 30 seconds. List two reasons why breathing is important.		
3. Identify the main parts and the importance of the Nervous System.	The **nervous system** is responsible for all the activities of your body. The **brain, spinal cord** and **nerves** make up the nervous system. The brain receives information from various parts of the body through the nerves. The nerves form a network throughout the body. The brain then sends signals to different parts of the body. The nerves are all connected to the spinal cord.	3. Pin the Part a. Place an unlabeled diagram of the nervous system on the chalkboard/bulletin board. b. Place labels of the parts of the nervous system on a table nearby.	*Harcourt Science* Bk. 4 *Science Horizons* Bk. 5 *Harcourt Health and Fitness* Bk. 4 www.teachers.ash.org.au/jmresources/systems/body.html	III & IV. Have the students observe individual pictures of the three main parts of the nervous system that have been numbered. a. Write the name of each part of the nervous system. b. Explain how the three parts work together.

CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: THE HUMAN BODY AND HYGIENE **STRAND 1: STRUCTURE AND FUNCTION IN LIVING SYSTEMS**

LIFE SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
	The spinal cord is located in the spine or backbone.	c. Have a volunteer pick a clue card out of a bag. The clue card will have a description of each main part of the nervous system written on it. d. The student must solve the clue and choose the correct label that matches the clue. Then place a piece of tape on the label and pin it on the correct part of the diagram.		
		4. Trace how signals travel to the brain and back to the parts of the body on a flow chart. Write a paragraph to explain the importance of the nervous system.	*Harcourt Science* Bk. 4 *Harcourt Health and Fitness* Bk. 4 *Science Horizons* Bk. 5	

CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: THE HUMAN BODY AND HYGIENE **STRAND 1: STRUCTURE AND FUNCTION IN LIVING SYSTEMS**

LIFE SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
4. Identify risk factors to health and how they may be reduced.	It is important that the food we eat and the water we drink are clean and safe. If germs (such as harmful microorganisms and parasites) get into our food and drinks they may give us **food poisoning** resulting in diarrhea or vomiting. **Unsafe** or **contaminated drinking water** and **poor sanitation** can cause many diseases such as vomiting, diarrhea, skin irritations, or gastrointestinal diseases. Food poisoning can be prevented by: – Preventing germs from reaching foods and drinks – Washing hands with clean water and soap after using the bathroom – Washing hands before and after preparing and eating food – Keeping fingernails clean – Storing food properly Unsafe or contaminated drinking water and poor sanitation can be prevented by: – Using safe water that has been treated or water from a protected well – Boiling water that may not be safe	5. Set up a scene displaying uncovered food, an open container of water with leaves or other debris, a potty, etc. Present a short skit to the class demonstrating how food can be poisoned, water made unsafe or contaminated, and poor sanitation. a. Discuss the skit with the class. b. Distribute drawing materials. c. Instruct the students to make a drawing showing an unsafe/unhealthy habit. Then write what the unhealthy habit causes.	Family Nutrition Guide *Harcourt Health and Fitness* Bk. 4 www.ucsfchildrenshospital.org>PatientEducation www.ncbi.nlm.nib.gov>...>HealthServRes>v www.RightHealth.com	V. Review activity. On a sheet of paper write: a. Two ways to prevent food poisoning. b. Two ways to have safe drinking water. c. One way to have good sanitation. Using a blank sheet of paper, draw three large frames. ☐☐☐ (squares connected) Use the frames to draw a picture of how to prevent the following health risks: Food poisoning Unsafe drinking water Poor sanitation Write a sentence to explain each frame. Collect pictures and label them 1. Washing hands 2. Washing hands in the bathroom 3. Preparing food with gloves on hand. 4. Putting food in the refrigerator. Etc.

CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: THE HUMAN BODY AND HYGIENE **STRAND 1: STRUCTURE AND FUNCTION IN LIVING SYSTEMS**

LIFE SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
	– Use clean covered containers to collect and store water – Use a toilet and keep it clean – Teach children to use a potty and flush the faeces in a toilet – Clean up faeces from pets			Assessment Coral Reef in a box Assessment Planets. Have students make a model of the Solar System.
5. Identify safety procedures for natural disasters.	Natural disasters are forces of nature. General suggested procedures for natural disasters such as hurricanes, floods or tornadoes are: 1. Remain indoors 2. Only enter disaster area if necessary 3. If outdoors get to a safe area 4. Stay away from windows 5. Do not touch fallen or damaged electrical wires 6. Store/properly secure all loose objects 7. Identify nearest available shelter	6. Discuss safety procedures for natural disasters such as hurricanes floods or tornadoes. Have students work in groups to create a pamphlet of safety procedures for natural disasters.	www.naturaldisasters.com *Harcourt Health and Fitness* Bk. 4 www.einnews.com/bahamas/newsfeed-bahamas-natural-disasters www.fema.gov/kids/ www.pge.com/myhome/edusafety/naturaldisaster	VI. Have students observe a video or other presentation about natural disasters. On a sheet of lined paper write four safety tips/procedures for natural disasters. Draw a comic strip that shows how to remain safe during a natural disaster. Add dialogue or what the characters say. Write a title for your comic strip.

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CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: PLANTS — **STRAND 1: STRUCTURE AND FUNCTION IN LIVING THINGS**

LIFE SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
1. Investigate plants with seeds and without seeds.	A **seed** is a part of a plant from which a new plant can grow. A plant that can form new plants from seeds is called a **seed plant**. E.g. hibiscus, dandelion, pine tree A plant without seeds is called a **non-seed plant**. Some non-seed plants reproduce by **spores** instead of seeds. The spores are especially made to survive drought and harsh conditions. The main groups of non seed plants are algae/seaweed, mosses and liverworts and ferns.	1. Create a container garden to grow seed plants and non seed plants. Examine plants. Identify the plants that have seeds and the plants that do not have seeds. Use a table to classify each plant. Go on a field trip to a local plant nursery, a garden, a forest or The Bahamas National Trust. Identify seed and non seed plants.	*Science Horizons* BK. 3 *Harcourt Science* Bk. 3 *Silver Burdett Science* Bk. 4	I. Have the students draw a seed and a non seed plant. a. Write the name of each plant and where it lives. b. Explain how each plant reproduces. c. Circle the reproductive part of the plant on the drawings.
2. Classify plants with flowers and plants with cones.	When a tiny plant grows out of the seed this is called **germination**. Two groups of plants form seeds. One group is the plants that have **flowers**. Flowers grow on bushes, trees or on small plants. The other group of seed forming plants is plants that have **cones**. Cones grow on some evergreen trees such as pine trees, spruce trees, hemlock, cedar etc.	2. Distribute pictures/specimens of plants with flowers and plants with cones. Have students observe and examine each specimen/picture. Use a classification table to group the plants. (Note. Students work in cooperative groups)	*Science Horizons* Bk. 3 *Harcourt Science* Bk. 3 www.dmturner.org/Teacher/Library 14thText/PlantsPart1.html	II. Give the students a blank classification table. a. Have them name four plants below each phase. b. In complete sentences, tell how plants with flowers and plants with cones are similar and how they are different.
3. Compare monocots and dicots.	All plants that produce flowers and seeds are flowering plants. The seeds they produce may have one or two food leaves called cotyledons.	3. Go on a field trip to a local plant nursery, a garden, forest or The Bahamas National Trust. Identify monocots and dicots.	*Science Horizons* Bk. 3	III. Distribute packets of leaves to each student. Trace the leaves in the packet. Identify each leaf as a monocot or a dicot.

CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: PLANTS **STRAND 1: STRUCTURE AND FUNCTION IN LIVING THINGS**

LIFE SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
	Flowering plants are grouped by the number of food leaves their seeds produce. Those with a single food leaf are called **monocots** and those with two food leaves are called **dictos**. Monocot plants have leaves with parallel veins and dicots have leaves with a network of veins.	3. Take a nature walk. Have students distinguish monocots from dicots and collect samples of leaves to classify.		
4. Predict which of two seeds will germinate first. 5. Compare the growth rate of two plant specimens.		4 & 5. Plant two different seeds. Predict which seed will germinate first. Use a ruler to measure the growth rate of each plant. Record data. Compare the growth rate of the seeds.		IV & V. Have the students use their recorded data from the germination activity to answer the following questions: a. What changes did you observe in the seeds? b. How quickly did the changes take place in the different seeds? c. How did observing the seeds help you understand more about seeds?
6. Identify and describe indigenous flowering plants in The Bahamas.	**Indigenous plants** are plants that are native to a specific country. There are many indigenous flowering plants in The Bahamas, such as strong bark which has white flowers, morning glory with purple bell shaped flowers, rooster comb with yellow flowers, wild sage with red and yellow flowers and purple fruits in bundles, and the lignum vitae (tree of life) which has lots of flowers ranging in colour from blue to purple.	6. Have the students observe pictures or specimens of indigenous flowering plants in The Bahamas. Make a list of each plant and describe its leaves and flowers. 6. Arrange a field trip to The Bahamas National Trust (Family Island teachers can explore a similar site) Ardastra Gardens or Botanical Gardens	Bahamas National Trust Retreat – Village Road Nassau Bahamas www.ardastra.com/plantinfo.html	VI. Have the students complete a worksheet by matching the drawings of indigenous flowering plants to its name. Have the students make a booklet containing drawings of five indigenous flowering plants and a brief description of each one.

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.

CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: CONSERVING ECOSYSTEMS **STRAND 1: ORGANISMS AND THE ENVIRONMENT**

LIFE SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
1. Define food chain and web. 2. Distinguish between producers, consumers and decomposers. 3. Create a food chain and web. Identify plants and animals that live in the pine forests, coral reefs and mangroves.	All living things need energy to live. Living things get their energy from food. A **food chain** is the flow of food in an ecosystem from one living thing to another. A food chain also shows how energy moves through the environment. Living things in an ecosystem can be classified as **producers, consumers** and **decomposer**. **Producers** are plants; they make their own food. **Consumers** are animals; they eat other living things as food. **Decomposers** are living things such as mushrooms and earthworms; they breakdown dead plants and animals for food. A food chain begins with a green plant, the producer. It continues with an animal, the consumer, that eats the green plant. A food chain may include one or more other consumers. A **food web** is a combination of several food chains.	1. Have four students hold labeled picture cards that are connected using string. Each student will identify which organism he/she represents. The other students will read the order in which the organisms are connected. Explain and discuss the food chain. 2 & 3. Food Chains Play this game with ten students at a time. a. Have each player wear a tag that names him or her as a kind of plant, animal, fungi, bacteria or microbe. b. Scatter game markers over a large area. The game markers read producer, consumer or decomposer. c. Each round of the game is 30 seconds. d. At the end of the rounds all the players that have similar game markers will form a group. Check to see if anyone does not belong in a particular group.	*Harcourt Science* Bk. 3 *Silver Burdett Science* Bk. 4 www.vtaide.com/priglfoodchains.htm "Iguana of the Bahamas"	I, II & III. Have the students cut and paste pictures to make their own examples of two food chains. Name the producer and consumers. Draw arrows between parts of each food chain to make a food web. Answer the question: What does a food web show, that a food chain cannot show?

CURRICULUM GUIDELINES
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SCOPE OF WORK

TOPIC: CONSERVING ECOSYSTEMS **STRAND 1: ORGANISMS AND THE ENVIRONMENT**

LIFE SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
	An **ecosystem** is a place where living things and nonliving things interact. There are many different types of ecosystems. Each ecosystem has plants and animals that are specially adapted for living in that ecosystem. Some examples of ecosystems are pine forests, coral reefs and mangroves.	e. Have a player from each group join up to form a food chain. f. Then have two or more food chains join up to form a food web. 3a. View videos/observe pictures to identify plants and animals that live in the pine forest, coral reef and mangrove. Make a list of plants and animals that live in each ecosystem. Participate in a field trip at either or all of these ecosystems (pine forest, coral reefs, mangroves). 3b. Divide the class into groups of five students. Assign one of the following animals or plants to each group: grouper, crawfish, red mangrove etc. Using textbooks or internet resources have the students research the ecosystem of which each animal or plant is a part. Ask the students to describe the nonliving features and make a list of three or four plants or animals that also live in that ecosystem have each group give oral report to the class.	*Harcourt Science* Bk. 3 *Harcourt Science* Bk. 4 www.bahamas.gov.bs/BhamasWeb/VisitingTheBahamas.hsf/subjects/Ecosystems+of+The+Bahamas	III. Give the students a diagram of a pine forest, coral reef and mangrove ecosystem. Have the students draw four organisms found in each ecosystem on the diagram.

CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: CONSERVING ECOSYSTEMS **STRAND 1: ORGANISMS AND THE ENVIRONMENT**

LIFE SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
4. Hypothesize the effect on organisms when a pine forest is damaged.	A **forest** is an area in which the main plants are trees. In a pine forest there are pine trees, bushes, ferns, and grass. Animals such as raccoons, birds, snakes etc. live here. When pine forests are cut or burned it can destroy habitats causing animals to leave an area and plants that grow there to disappear.	4. View a chart/video of a pine forest destroyed by cutting or burning. Write a paragraph to predict how these actions affect organisms that live there.	*Harcourt Science* Bk. 3 www.educationalimages.com/it060005.htm *Science Horizons* Bk. 3 outdoors.webshots.com/photos/2177207600763079 20ajRnsk	V. Have the students draw a picture of how they imagine a pine forest would look after it is damaged. Write two sentences to explain how the damaged pine forest would affect the organisms that lived there.
5. Explain how a coral reef differs from other ecosystems.	**Coral reefs** are made up of the rocky skeletons of many tiny animals called corals.	5. Make a mural of a coral reef ecosystem. Write a paragraph to describe it.	*Treasures in the Sea*	VI & VII. Have each student create a poster of a coral reef habitat and what lives there.
6. Explain the importance of coral reefs.	Coral reefs provide homes for many marine animals such as fish, crabs, crawfish, conchs, sea eggs or sea urchins, sponges, starfish and octopus. Coral reefs provide **protection** from storms by breaking up the force of the waves before they reach the shoreline. Coral reefs are a great **source of food** for marine life and they also serve as **tourist attractions**. The third largest barrier coral reef in the world is found in waters offAndros Island.	6. Invite a resource speaker to talk about the benefits/importance of coral reefs and some dangers they are facing. 6. Go on a field trip to experience a coral reef ecosystem. Take the glass bottom boat, semi-submarine or other fishing vessels licensed for this activity.	*Harcourt Science* Bk. 4 Sea world Explorer (Moses Plaza Downtown Nassau) oceanworld.tamu.edu>students>coral www.bahamas.gov.bs/...nsf/.../Ecosystems+of+The+Bahamas www.seaworld.org/infobooks/coral/conscr.htm/	VII. Identify four organisms on the poster. Tell how each organism uses the coral reef. Design and make a poster of a coral reef habitat to communicate the importance of coral reefs and what lives there.

CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: CONSERVING ECOSYSTEMS **STRAND 1: ORGANISMS AND THE ENVIRONMENT**

LIFE SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
7. Identify the four types of mangroves.	**Mangroves** are ecosystems found along the coast and in swampy areas with brackish and salt water. The four common types of mangroves found locally are red mangroves, black mangroves, white mangroves and buttonwood. Each type of mangrove has a special role to play in the ecosystem.	7. View video/specimens/fact cards of four types of mangroves. Identify and describe each one. Listen to the mangrove song by BREEF Teachers.	*Wondrous West Indian Wetlands* Adventure Learning Centre Mangroves Ecosystem *Harcourt Science* Bk. 4	VII & VIII. The students will complete a mangrove ecosystem worksheet by filling in the habitat, roots, leaf appearance/ position flowers and fruits of the four types of mangroves, and organisms that may be found there.
8. Communicate characteristics of each type of mangrove/ Identify organisms found in this ecosystem.		8. Visit a mangrove ecosystem. Record and illustrate the types of plants and animals that you observed. 8. Make a model of a mangrove ecosystem.	*Wondrous West Indian Wetlands* www.youtube.com/watch?v=bDJTKFE_fc www.pintailpride.com/pdfs/angroves.pdf	
9. Infer the importance of mangroves.	**Red mangroves** live in water along the shoreline. They have thick prop roots that trap debris and mud. They help to prevent waves from flowing inland, and this helps to reduce flooding. **Black mangroves** live in shallower salty water. They are surrounded by thin breathing roots.	9. Use pictures/specimens to design a poster that tells about the importance of mangroves.	*Wondrous West Indian Wetland* www.flmnh.ufl.edu/Fish/.../mangrove/importance.html www.eoearth.org/article/Bahamian_mangroves	IX. Write a story entitled "A day in the life of a black, white or red mangrove tree".

CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: CONSERVING ECOSYSTEMS **STRAND 1: ORGANISMS AND THE ENVIRONMENT**

LIFE SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
	White mangroves usually live in brackish water. They have thick, knobby breathing roots. **Buttonwood** lives near the sea on rocks and beaches. They have no prop or breathing roots. Mangrove ecosystems serve as an important source of nutrients and nurseries for young fish and as homes to many animals such as crabs and shellfish. In The Bahamas, mangroves are referred to as “flats”, “swamp” and “swash”.			

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

CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: CHANGES ON EARTH **STRAND 2: PROPERTIES AND STRUCTURE OF EARTH**

EARTH SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
1. Identify the three layers of the Earth.	Earth is made up of three layers. These layers are the **crust**, **mantle**, and the **core**. The **crust** is the outer layer and includes the surface of the Earth. The crust is the layer we live on. It is rough and uneven with hills and valleys and has a layer of bedrock at its base. Below the crust is the **mantle**. This layer is thicker than the crust and is made up of lighter rock material. The thickest layer is the **core** which consists of two parts: the **outer** and the **inner** core. The core is made of very hot iron. Part of it is liquid and part is solid.	1a. Observe a model/diagram to identify the three layers of the Earth. 1b. Investigate the Earth's layers. Give each student half of an apple and a ruler. Draw a picture showing its layers. Measure the thickness of the peel, the thick white part and the core. Explain which parts of the apple are like the crust, mantle, and core of Earth.	*Harcourt Science* Bk. 4 *Harcourt Science Workbook* 3 *Silver Burdett* Bk. 4 http://science.pppst.com/layers.html	I & II. Give each student an object e.g. peanut M & M, or hard boiled egg. Have each student tell which material or part represents the crust, the mantle and the core. Write a brief description of each layer of the Earth. 1. Display photographs of a variety of places where rocks are found. Include underwater locations, as well as any unusual places you can find rocks. 2. Have students describe what they would encounter while traveling through a tunnel from where they live straight through the earth. They will locate on a globe or map where they would exit the tunnel.
2. Describe the Earth's layers.		2. Make a model of the Earth using a small gum ball and modeling clay. Describe each layer.		
3. Describe weathering and erosion.	Some natural forces that change the Earth are weathering and erosion. **Weathering** is the breaking up or wearing away of rocks by water, air (wind), ice and living things. **Erosion** is the moving of weathered rocks and soil from one place to	3. Conduct an experiment to find out how hard rocks are. a. With your group predict what will happen if you rub two rocks against each other. Record your prediction.	*Science Horizons* Bk. 3 Houghton Mifflin Science Discovery Works	III. Have the students observe rock that has been weathered. a. List four things that can weather a rock. b. How is weathering different from erosion?

CURRICULUM GUIDELINES
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TOPIC: CHANGES ON EARTH **STRAND 2: PROPERTIES AND STRUCTURE OF EARTH**

EARTH SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
	another by moving water, wind or ice (glaciers). Erosion can cause mountains and hills to be worn down to become flat lands and can also cause scratches, grooves and basins to be formed on the Earth's surface.	b. Hold two small rocks over a clean sheet of white paper. Press them together and rub hard. Record your observations. c. Infer what might happen to large rocks.	www.kidgeo.com/geology-for-kids/0060-weatheringphp	
4. Identify the causes of weathering.	Some natural forces that change the Earth are weathering and erosion. **Weathering** is the breaking up or wearing a way of rocks by water, air (wind), ice and living things. **Erosion** is the moving of weathered rocks and soil from one place to another by moving water, wind or ice (glaciers). Erosion can cause mountains and hills to be worn down to become flat lands and can also cause scratches, grooves and basins to be formed on the Earth's surface.	4a. Conduct an experiment to show how glaciers change the Earth. a. Make a model of a glacier. b. Predict what will happen to the surface of the soil if the glacier is dragged over it. Record your prediction. c. Put about 3cm of soil in an aluminum pan. Take the glacier model and use a paper towel to move it in one direction over the soil in the pan. Record your observation. 4b. Give each pair of students 1 cup of soil, 1 cup of stones, and 1 cup of sand. Use these materials to make a hill that will not wash away when you pour 1 cup of water over it. Make the hill in an aluminum pan.	Houghton Mifflin Science Discovery Works	IV. Choose an area around your school. Look for some evidence of erosion or weathering. Write a report about the results you found.

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GRADE 4
SCOPE OF WORK

TOPIC: CHANGES ON EARTH **STRAND 2: PROPERTIES AND STRUCTURE OF EARTH**

EARTH SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
5. Identify ocean resources.	The oceans are an important sources of food, minerals, freshwater, oil and natural gas. The ocean produces about 65% of the oxygen in the air. One mineral taken from the ocean water of The Bahamas is salt. Heat from the sun causes fresh water to evaporate from the ocean leaving the salt behind. Ocean water is also changed to **fresh water** by a process called **desalination**, which removes salts and other dissolved solids from ocean water. Another mineral taken from the ocean in The Bahamas is **aragonite**. Aragonite is a very fine lime stone sand used in the manufacture of glass, cement, fertilizers and chemicals. Aragonite is dredged from the sea at Ocean Cay in Bimini. Marine plants such as **seaweed** are used in many countries as a source of food, medicine, in shoe polish, soap and as a fertilizer.	5. Salt from the Sea. What you will need: Seawater (salt) 2 or 3 jars Food colouring A piece of aluminum foil Eye dropper What to do: 1. Pour some of your seawater into each jar. (if you don't have real seawater you can make some by mixing 3-4 table spoons of salt with 1 cup of water. Use hot water to dissolve the salt quickly.) 2. Add a few drops of different food colouring to each jar. 3. Using the eye dropper, drop some seawater onto the foil. Be creative and make designs using your different colours of seawater solutions. 4. Allow the seawater to dry up (evaporate). This may take several hours. To help speed up the process, put your foil and seawater in the sun. 5. After the water has evaporated, what do you see on the foil?	*Science Horizons* Bk. 4 *Harcourt Science* Bk. 4 www.hometrainingtools.com/seashore http://marinebio.org/oceanresources.asp	V. Students will design and conduct an experiment to form freshwater from saltwater. Then write down conclusions: 1. What did you observe? 2. What did you infer happened to the salt water as it sat in the sun? 3. What can you conclude about the water cycle and ocean water?

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CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: CHANGES ON EARTH **STRAND 2: PROPERTIES AND STRUCTURE OF EARTH**

EARTH SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
6. Investigate the movement of the ocean water and how it is affected by the moon.	Water covers almost three quarters of the earth's surface. About one tenth of all of the water on the earth is fresh water and nine tenths of it is saltwater. Most of the saltwater is found in the oceans. Water moves from one ocean to the other in rivers called **currents**. **Ocean currents** are parts of the surface layer of the ocean that move continuously in a particular direction forming rivers in the ocean. Wind blowing over the surface of the ocean transfers energy to the water and causes waves to form. Waves are the alternating rising and falling of water. Tides are the alternate rise and fall of the oceans and seas and the bodies of water that are connected to them. These changes in the surface level of the ocean are caused by the **gravitational force** of the moon acting on the oceans and seas.	6. Design an experiment to create waves, tides and currents. 6. Take a field trip to the beach and observe wave action.	*Science Horizons* Bk. 4 *Harcourt Science* Bk. 4 www.science–class.net/oceanography/waves_currents_tides.htm	VI. Have the students watch a video of wave action. Count the frequency (how often waves occur in a given time) of the waves on different parts of the beach. Record your findings.

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TOPIC: CHANGES ON EARTH **STRAND 2: PROPERTIES AND STRUCTURE OF EARTH**

EARTH SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
	The force of gravity is strongest on the parts of the earth closest to the moon and weakest on the parts of the earth farthest form the moon. Water on the side of earth nearest the moon is pulled away from Earth by gravitational force. On the side of the earth farthest from the moon, the solid earth is closer to the moon than the water resulting in the earth being pulled more toward the moon than the water. This causes a tidal bulge. The highest tides occur when the moon and the sun are in line with Earth. The motion of the ocean causes weathering and erosion to the shoreline.			
7. Infer what is ocean pollution/ examine its effect on organisms in the ocean.	Pollution of the oceans can be caused by the dumping of wastes and by oil spills. It can also be caused by fishermen using chemicals like bleach to catch crawfish. Garbage is a large source of ocean pollution. Pollution damages the oceans and destroys plant and animal life. We should take every precaution to prevent pollution.	7. Create an oil spill in a tank with water and have students experiment to find the best possible ways to clean it up.	*Science Horizon* Bk. 4 www.kiddyhouse.com/themes/environ/water.htm	VII. Have the students design a flyer. Outline two forms of ocean pollution. Illustrate how the forms of pollution affect the environment.

CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: WEATHER **STRAND 2: CHANGES IN EARTH AND SKY**

EARTH SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
1. Define Meteorology.	**Meteorology** is the study of weather and the atmosphere. **Meteorologists** are scientists who study and measure weather conditions. Meteorologists have developed tools for measuring weather conditions such as air temperature and wind speed. They use the information from the weather instruments to predict the weather.	1. Visit the meteorological office to observe how they predict weather. 2. View a video or weather forecast on television or radio and compare these weather predictions to the actual weather for that week.	*Science Horizons* Bk. 5	I. Take on the role of a meteorologist. Observe and record current weather conditions. Then predict the weather for the next day and write your own forecast.
2. Describe the Earth's atmosphere.	The **atmosphere** is the air that surrounds Earth. It is a very thin blanket surrounding the entire Earth and is a mixture of gases, solids and liquids. The air we breathe is made up of 78% nitrogen, 21% oxygen, 0.4% carbon dioxide, up to 0.6% water vapour and traces of other gases including ozone, helium and hydrogen. The air in the atmosphere has certain properties. Air takes up space, has weight and presses on things. The atmosphere has layers. Weather takes place in the lowest layer of the atmosphere.	2. View a chart to describe and discuss the Earth's atmosphere.	*Harcourt Science* Bk. 3	II & III. Have the students use a paper plate to make a model of the gases that make up the atmosphere. On the back of the paper plate, list three properties of air.
3. Investigate the properties of air.		3. Conduct an experiment to investigate the properties of air. Air Pressure jars, 2 rubber bands, string, plastic bags Procedure: 1. Students will fill a plastic bag with air by blowing them up. 2. Tie the air filled bags, upside down to each jar with its mouth over the opening of the jar. 3. Wind a string very tightly around the bag and jar and tie it. 4. Press down on the bag, rest objects on top of them. What happens?	*Science Horizons* Bk. 5	

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CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: WEATHER **STRAND 2: CHANGES IN EARTH AND SKY**

EARTH SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
4. Describe the elements of Weather.	**Weather** is what is happening in the atmosphere at a certain place. **Temperature**, **wind** and **precipitation** are all elements/parts of weather. **Temperature** is a measure of how hot or cold something is. **Wind** is the movement of air. **Precipitation** is any kind of water from the atmosphere that falls to the ground. **Climate** is the average weather of a region over a long period of time.	4a. Make a chart to record data. b. Write the dates in the first column. c. Use a thermometer to measure the temperature outside. Write this in the second column. d. Use a wind chart to determine the wind speed in the third column. e. Use the fourth column to record precipitation. 4b. Make graphs to show rainfall and temperature for a week.	*Harcourt Science* Bk. 3 *Silver Burdett Science* Bk. 4 http://weathereye.kgan.com/cadet/climate/climate-vs.html	IV & V. Give the students a template of a family island to trace. Record today's weather on one side of your island. Write a temperature, describe the wind, and tell if it is raining on your island. On the opposite side of the island draw a picture of how your island would look for most of the year. Write a short description.
5. Distinguish between weather and climate.		5. Give students data of weather that was recorded over several weeks/months. a. Have the students determine what the weather was for one particular day for the area given. b. Interpret the data to tell what the climate is for the area given.		

CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: WEATHER **STRAND 2: CHANGES IN EARTH AND SKY**

EARTH SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
6. Measure water at various temperatures.	Temperature is measured with a thermometer. Most thermometers are made of a glass tube with coloured alcohol inside. When the air gets hotter, the level of the liquid in the tube rises. When the air cools, the liquid level falls. The thermometer has two scales for measuring temperature; Fahrenheit and Celsius. Wind vanes show the direction of the wind. The arrow of the wind vane points into the wind. When wind is blowing from the south, it is called a south wind. When the arrow of the wind vane points between two directions the directions are combined. E.g. north and west is called a northwest wind.	6a. Conduct an experiment to measure temperature with a thermometer. 6b. Make a model of a simple thermometer. a. Take the thermometer to five different places at school. Leave it at each place for 10 minutes. b. Use a ruler to measure the water level in the mark to the top of the water level. c. Record the measurement and the location. d. What happened to the water levels at the different locations?	*Science Horizons* Bk. 4 *Harcourt Science* Bk. 3	VI. & VII. Have the students observe a table which shows different times and temperatures for one day. Interpret the data. Then have the students observe four drawings of a wind vane with the arrow pointing in different directions. Write the direction shown on each drawing. Take the wind vane that you made outside and place it in an open area. Use a compass to make sure the N or your direction is pointing north. When the wind blows, observe which direction the wind is blowing from. Record this data or your Weather Data Sheet.
7. Measure wind direction.		7. Make a model of a wind vane to show wind direction. a. Take what you made and a compass outside to find north. Point the plate's "north" in that direction. b. In what direction did the arrow point?	*Science Horizons* Bk. 34 http://classroom-jc-schools.net/sci-units/atmosphere.htm	

CURRICULUM GUIDELINES
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SCOPE OF WORK

TOPIC: WEATHER **STRAND 2: CHANGES IN EARTH AND SKY**

EARTH SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
8. Demonstrate the sun's effect on Earth.	The sun shines on Earth's surface and warms it. The land absorbs sunlight. The sunlight is changed to heat. Not all places on the Earth absorb the same amount of sunlight. The Earth heats unevenly.	8. Take the students outside. Have them line up on the sidewalk where there is grass. Have the students predict which surface they think is hotter. Then have the students place one barefoot on the sidewalk and the other on the grass. a. Which surface was actually hotter? b. What does this tell you about how the sun heats the Earth?	*Science Horizons* Bk. 3	VIII. Have students work in groups. Have them tape black paper to the outside of one empty can and white paper to the outside of another can. Place the cans in a sunny area. Place a thermometer in each can. Read the temperature after ten minutes. Have each student on a separate sheet of paper tell which can had a higher temperature. Explain why one can had a higher temperature than the other.

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CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: EXPLORING THE PLANETS **STRAND 2: UNIVERSE AND THE SOLAR SYSTEM**

EARTH SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
1. Record the order of the eight planets.	A **planet** is a large body of rock or gas that orbits the sun. The planet closest to the sun is Mercury, followed by Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune. The inner planets Mercury, Venus, Earth, and Mars, lie between the sun and the asteroid belt. They all have rocky surfaces. They are also smaller than most of the outer planets. None of them has more than two moons. **Mercury** is the closest planet to the sun. It is covered with craters. It is about the size of the Earth's moon and has a thin **atmosphere**. **Venus**, the second planet from the sun, is about the same size as Earth. It is dry and has a thick atmosphere that traps heat. **Earth** is the third planet from the sun. It is the largest of the inner planets. It has one natural satellite, the moon. It is the only planet that has liquid water. It is the only known planet to support life.	1. Create a model of the planets in the solar system. Have the students learn the acronym to remember the order of the planets – "My Very Educated Mother Just Served Us Noodles."	*Harcourt Science* Bk. 3 *Silver Burdett Science* Bk. 4 http://kids.nineplanets.org/ (The Eight Planets)	I. Give each student an orange circle to represent the sun. Have the student place it in the center of a blank paper. Give each student coloured circles to represent each planet. Write the name of each planet on a circle. Place each named circle in the correct position around the sun.
2. Classify the planets as inner and outer planets.		2. Have students cut out circles from different coloured paper. These circles represent the inner planets – Mercury Venus, Earth and Mars. Fasten the circles to the wall alongside the model of the sun. Label each circle with the appropriate planet name. Attach a large sheet of paper below each circle. Have the students tell what they know about each inner planet. List these things on the sheets of paper. Repeat the same procedure for the outer planets.		II & III. Have the students make two tables. The first table should be labeled Inner Planets. The second table should be labeled Outer Planets. Have the students list each inner planet in the first column of the first table and each outer planet in the first column of the second table. In the second column of both tables, have them list three characteristics of the inner planets and three characteristic of the outer planets.

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

CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: EXPLORING THE PLANETS **STRAND 2: UNIVERSE AND THE SOLAR SYSTEM**

EARTH SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
3. Distinguish between inner and outer planets.	**Mars**, the fourth planet from the sun, is sometimes called the red planet. Its atmosphere is thin and consists mainly of **carbon dioxide**. The gas freezes, forming ice caps in winter. Mars has **volcanoes**, **canyons craters** and **sand dunes**. On the other side of the asteroid belt are the **outer planets** – Jupiter, Uranus and Neptune. These planets are large spheres made up mostly of gases and are often referred to as gas giants. **Jupiter**, the fifth planet from the sun, is the largest planet in our solar system. At least 16 moons orbit around it. It is twice the size of Earth. Its energy causes a circular storm known as the Great Red Spot. It is surrounded by a system of thin, dark rings.	3. On a separate sheet of paper use the information recorded on the sheets from the previous activity to compare/distinguish between the inner and outer planets.		

CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: EXPLORING THE PLANETS **STRAND 2: UNIVERSE AND THE SOLAR SYSTEM**

EARTH SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
4. Create a scale model of the distances between planets.	**Saturn** is the sixth planet from the sun. It is the second largest planet in the solar system. It has at least 18 named moons. The many bright rings that surround the planet are Saturn's most famous features. **Uranus**, the seventh planet from the sun is a blue-green ball of gas and liquid. It is the third largest planet in the solar system and has at least 15 moons. The eighth planet from the sun is **Neptune**. It has at least 8 moons including Triton and it also has a faint ring.	4. Create a scale model of the distances between the planets. a. Get paper models of the planets and the sun from the teacher. Tape the model of the sun to the wall. b. Measure 58 mm from the sun. Tape the model of Mercury at this point. c. Measure 50 mm from Mercury. Tape the model of Venus at this point. Tape the model of Earth 42 mm from Venus. Tape the model of Mars 78 mm from Earth. d. Measure 55.1 cm from Mars. Tape the model of Saturn 65.1 cm from Jupiter.		IV. Give the students a chart showing the average distance of each planet from the sun and the scale distance. Give each student a string. At the end of the string, tie three or four knots at the same point to make one large knot. This large knot will stand for the sun. Use the scale distances on the chart to mark and measure the position of each planet on the string (use different coloured markers). On a folder sheet explain how it helped to make a scale model instead of trying to show actual distances between planets.

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.

CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: MATTER CHANGES **STRAND 3: PROPERTIES AND CHANGES IN MATTER**

PHYSICAL SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
1. Observe and identify properties of matter.	A **property** is a characteristic that is used to describe matter. A **physical property** is one that can be measured or observed with the senses without changing the matter into another kind of matter. Physical properties include shape, size, texture, hardness, odor, state, mass, and colour.	1. Property Game Discuss different properties of objects such as colour, texture, etc. Then have students choose objects and write riddles that describe their properties. Have students read their riddle and invite volunteers to guess the object. Encourage students to think about how objects are alike and different from each other.	*Science Horizons* Bk. 4 *Harcourt Science* Bk. 3 www.brainpopjr.com	I. Have the students observe three different objects. Give them three circles to make a Venn diagram to compare the properties of each type of matter.
2. Investigate physical changes in matter.	A change in the size, shape or state of matter is called a **physical change**. The particles of which matter is made remains unchanged after a physical change.	2a. Change Without Change Empty a bag of assorted materials on your work surface. Observe each material with a hand lens. Talk with a partner to decide how you might change each of the materials. Record the name of each material and how it was changed. 2b. Experiment Change in matter. a. Place the plastic cup on the paper towel. Put the ice cubes in the cup.	*Houghton Mifflin Science* *Discovery Works* Bk. 3 *Science Horizons* Bk. 4 *Harcourt Science Workbook* 3 WB 221-222, WB 225 http://www.nyu.edu/pages/mathmol/textbook/whatismatter.html	II & III. Write a list of four kinds of matter on the chalkboard. Give each student a sheet of paper. Have each student list one physical property of each matter. Then write one way it can be changed physically. Draw a picture to show each physical property and physical change. Draw the pictures side by side each kind of matter.

CURRICULUM GUIDELINES
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SCOPE OF WORK

TOPIC: MATTER CHANGES **STRAND 3: PROPERTIES AND CHANGES IN MATTER**

PHYSICAL SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
		b. Predict what the ice cubes will look like after 45 minutes. Use your past observations of ice cubes to predict what will happen this time. Record your prediction. c. Observe what's in the cup after 45 minutes. Record what you see. Was your prediction correct? Discuss the physical change observed.	*Harcourt Science* Bk. 3	
3. Compare physical properties and physical changes in matter.		3. Give each student a coloured sheet of paper. On a separate sheet of paper have each student make a table. In column one, list the physical properties of the paper. In column two list the physical changes that can be made to the paper. Discuss. What do physical properties and changes tell us about matter?		

CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: MATTER CHANGES **STRAND 3: PROPERTIES AND CHANGES IN MATTER**

PHYSICAL SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
4. Measure the mass of objects.	**Mass** is a measure of the amount of matter in an object. A **balance** is a tool used to measure mass. **Volume** is the amount of space that matter takes up. The volume of a liquid can be measured using a special container called a **graduate**.	4a. Make a balance. a. Place a coin in one of the cups. What happens to the balance? b. Add paper clips to the other cup, one at a time, until the cups balance. How many paper clips are needed to balance the cups? What is the mass of the coin, to the nearest paper clip? c. Find the masses of other objects. 4b. Give each group a bag with several objects in it. Open the bag and remove the objects. Infer the mass of each object. Make a chart to record the name of each object and its mass. Using a balance, measure the mass of each object in grams.	*Silver Burdett Science* Bk. 4	IV & Va. Use complete sentences to answer the following on a folder sheet. a. Pretend that you are trying to follow a recipe. You need to measure out 10g of salt. What do you need to do to measure out the correct amount? b. Tell which items are measured by volume and which by mass: flour, vinegar, juice, milk and sugar. b. Using Science Skills: Give each group of students a fourth cup and a graduate. On a separate sheet write how many milliliters of water you think a fourth cup holds. How can you find out?

CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: MATTER CHANGES **STRAND 3: PROPERTIES AND CHANGES IN MATTER**

PHYSICAL SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
5. Measure the volume of different matter.		5a. Set a graduate on a table. Fill it to a level below the 20ml mark. Look closely at the surface of the water. You will see the water is curved. Add water slowly until the bottom of the curve is exactly even with the 20ml mark. Place a rock in the water. Look at the water level. What is the new volume? How much did the rock increase the volume? What is the volume of the rock? 5b. 1. Half fill a cup of water. Use a piece of tape to mark how high the water is in the cup. Predict how high the water will be in three clear containers of different sizes, if you pour the water into each one. Mark each prediction with a piece of tape. Write 'P' (for prediction) on the tape. 2. Pour the water into the next container. Mark the height of the water with a piece of tape. Write 'A' (for actual) on the tape. Repeat Step two for each of the containers.		

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

CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: MAKING WORK EASIER — **STRAND 3: FORCES AND ENERGY**

PHYSICAL SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
1. Define force, work and motion	A **force** is a push or pull between objects that can change the speed of an object, start an object moving or change the direction of a moving object. **Motion** is a change in position. **Work** is the measure of force it takes to move an object a certain distance.	1. Roll On! a. Work on the floor in an open area. Have two members of your group each hold a pencil. Stretch a rubber band around the pencils. The pencils should be held just far enough apart to hold the rubber band in place without stretching it. b. Place six washers in a toy truck and tape them in place. c. Place the back of the toy truck against the rubber band. Pull the truck backwards to stretch the rubber band. Place a small piece of masking tape on the floor to mark the exact spot where the front of the truck stops. d. Release the truck and observe its motion. Use a meterstick to measure how far the truck rolled from the piece of masking tape. Be sure to measure the front of the truck. Record this measurement. e. Remove the washers from the truck. Place the empty truck against the rubber band. Repeat step D.	*Science Horizons* Bk. 4 *Science Horizons* Bk. 5 *Harcourt Science* Bk. 3 Workbook Bk. 3 *Houghton Mifflin Science* Bk. 3	I & II. On a sheet have the students observe four drawings. Each drawing shows a force being used. Which drawing shows a push or pull? Which drawing shows work being done? Write push or pull and work or no work on the lines provided near each drawing.

CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: MAKING WORK EASIER — **STRAND 3: FORCES AND ENERGY**

PHYSICAL SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
2. Compare the force of pushing and pulling. 3. Measure pulls using a spring scale. 4. Interpret data recorded on pushes and pulls.	A machine can also be used to apply a force. Machines are used to perform tasks faster and more easily. Scientists use a tool called a **spring scale** to measure pulls.	2, 3 & 4. Measuring Pushes and Pulls a. Work with a partner. Gently pull on the hook of the spring scale. Read the number in newtons. Record the number. b. Tie one piece of string around one wooden block. Tie the other end of the string to the hook on the scale. c. Pull on the spring scale without the block moving. Record the number. d. Now pull hard enough to make the block move. Record the number. e. Repeat the steps using a second block. Draw conclusions.	*Harcourt Science Workbook* *Science Horizons* Bk. 4	III, IV & V. Have the students read the following paragraph. Mark put a small stone in a cloth bag. Then he tied the bag to a spring scale and let it hang down. The scale measured 2 newtons pulling the stone down. In a second test, Mark added another stone to the bag. It measured 4 newtons. As a third test, Mark took out both stones and put a smaller one in the bag. This measured only 1 newton. 1. Arrange the data in a table. 2. How many newtons pulled the stone down the first time? 3. In which test did the scale measure the most newtons? 4. What do you think Mark learned from his experiments?
5. Investigate work and infer how (work) it is related to force.	We can calculate the amount of work done when a force is used to move an object by multiplying the distance that the object moves by the amount of force used to move the object.	5a. Make a table with four columns: object, distance, force and work. b. Hook a mug onto the spring scale. Work with a partner. Hold a meterstick on a table, with the 1 cm mark toward the bottom. Rest the mug on the table next to the meterstick. c. Gently lift the scale, and pull the mug off the table. Record the height.	*Harcourt Science Workbook* *Science Horizons* Bk. 4	

CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: MAKING WORK EASIER — STRAND 3: FORCES AND ENERGY

PHYSICAL SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
		d. Read the number of newtons on the spring scale. Record the number. e. Multiply the number of newtons you used times the distance you moved the object (mug). Record this number on the table under the heading 'work'. f. Repeat steps b through e, using other objects (hat, stapler). Record data on the table. Draw conclusions.		
6. Conclude what a simple machine is.	Machines that have few or no moving parts are called **simple machines**. The six simple machines are the **lever, pulley, screw, wheel and axle**, **wedge** and **inclined plane**. An **inclined plane** is a simple machine. It is a flat surface that is higher on the end. E.g. ramp, slanted road, path up a hill, slide and step. A **wedge** is a simple machine used to push two objects apart. A wedge is made up of two inclined planes. These planes meet and form a sharp edge. This edge can split things apart. E.g. knives, axes, nails, and doorstops.	6. Working in pairs use string to attach a toy car or other object to a spring scale. Make a ramp by propping up one end of a smooth board on the seat of a chair. Place the toy car at the bottom of the board. Slowly pull the car to the board at a steady rate. As one person pulls, the other person can read the force on the spring scale. Record it. Measure the distance the car was pulled up the board. Record it.	*Harcourt Science* Bk. 4 http://www.coe.uh.edu/archive/science/science-lessons/scienceles.htm	VI, VII & VIII. Display six objects. Have the students observe the objects. Make a table to classify each object as a wedge or an inclined plane. Then explain in your own words how each inclined plane and wedge helps to make a task easier to do.

CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: MAKING WORK EASIER **STRAND 3: FORCES AND ENERGY**

PHYSICAL SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
7. Identify various objects as wedges or inclined planes.		7a. Set up a kitchen scene with various simple machines such as plastic knives, stairs, sink etc. Have volunteers find and identify the simple machines as wedges or inclined planes. Make a list of all the simple machines found. 7b. Experiment to demonstrate how inclined planes and wedges work. 7c. Materials: Large books, ruler, one cup of rice inside a small plastic bag (closed with a twist tie) rubber band strip tied to the top of the bag. Procedure: 1. Stack the books in one pile. 2. Lean one book against the other to create an inclined plane. 3. Place the bag of rice on the table. 4. While holding the rubber band, lift the rubber band, lift the bag of rice straight up to the top of your book stack.		

CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: MAKING WORK EASIER **STRAND 3: FORCES AND ENERGY**

PHYSICAL SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
		5. Use the ruler to measure the length of the rubber band. 6. Now put the bag of rice at the bottom of the inclined plane and drag it to the top of the stack of books by pulling on the rubber band. When it is almost at the top. 7. Measure the length of the rubber band.		
8. Communicate how wedges are related to inclined planes.		8. Distribute materials and cut outs (shapes) of inclined planes. Have each student use the materials and cut outs to make two wedges. Write the name of your wedge on it.		VIII. A wedge is a special example of an inclined plane. Draw a picture of a wedge and show where the inclined planes are. Describe when you might use a wedge to help you.
9. Discuss energy conservation.	**Conservation** is the wise or careful use of natural resources. Conserving resources makes them last longer. **Recycling** makes resources last longer. It can help save energy needed to find, mine, or harvest more of the resource. Coal and oil can be saved when people use less electricity. People can turn off lights when not using them.	9. Have students work in groups to develop a poster showing how energy can be conserved. Then present and discuss each poster.	*Harcourt Science* Bk. 3	IX. Give each student a folder sheet to answer the following questions. 1. What are two ways to conserve energy? 2. How does recycling help to save energy?

CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: TECHNOLOGY **STRAND 3: FORCES AND ENERGY**

PHYSICAL SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
1. Describe ways technology is used to explore the ocean.	There are many natural resources to be found in the oceans of the world. Scientists study the ocean to learn how to protect and preserve its resources and how to use these resources more effectively. Technology helps to explore and learn about the ocean and its resources. Ships with special sonar equipment explore the ocean. Sonar is a machine used for echo sounding. It sends sound waves to the ocean floor and measures how long they take to bounce back. In the past ships measured the depths of the ocean floor by lowering a weighted rope to the bottom of the ocean. When the rope hung loosely, scientist knew that it had touched he bottom. Scientists also use submersibles to learn about the ocean. As a result of this ocean exploration, they have discovered many ocean resources that we can use.	1a. Visit a dock or wharf. Observe and describe the various shipping or fishing vessels. 1b. Design a boat or vessel that can be used for ocean exploration.	*Harcourt Science* Bk. 4 p. D54-D55 http://oceanexplore.hoaa.gov/technology/technology.html	I. Have the students observe a drawing of two submersibles or subs. 1. Explain how these submersibles can be used. 2. Write two problems that may occur from using these subs.

CURRICULUM GUIDELINES
GRADE 4
SCOPE OF WORK

TOPIC: TECHNOLOGY **STRAND 3: FORCES AND ENERGY**

PHYSICAL SCIENCE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
	Today, fishermen use special equipment developed using technology that allow the fishermen to locate a school of fish, determine the depth that the school is at and capture large numbers of the school. As technology improves greater caution must be taken to prevent overfishing.			

SECTION D

Perspectives that Enrich Instruction

Scientific Literacy is an essential support for sustainable development in the global economy. It therefore stands to reason that one of the main goals of the Science Instructional Programme would be the promotion of Scientific Literacy.

The benefits that accrue from the promotion of Scientific Literacy in the curriculum are numerous. For, as Scientific Literacy increases, so does the students' appreciation of the **application of scientific principles to problem solving**. In addition, students are encouraged to focus their creative energies, spawned by alert inquiring minds, to produce positive end results that can be of economic, social and emotional value to themselves and society.

As educators zealously attempt to prepare students for coping with the challenges of life in a technology driven world, care should be taken to incorporate current and innovative practices in the Science Instructional Programme. These and other instructional strategies will:

- Motivate students to increase their understanding of the subject through practical immersion and discovery encounter experiences.
- Increase the effectiveness of Science instruction
- Build students' confidence and competence
- Heighten students' expectations
- Promote higher overall achievement

This section is intended to provide teachers at the primary level with a wide range of perspectives and innovative practices for implementing an effective Science Instructional Programme. These strategies comprise:

- Inquiry-based Learning
- Constructivism
- Bloom's Taxonomy
- Process Skills Development
- Use of the Scientific Method
- Cooperative Learning Technique
- Student-centred vs Teacher-centred Learning
- Multiple Intelligences and Learning Styles
- Assessment Strategies
- Information Technology Linkages
- Science Safety

Inquiry–based Learning

Inquiry–based Learning places emphasis on experiential learning; where practical "hands-on" activities are used to motivate students to focus their innate curiosities and inquiring minds on problem solving through the application of scientific principles.

Proponents of the traditional "lecture method" of instruction (i.e. imparting information directly from text books with limited or no opportunity for students to engage exploration, questioning and discovery skills) are rapidly being convinced that this strategy (with respect to the teaching of Science) is very ineffective, and when compared with other modern approaches is now obsolete.

Research has shown that frequent use of the lecture method especially with regards to the teaching of Science results in diminished student expectation and achievement. Research "shows that people don't learn science by absorbing stuff that has been poured unto them (via lectures) but rather by constructing meaning out of experiences that the teacher provides." *Wendy Saul, Science Education Analyst; University of Maryland, Baltimore County, U.S.A.*

In **Inquiry–based Learning**, opportunities are provided that create an environment that enable students to gain experience as a result of Science exploration. Practical experiences are provided and open-ended questions asked to encourage experimentation that does not necessarily have a known outcome and that will lead to testable questions. During this experimentation, students are encouraged to take risks and are therefore, not afraid to make mistakes. Some of the greatest scientific discoveries come after many failures and disappointments.

Inquiry–based learning goes beyond providing students with opportunities for practical, "hands–on" experiences to illustrate established scientific principles e.g. giving them batteries, bulbs, and wires to show the concept of current electricity. This strategy takes the learning process to a different level e.g. It may challenge students to use the batteries, bulb, wire and additional materials to develop something useful for a deaf person or something that can assist with a specific chore, homework assignment, etc.

The inquiry–based approach to the teaching of Science is key to effective and meaningful instruction as it encourages students to:

- Critically evaluate situations
- Frame their own questions
- Develop diverse strategies for coping with problems in their environment
- Cultivate organizational and creative skills
- Assume leadership roles and be self motivated
- Be accountable for their learning
- Collaborate and communicate with each other
- Develop team interaction skills

Constructivism

Constructivism is closely related to **Inquiry-based Learning** therefore, effective application of **Inquiry-based Learning** is enhanced by **Constructivism. Constructivism** means generating meaning by connecting what is to be learned with personal knowledge that has been constructed from past experiences. "A Constructivist is one who believes that the learner is responsible for constructing knowledge and, therefore, the responsibility for learning must be returned to the child." *Ebenezer & Conner 1998, Learning to Teach Science, A Model for the 21ST Century.*

Students' understanding of the world is moulded by their experiences. As they think about these experiences, their views and beliefs, they construct personal meaning and acquire knowledge. Constructivists advocate that students should not be expected to just accept knowledge and skills developed over the years and imparted by the teacher. Instead they become "active seekers" of knowledge as inquiry is encouraged and they discover and decipher things for themselves.

In using Constructivism, teachers become facilitators that create stimulating environments with a variety of "hands-on" experiences that empower students to explore. The teacher's main role is to provide experiences that help students make connections between what is learned and what they already know or believe. More learning takes place when students become active participants in the learning process and are "allowed to make their own sense out of the world."

Providing students with "hands-on" experiences that reinforce ideas or perceptions that they already have results in them assimilating or absorbing new concepts easily. The knowledge that the students construct from the information that they receive as a result of these "hands - on" activities makes sense and is easier for them to relate to and apply to their everyday life and their environment.

Constructivists probe students' knowledge base, examine and classify their concepts then provide them with opportunities to share and debate common knowledge. They then convert and expand students' knowledge by asking open-ended questions and presenting problems which cause them to gain new understanding of the concepts being taught. By doing this they challenge and promote conceptual change.

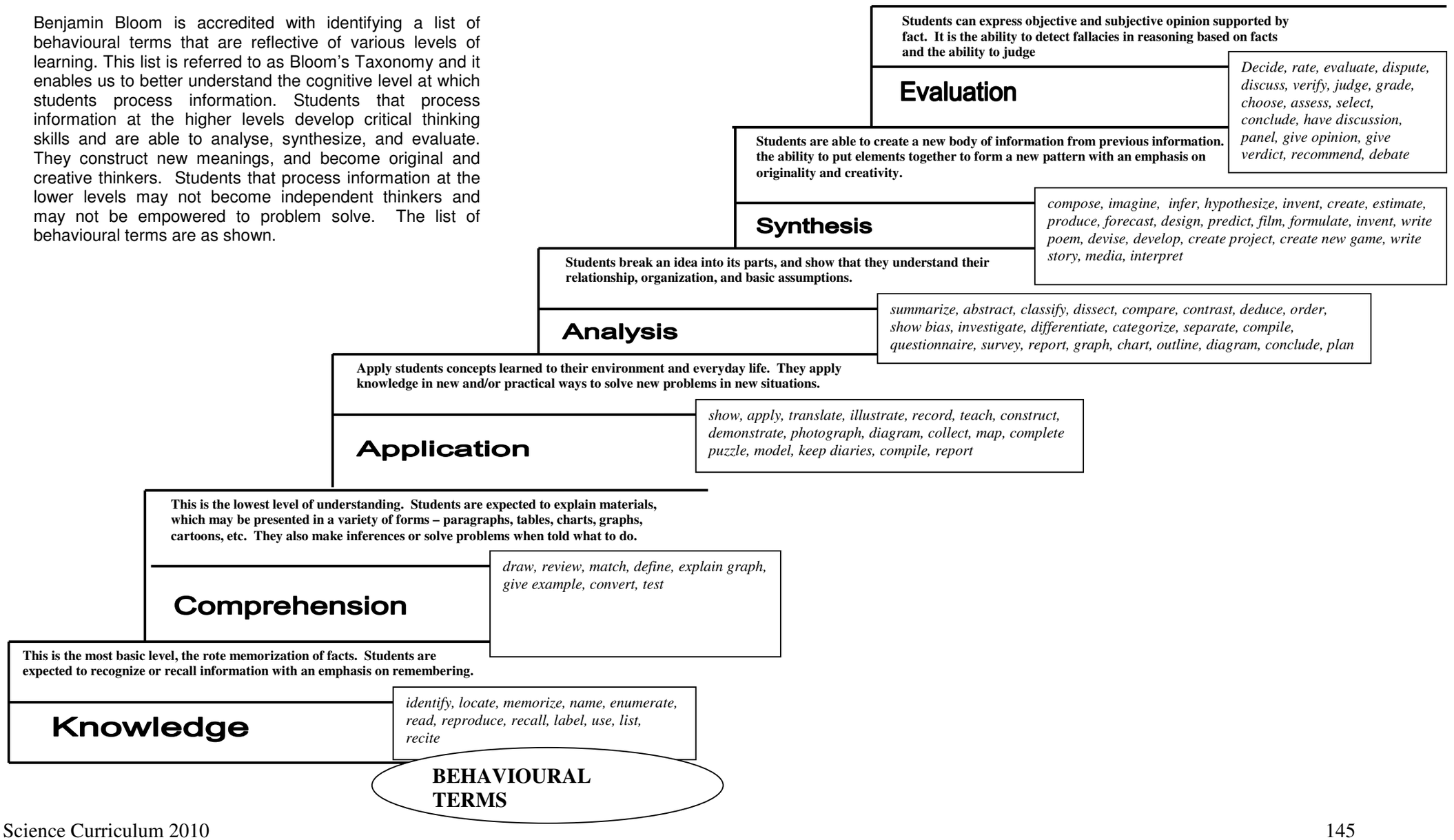
When using the Constructivism Theory, it should be noted that there are times when knowledge has to be imparted directly by the teacher in a detailed and explicit way. Although many benefits can be accrued from utilizing the Constructivism Theory if it is not used properly, learning may become sporadic and disorganized. Although students should not be stifled in their exploration to acquire knowledge, when using this theory it is important to:

- Set clear precise goals for the knowledge and skills that the students are expected to acquire
- Communicate these goals to the students and ensure that they are understood
- Organize assignments in a clearly planned sequence
- Provide guidance for the students

Blooms Taxonomy

STEPPING UP TO HIGHER LEVELS OF THINKING

Benjamin Bloom is accredited with identifying a list of behavioural terms that are reflective of various levels of learning. This list is referred to as Bloom's Taxonomy and it enables us to better understand the cognitive level at which students process information. Students that process information at the higher levels develop critical thinking skills and are able to analyse, synthesize, and evaluate. They construct new meanings, and become original and creative thinkers. Students that process information at the lower levels may not become independent thinkers and may not be empowered to problem solve. The list of behavioural terms are as shown.



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. **Communication.** 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 maximum amount of data can be reviewed with an eye toward discovering inherent patters 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

Science Process Skills		
Process Skills	**Students**	**Scientists**
Observe	use your senses	computers, microscopes, senses
Experiment	change something watch what happens	manipulate and control variables
Collaborate	other in classroom	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

Use of the Scientific Method

*Students need to be taught valuable problem solving skills in order to react appropriately to the many situations that confront them on a daily basis. The **Scientific Method** sets out a sequence of logical steps that are employed in problem solving. It is applicable to **ALL** areas of life and is not restricted only to the teaching of Science.*

The components of the **Scientific Method** and their descriptors are set out below. It is to be noted that students should utilize this format when writing up experiments or laboratory reports.

1. PURPOSE	The purpose is the question that is to be answered by doing the experiment. State the reason or reasons why you are doing the experiment. State the purpose as a question needing an answer.
2. HYPOTHESIS	A hypothesis is an educated guess on how the experiment/ activity will turn out, that is based on prior knowledge. Although a good hypothesis is testable, it may not be correct. Experimenting can find out whether or not he hypothesis is correct or not.
3. MATERIALS	All materials required for the activity/ experiment need to be identified. One must be as accurate as possible in describing the materials. Be sure to give exact amounts and quantities.
4. PROCEDURE	The procedure describes everything that will be done during the experiment. The procedure affects the result of the experiment therefore, care should be taken to explain the procedure as accurately as possible. State the procedure as numbered steps. (It would help if they be written beginning with behavioural terms.)
5. OBSERVATION	The observation describes exactly what happens during an experiment. Report the observations made and the data collected during the experiment. Data are recorded facts or measurements from an experiment. Data should be presented as tables, charts, and graphs, to be easily understood.
6. CONCLUSION	The conclusion is a comparison between the results and the hypothesis of an experiment. To draw a conclusion, the data needs to be analysed to see what is meant. Explain observations and describe how the data relates to the problem. The conclusion should state whether or not the data supports the hypothesis. Part of the conclusion may be a statement or a new hypothesis based on findings and suggestions for testing the new hypothesis in a further experiment.

The **Cooperative Learning Technique** allows all students to have a sense of accomplishment. **Cooperative Learning** promotes group work and opportunities for verbal face-to-face interactions, which assist students to acquire and apply concepts.

Cooperative Learning builds interpersonal skills and positive interdependence characterized by specific roles, sharing of knowledge and materials and achievement of mutual goals. It encourages group processing as students analyse how well their groups are functioning and design and employ strategies to ensure that they function effectively.

When using the **Cooperative Learning Technique**, the teacher functions as a facilitator and students are more accountable for their learning and share the responsibility for the learning of others. It is important for the teacher to set and evaluate social and academic goals for the groups and the quantity and quality of students' learning.

When forming cooperative groups, it is recommended that groups work together for three to six weeks before students are assigned new roles or groups changed. During the year, each student should have an opportunity to function in each role. Once groups are formed, ensure that all members realize that they are jointly responsible for achieving group goals. They do this by:

- Contributing ideas to the group
- Listening carefully for ideas from others
- Helping the group make good decisions.
- Cooperating rather than competing
- Solving problems in a calm manner

Reference: Circle of Learning: Cooperative Learning in the Classroom by D. W. Johnson et al, 1986

STUDENTS' ROLES AND FUNCTIONS

Supervisor, Leader or Investigator

Does experiments, manipulates materials

Assistant, Helper or Organizer

Collects, organizes and distributes materials and makes sure group cleans up any mess.

Manager or Motivator

Assists supervisor, leader or investigator, encourages the group, encourages time on task and adherence to goals and safe practices, and also times activities, if necessary.

Writer or Recorder

Records observations, questions, answers, illustrations etc.

Reporter

Collaborates with Writer or Recorder and shares group's data, results, and conclusion with class.

Student- Centred vs. Teacher-Centred Learning

Student-centred Learning develops self-directed learners who are confident in doing Science, proactive in the learning process and willing to share and accept responsibility for their own learning. Student-centred Learning activities are adaptive and cater to the learning needs of students.

COMPARISON OF STUDENT-CENTRED AND TEACHER- CENTRED LEARNING

STUDENT-CENTRED

- Students' conceptions and experiences are explored.
- Teacher challenges students to question before accepting information.
- Discussion is encouraged between students and teacher.
- Students are allowed to move about in an orderly manner to discuss and problem solve.
- Students share and help each other. They use peer tutoring.
- Students actively participate in decision-making.
- Learning activities cater to multiple intelligences and different learning styles.

TEACHER-CENTRED

- Teacher is the authority figure and has the final say.
- Students must never question the teacher.
- Students only respond when a question is asked.
- Students must remain seated at all times.
- Collaboration between students is discouraged and regarded as cheating.
- Students do not participate in decision-making.
- There is very little variation in learning activities.

Multiple Intelligences

HOWARD GARDNER

The theory of Multiple Intelligences is a way of understanding the different facets of the intellect and each person's level of intelligence. The intelligences can work individually or in collaboration with the other intelligences, so a person could be operating in more than one intelligence. As we teach children, we should ensure that appropriate provision is made for individual differences and multiple intelligences.

- **Linguistic Intelligence** is a person's ability to construct and comprehend language. It is the capacity to use language to express feelings and to understand other people. It may be in a person's native language or another language. Poets, writers, orators, speakers, lawyers specialize in linguistic intelligence.

- **Naturalist Intelligence** is the ability to identify and classify patterns in nature. It the way a person relates to his environment and the recognition of the role that the environment plays in our lives. It is the ability to discriminate among living things like plants and animals and sensitivity to changes in nature e.g. weather patterns, rock configurations.

- **Spatial Intelligence** is how persons comprehend shapes and images in three dimensions. Spatial Intelligence is utilized to perceive and interpret things that we may or may not see. It is the ability to represent the spatial world internally in your mind--the way a sailor navigates the seas with only the stars or airplane pilot navigates aerial space, or the way a chess player or sculptor represents the spatial world. Spatial intelligence can be used in the arts or in the sciences. Persons with this type of Spatial Intelligence are usually painters, sculptors, architects and scientists that deal with anatomy and topology.

- **Musical Intelligence** is the ability to perform and compose music. It is the capacity to think in music, to be able to hear patterns, recognize them, remember them, and perhaps manipulate them. Persons with strong musical intelligence are completely preoccupied with music, it is always playing in their minds. Persons with musical intelligence use music to face their challenges and to assist them in solving their problems.

- **Bodily - Kinesthetic Intelligence** is a natural sense of how the body should act and react in demanding situations. These persons have extraordinary control of their movements, balance, agility and grace. They have the capacity to use their whole body or parts of their body to solve a problem, make something, or put on some kind of a production. **Bodily - Kinesthetic Intelligence** is evident in athletes and persons in the performing arts, particularly dance or acting.

- **Logical – Mathematical Intelligence is the ability to mentally process logical problems.** Persons with a highly developed **Logical-Mathematical Intelligence** can manipulate numbers, operations and quantities, and they have the ability to process logical questions at an unusually fast rate. These persons have the ability to understand the underlying principles of some kind of a causal system, the way a scientist or a logician does.

- **Intrapersonal Intelligence is a person's cognitive ability to** sense and understand him or herself. It refers to a very strong self-concept and strength of character, which gives the person the ability to solve internal problems. These persons know who they are, what they can do, what they want to do, how they react to things, which things to avoid, and which things to gravitate toward. These persons have a strong sense of purpose and are not easily deterred from that purpose. They know their strengths and their limitations and know where to go if they need help.

- **Interpersonal Intelligence** is understanding and interacting with others and interpreting their behaviour. As social beings, it is an essential ability that we all need however, persons with Interpersonal Intelligence have a greater perception of distinctions between persons and have the ability to judge their moods, temperaments, intentions and motivations. Persons with **Interpersonal Intelligence** become teachers, clergy, leaders, clinicians, salespersons, or politicians. Anybody who deals with other people has to be skilled in the interpersonal sphere.

Learning Styles

DAVID A. KOLB

Persons have their unique, individual way of learning. Understanding how students learn and planning activities that cater to various learning styles will enhance their learning and ensure higher achievement.

- **Visual Style**
  Persons who prefer the visual style convert what they hear and read to pictorial images in their brain. When recalling information they go through a process similar to reviewing pictures in a movie. These students have no problems in obeying conventional classroom rules. They will sit quietly, write neatly and use all materials well. These persons often choose careers like engineer, surgeon, designer, architect and positions of leadership that requires visionary thinking.

- **Auditory Style**
  These persons learn best by hearing and listening, they process information through their listening and repeating skills. They are good storytellers and can successfully talk through their problems. These students can easily repeat what they heard just as it was said. They are the most talkative and the most likely to participate in discussion however, they may experience difficulty in writing. These persons often become psychologists, disc jockeys, great musicians and other occupations that require a great deal of listening.

- **Kinesthetic Style**
  These persons process and remember information through their bodies and their feelings. Kinesthetic learners need to touch and feel what they are learning about. They may become restless unless they are actively involved in the learning process.

Assessment Strategies

WHAT IS ASSESSMENT?

- Whenever we interact with other people we obtain and interpret information about their knowledge and understanding, and may well make judgements about their ideas, abilities and attitudes.
- Assessment whether direct or indirect is a human encounter and is a central feature of social life.
- Educational assessment includes a wide range of methods for evaluating student performance that describes the nature and extent of learning and how it matches up to the objectives of teaching.

When assessing there must be alignment between what is in the curriculum, what is actually taught and what is tested.

WHY DO WE ASSESS?

- The main purpose of assessment is to judge the attainment or performance level of students, with a view of evaluating or grading them for one purpose or another.
- Purpose might include:

  - Placing students in appropriate teaching sets;
  - Providing extra motivation for learning and an aid to remembering;
  - Informing parents about progress;
  - Informing other teachers who have to make decisions about students e.g. when students transfer to a new school or new courses, which may have been studied;
  - Accumulating records of achievement;
  - Acting as a diagnostic tool e.g. diagnosing weaknesses so that remedial action may be taken;
  - Making decisions about examination entries involving predictions about future performance;
  - Informing further education institutions or employers about attainment so that suitable placement may be made. In doing this, we are using measured attainment to make predications about likely future performance.

Hence assessment has primarily been used as a means of judging the attainment and progress of students, providing a reporting system and deciding appropriate action.

FORMS OF ASSESSMENT

Assessment may be:

- Informal
- Formal

- **Informal assessment** takes place during normal learning activities. Much information can be picked up by teachers in their normal interaction with individual students, allowing problems to be overcome at an early stage and progress accelerated. Hence **informal assessment** is often used **diagnostically.**
- It is often said that **informal assessment** should be unobtrusive if the teacher is to gain reliable insights about students' abilities and the state of development, and that it should be for a specific purpose and for private use only.
- With **formative i.e. informal assessment** the results are fed back to the learner. Such feedback can be **confirmatory** (a recognition that the particular tasks have been mastered at that particular time) or can be **corrective,** allowing dialogue between teacher and learner to show where the learner went wrong.
- **Formal assessment** is only aimed at obtaining knowledge about the student. It is obtrusive and may not be able to provide direct instructional function.
- **Formal assessment** becomes **summative** when information is not available for feedback purposes because it is obtained too late in the learner's career to be used in this way.
- **Formal** and **summative assessment** is used largely for public purposes (e.g. BJC, BGCSE and RSA Examinations)
- Even this is changing with the advent of initiatives such as the GLAT where **formal and summative assessments** are made with students at grade 3 and 6. The results of formal assessments made at an early stage can be used for the benefit of the learner at the next stage of education.

ASSESSMENT MAY ALSO BE TRADITIONAL OR AUTHENTIC

Traditional Assessment measures what the students were taught and basically assesses their ability to recall information. This type of assessment includes **homework, quizzes, tests** and **book reports.**

Authentic Assessment measures what students have actually learned and can promote further learning. This type of assessment includes **portfolios**, **journal keeping, anecdotal records**, **student conferencing, self and peer assessment** and **projects and reports.**

Although there is no alternative for traditional assessment in certain situations, authentic assessment should be frequently used in the Primary Science Instructional Programme, especially portfolios and the keeping of Science journals.

Contributed by Sheena Williams, Testing and Evaluation Section

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 …	*More Emphasis on …*
Assessing what is easily measured	Assessing what is most highly valued
Assessing discrete knowledge	Assessing rich, well-structured knowledge
Assessing scientific knowledge	Assessing scientific understanding and reasoning
Assessing to learn what students do not know	Assessing to learn what students understand
Assessing only achievement	Assessing achievement and opportunity to learn
End-of-term assessment by teachers	Ongoing assessment by students of their work and that of others
Development of external assessment by experts alone	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 form 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 student scan express themselves in writing, as indicated by the way they respond to problem sobbing 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 note books 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 the 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.

Information Technology Linkages/Literacy Skills for the Science Classroom

Our students are known as the **digital or the information generation.** As computers are transforming the way students learn and are making a big difference in the way that their brains process information, we must use information technology to cater to the unique needs of this computer savvy generation. Computer technology can play a pivotal role in the instructional strategies of teachers as they adapt and adjust their modes of teaching to incorporate information technology into their lessons.
As we seek to use information technology to our advantage, we must be forever mindful of the challenges of the information highway and make a comprehensive review of all Web sites before they are used and recommended to students. Please note that the suggested Web sites listed below have been reviewed for currency and suitability for students and teachers. As the Internet is constantly changing, some Web sites may become non functional, outdated or unsuitable.

1. **The Learning Site**
   www.harcourtschool.com
   A world of Science resources, expeditions, interactive learning games and activities by Harcourt School Publishers.

2. **NSTA SciLinks**
   www.scilinks.org/harcourt
   Connects students to a variety of innovative Science Web sites.

3. **Teachers**
   www.teacher@hmco.com/act_archive

   Resource of ideas and activities for each month of the year *by the Houghlin Mifflin Company.*

4. **Education World**
   www.educationworld.com
   Lesson plans, resources and assistance for teachers.

5. ***Education Place***
   www.eduplace.com/science
   Primary Science Curriculum 2010
   professional development, Science activities, projects and links, etc.

6. **Science**
   www.npac.syr.edu/textbook/kidsweb/science.html
   Information on the Solar System and Marine Science with links to interactive exhibits of Science museums around the world by Syracuse University.

7. **Windows to the Universe**
   www.windows.ucar.edu
   Information, fun, games and activities about the Solar System and Earth Science.

8. **Links for Teachers**
   www.pe.ca/athena/awebtelk.htm
   Links with Web sites for teachers.

9. **Astronomy for Kids**
   www.kidsastronomy.about.com
   parents.

10. **NASA**
    www.arc.nasa.gov/kids.html
    Information on all aspects of space and the work of the North American Space Agency (NASA).

11. **NASA Kids**
    www.NASAKids.com
    NASA's official fun and comprehensive children's site that includes information about planets, the Solar System, space travel and our universe; space news, features, games, questions and answers and homework questions.

12. **The Canadian Space Agency**
    www.space.gc.ca/kidsspace/csasupports
    A children's space site that teaches them about the Solar System, space careers and Canada's role in space.

13. **Do Science**
    www.doscience.com
    Cool Science tricks, experiments and activities that can be done anywhere.

14. **Magic School Bus**
    www.place.scholastic.com/magicschoolbus/index.htm
    Fun filled interactive site that covers many aspects of Science.

15. **Cyber Sleuth**
    www.cybersleuth-kids.com
    A comprehensive educational search engine directory and homework helper for levels K-12 that also features information about Science exhibitions.

16. **MSNBC Network Broadcasting**
    www.msnbc.com/news/SCIENCE_front.as
    Science headlines and information about current and innovative science research.

17. **MSNBC Network for Kids**
    www.kids.msn.com/kidz/partnerdiscovery.asp
    Fact, fun, games and homework help that give focus to animals and space.

18. **Discovery**
    www.discovery.com
    Uses adventure, fun and games to explore the impressive world of discovery with features on nature, Science and technology, also includes homework help.

19. **Discovery Channel**

20. **National Geographic for Kids**
    www.nationalgeographic.com/kids
    Learn amazing Science facts, opportunities to chat with other students about Science, write cartoons and try out outrageous experiments; interactive activities, adventure, exploration and maps.

21. **Nickelodeon for Teachers**
    www.teachers.nick.com
    Features include Bill Nye, The Science Guy, The Big Help and 3-2-1 Contact, a programme that exposes children to all aspects of science. This site has activities, lesson plans, resources, cable connections, etc.

22. **Yahooligans**
    www.yahooligans.com/Science and Nature
    Information, experiments, games, activities and links to many scientific sites.

23. **Canadian Broadcasting Corporation for Kids**
    www.cbc4kids.ca/general/the_lab
    Powerhouse of learning and fun in Science for students, parents and teachers.

24. **Kids Science**

25. **The Smithsonian Institution**
    www.si.edu/info/education.htm
    Details on museum's exhibits and educational resources, including activities and lesson plans for teachers.

26. **Brain Pop**
    www.brainpop.com
    Features animated activities to learn about cells, tissues, organs and the rest of the body.

27. **Fun Brain**
    www.funbrain.com
    Fun, games and trivia on Science and other subjects.

28. **The Franklin Institute - Brain Drops**
    www.fi.edu/braindrops/
    "Nuggets" of Science to expand students' knowledge of Science in their environment.

29. **Neuroscience for Kids**
    www.faculty.washington.edu/chudler/neurok.html
    Experiments, activities, games and lesson plans to teach students about the senses, the brain and the nervous system, by the University of Washington.

30. **Sandlot Science**
www.sandlotscience.com
A site full of unbelievable optical illusions.

31. **Cool Science for Curious Kids**
www.hhmi.org/coolscience/
Explorations in Life Science by the Howard Hughes Medical Institute.

32. **The Exploratorium**
www.exploratorium.edu
Hands-on Internet museum that lets students explore Science and Art in interactive exhibits and games.

33. **Science Learning Network**
www.sln.org
Experiments, activities and information for students and teachers in all areas of Science (Kindergarten- Junior High School).

34. **Educational Web Adventures**
www.eduweb.com
Exploring Science, Social Studies and Art through storytelling and interactive games.

35. **Ontario Science Centre**
www.osc.on.ca
Students learn how their minds and bodies work through experiments and interaction with some of the exhibits at the Ontario Science Centre.

36. **YES Mag – Canadian Science Magazine for Kids**
www.yesmag.bc.ca/

37. **The Lab**
www.abc.net.au.science
Information and interactive activities that cover almost all areas of Science featured in this colourful gateway to Science by the Australian Broadcasting Corporation.

38. **Canadian Hurricane Centre for Kids**
www.ns.ec.gc.ca/weather/hurricane/ids.html
A comprehensive look at hurricanes including a full glossary and list of hurricane links.

39. **Hurricanes**
www.eduscapes.com/42explore/hurricane/htm
Information, activities and links for hurricanes.

40. **EcoKids Online**
www.ecokids.earthday.ca/
Games, news and stories that teach students about the environment.

41. **EcoKids and Teachers**
www.ecokids.earthday.ca/pub/educators/clamate/frm_set.htm
Information about climate change, global warming, the green house effect and other atmospheric conditions for educators and parents

service.

42. **SciCentral K-12 Science**
www. Scicentral.com/K-12/

43. **Dr. Bob's Interesting Science Stuff**
www.frontiernet.net/~docbob/
Interesting Science and Technology facts, articles, bulletin board ideas, Science Exhibition projects, questions and answers and Science links.

44. **CyberFair – Science Project Steps**
www.isd77.k12.mn.us/resources/cf/steps.html
See sample projects and get information on how to do projects.

45. **Bonus**
www.bonus.com
Super resource for students that offers activities, interactive games and graphical toys to help them learn to about Science and other subjects.

Literacy Skills for the Science Classroom

The following sites features information and strategies for helping students develop the reading and writing skills needed for success in the science classroom.

Sites That Matter

Resources for Science Literacy: Professional Development
The mission of Project 2061, a long-term initiative of the American Association for Advancement of Science, is to advance literacy in science, math, and technology through workshops for teachers, principals, curriculum and materials developers, policy makers, and others. There are also self-guided courses and trade book information for teachers. This site also includes a fabulous evaluation tool for comparing Benchmarks for Science Literacy with the benchmarks set by the National Council of the Social Studies, the National Council of Teachers of Mathematics, and the National Research Council.
www.project2061.org/publications/rsl/online

Science and Literacy, by Ellen Stone, National Energy Foundation
This brief article is posted on the Science Site from the Utah Office of Education. The author explains why the science curriculum ought to help students learn to read and write about science. She includes suggestions for how to integrate reading into a science program and lists strategies for helping students comprehend nonfiction.
www.usoe.k12.ut.us/curr/Science/ReadScience/NEF%20Sci%20and%20Lit.html

Reading and Writing in the Science Classroom, by Dr. Patricia Bowers
This article from the Professional Development section of Houghton Mifflin's Science Discovery Works site emphasizes the connection between science and what the author calls "the communication skills of reading and writing". Focusing primarily on the upper and lower elementary grades, the author provides a chart that demonstrates how the process skills of science, reading, and writing are interrelated, and she includes suggestions for how to develop an integrated unit. www.eduplace.com/science/profdev/articles/bowers.html

MCPS Science Instruction
This section of the Montgomery Country Public Schools web site contains numerous ideas and strategies for integrating reading and writing with science instruction.
www.mcps.k12md.us/curriculum/science/instr/instr.htm

Learning Styles and Writing in Science
This report from England's Department for Education and Skills list numerous strategies for integrating writing into the science curriculum. The strategies are organized into categories based on Howard Gardner's multiple intelligence theory: visual, auditory, kinesthetic, intrapersonal, and interpersonal.
www.standards.dfes.gov.uk/midbins/keystage3/Learning%20styles%20and%20writing%20in%20science.PDF

Use of Writing in Science Class
This web page from the University of Akron's K-12 Science Education site gives a concise rationale for including literacy instruction in the science class and gives some practical suggestions for how to do it.
www.agpa.uakron.edu/k12/best_practices/using_writing_resources.htm

Journals and Logs: Science, Conversation, and Writing
This article from Perspectives in Education and Deafness describes different types of logs and journals and includes ideas for how they can be used in the science classroom.

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
- 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.

a. **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 were chemical splash safety goggles.

b. **Asbestos.** Asbestos should not be used and should be discarded according to school system policy. Some forms of this mineral – commonly used in hear-proofing applications – is know to cause cancer.

c. **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 the use in elementary classrooms.

Science Safety

Teachers should communicate the following safety rules to their students and ensure that they are obeyed.

In the Classroom

- Listen to your teacher for special safety directions. If you do not understand something, ask for help.
- Wear safety goggles when your teacher tells you to wear them.
- Tell your teacher if something breaks or spills. Move away from it and wait for the teachers' instructions.
- Be careful around a hot plate, a candle or open flame. Only use these items if instructed to do so by the teacher.
- When heating materials in test tubes, always slant the tubes away from yourself and others.
- Wear safety aprons if you work with anything messy or anything that might spill.
- Read all of the directions before doing experiments or using equipment. Make sure you understand them. If you do not, ask your teacher for assistance.
- Carefully read the label on the container of a product before you use it; follow the manufacturer's instructions and pay special attention to health or safety warnings.
- Keep your hair and clothes away from open flames. Tie back long hair and roll up long sleeves.
- Keep your hands dry around electrical equipment.
- Know the location and proper use of the fire extinguisher and first aid kit.
- Never run or play around in the Science Laboratory classroom.
- Never eat, drink or smell unless you are instructed to do so by the teacher.
- Never draw any material into a tube with your mouth.
- Clean up your work area, and wash your hands afterwards.
- Put tools and equipment safely away the way your teacher tells you to as soon as you finish using them; do not leave them out where they may be stumbled over.
- When using liquids or other potentially messy substances, cover work surfaces with newspaper.

On Field Trips

- Always be accompanied by a trusted adult – like your teacher or a parent or guardian.
- Never touch animals or plants without the adult's approval. The animal might bite. The plant might be poisonwood or another dangerous plant.
- Stay with your group and keep within sight of the accompanying adult. Report any scrapes, cuts, and injuries to your teacher immediately.

Responsibility

- Treat living things, the environment, and each other with respect.

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 students' 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

Construction 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 though, 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 though, 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	2	3	4	5
strongly disagree		somewhat agree		strongly agree

Data collection was within expected norms, explanations were given where they deviated.

1	2	3	4	5
strongly disagree		somewhat agree		strongly agree

Conclusion is appropriate for the data collected and shows a strong grasp of the scientific concepts.

1	2	3	4	5
strongly disagree		somewhat agree		strongly agree

Writing style shows neatness, grammatical correctness, and good spelling.

1	2	3	4	5
strongly disagree		somewhat agree		strongly agree

The lab write up was complete with graphs and charts where appropriate. Check the parts present.

Purpose _____ Materials List _____ Procedures _____ Data and Oservations _____ Calculations _____ Questions _____ Conclusion _____

1	2	3	4	5
strongly disagree		somewhat agree		strongly agree

The response to the questions were carefully though out and well reasoned.

1	2	3	4	5
strongly disagree		somewhat agree		strongly agree

By Barbara Schaner

SECTION E

APPENDICES

Teaching and Learning Strategies

http://www.newhorizons.org/strategies/front_strategies.html

In this area of the website you will find information on some of the best researched and the most widely implemented methods of helping all students to learn more successfully. The information includes a description of how the teaching and learning strategies work, where they have been applied, results, and where to find further information from experts in the field, books, websites, and other resources. They have been demonstrated to be successful with students of all ages and ability levels, including those with various kinds of disabilities and those who do not learn in traditional ways. Following are links to different teaching and learning strategies, a description of how they work, where they have been applied, results, and where to find more information from individuals, books, web sites, and other resources.

Accelerated Learning Techniques

Action Research

Applied Learning

Arts in Education

Assessment Alternatives

Character Education

Cognitive Coaching

Cooperative Learning

Democratic Classrooms

Differentiated Instruction

Emotional Intelligence

Environmental Education

Environments for Learning

Graphic Tools

Instrumental Enrichment

Keeping Fit for Learning

Learning Styles

Literacy

Multicultural Education

Multiple Intelligences

Service Learning

Teaching for Understanding

Technology in Education

Thinking Skills

Some Teaching and Learning Strategies that work in Science

I. **"OWL STRATEGY"**

Credit is given to Ansberry and Morgan 2005 for the creation of the OWL Strategy. This strategy is a three – column chart – OBSERVATIONS, WONDERINGS and LINK TO LIFE/LEARNING where students record their **observations** about a phenomenon or object, their **wonderings/thoughts** and what they **learned** as it relates to **life**.

II. **"READ ALOUD" -SCIENCE LITERATURE/CONCEPTS**

This strategy is appropriate for all grade levels. Many researchers contend that this strategy improves reading skills and increase interest in reading and literature and can improve overall academic achievement.

III. **"FRAYER MODEL"**

The Frayer Model is a tool use to help students develop their vocabulary. Frayer believes that students develop a stronger understanding of concepts when they study them in relational manner. Participants write a word (e.g. ECHINODERMS) in the middle of a box and proceed to list characteristic, examples, non-examples, and a definition in other quadrants of the box. They are encourage to proceed in any order; using the examples and characteristics to help them formulate a definition.

IV. **"ALPHABOXES"**

This strategy could be use as a brainstorming activity to elicit student's prior knowledge and to activitate learning, or it could be use at the end of a unit to assess what students learned. Students would be given a blank alphabox (with letters from A to Z – see sample handout). They are given a topic (e.g. MATTER) and are given a time period to write or suggest a word/phrase beginning with each letter of the alphabet associated with the given topic.

V. **"PUT RHYTHM TO WORDS"**

This strategy could be use to aid students in learning definitions of science words and assessing their knowledge of concepts taught in a lesson/unit.

This strategy provides the opportunity for participants to be creative. In small groups, participants are provided with five definitions each. Example: "AN ECOSYSTEM IS A PLACE WHERE LIVING AND NONLIVING THINGS AFFECT EACH OTHER." They are encourage to read the definitions, identify key words in the definitions, identify the part of speech for selected words in the definitions – (integrating language Arts) discuss meaning and finally use words in a rhythmic beat so that the definition can easily be remember.

To assess definition of words, each word of the definition is placed in squares of firm construction paper and cut out individually. (Word puzzle.) The words are shuffled and participants are given a specific time to put word puzzle in correct order.

VI. **USING MUSIC**

Using music instead of memorization is a technique use to show how science concepts can be taught. Example: Information on "Bones Found in the Human Body" is provided. In small groups, participants use the tune of familiar nursery rhymes and songs to learn basic content on a topic.

VII. **VOCABULARY WHEELS (by Jane Feber)**

Participants create a moving wheel that was placed within a folded piece of paper, which has a small opening cut on both sides. Through the small openings, students write science words on one side of the wheel and their definitions on the other side of the wheel. This visual tool which participants can make can be use to test vocabulary in Science.

VIII. **SWAT**

This is a fun way to review vocabulary. Teachers are encourage to select an area in the classroom where science words can be mounted (science wall).

At the end of each unit, the students are grouped into two teams. Each team is provided a light plastic fly swatter. At various intervals two persons (one from each team) stand with fly swatter and back to word wall. Remaining students are given the initiative to give the definition of a word on the word wall. The "GO" Sign then give permission for the two individuals to turn and SWAT the correct word for the meaning given as quickly as possible. This game reinforces concepts and allow students to have fun while learning.

IX. **FOLDABLES (by Denise White)**

Foldables are great hands-on instructional strategy and more valuable than worksheets. Students can create various styles of foldables using sheets of colored paper. They can use the foldables for note taking or written activities.

X. **VOCABULARY CHARADE (by Madeline Marcotte)**

This strategy can be use with any age group. The purpose of this technique is to review Science vocabulary previously studied. The techniques utilize visual/spatial, body/kinesthetic and interpersonal intelligences.

- Students are given cards with science vocabulary words (one word per card).
- Each student is given the opportunity to choose two persons to work with them.
- A time limit is given for discussion of vocabulary in small groups, and then participants ACT out the WORDS for the class without using oral language.
- The class observe the ACT and then make an effort to identify the WORD. This technique can be used in conjunction with a visualizing activity in which students draw a small picture or symbol next to each word in their notes.

XI. **"CONCEPT DEFINITION MAP"**

The teacher will choose a word or concept, which relates to topic being studied and write it in the center of the graphic, keep in mind a few questions:

1. What is the central word, concept, research question? (example: Vertebrates)
2. What are the concepts? The items, descriptive words, or telling questions that you can associate with the concept, topic etc. (for example: animals with backbone, warm blooded).

The Concept Definition Map could be used during or after reading of a Science passage. It can be used with expository and narrative text. (See www.forpd.ucf.edu/strategies/samMap.html)

Sample Glossary

GRADES: 3 – 4

WORD:	DEFINITION:
Adaptations	A body part, a body covering or an action that helps an animal survives.
Amphibians	An animal with smooth, wet skin. Cold-blooded animals that live part of their lives in water and part on land.
Atmosphere	A thick layer of gases, water, and small solid particles that surrounds the earth.
Balance	A tool used to measure mass.
Birds	Warm-blooded animals that have feathers and lay eggs.
Brain	The main organ of the nervous system.
Camouflage	A color or shape that helps an animal blend in with its environment.
Climate	The average weather of a region over a long period of time.
Clouds	Tiny drops of condensed water that gathers in the atmosphere.
Conservation	The wise use and careful management of natural resources.
Consumer	A living that that eats other living things.
Core	The layer of the earth beneath the mantle and at the center of the earth.
Crust	The outer layer of the earth.
Current	An ocean movement; a large stream of water that flows in the ocean.
Decomposer	A living thing that gets energy by breaking down dead plant or animal parts.
Desalination	A process where salt is separated from ocean water.
Diaphragm	A thick sheet of muscle just below the lungs that does the work of breathing.
Dicot	A plant whose seeds have two parts.
Digestion	The way the body breaks down food and changes it to a form that can get into the blood.
Ecosystem	A place where living and non-living things interact.
Erosion	The moving of weathered rocks and soil from one place to another place.
Fish	Cold-blooded animals that live in the water and breathes through gills.
Flower	The part of some plants in which seeds and fruits form.
Food chain	The path that energy takes as one living thing eats another.
Food web	A group of food chains that overlap.

WORD:	DEFINITION:
Force	A push or pull on an object, caused by another object.
Forest	A place where many trees grow.
Germination	The beginning of the growth of a plant embryo.
Indigenous plants	Plants that are native to a particular country or area.
Inner planets	The four planets closest to the sun: Mercury, Venus, Earth and Mars.
Insect	Arthropods that have three body segments (head, thorax and abdomen) and six legs.
Invertebrates	Animals without backbones.
Leave	The part of a plant where most of the plant's food is made.
Life cycle	The order of the stages in an animal's growth.
Magnet	An object that attracts iron and a few other (but not all) metals.
Mammals	Warm-blooded animal that is covered with hair or fur and produces milk to feed its young.
Mantle	The layer of the earth just beneath the crust.
Mass	A measure of the amount of matter in an object.
Matter	Anything that has mass and takes up space.
Metamorphosis	The changes in form that occur from egg to adult in some animals.
Meteorologist	A scientist who studies weather.
Meteorology	The study of weather.
Mimicry	An adaptation in which an animal looks like a harmful animal.
Monocot	A plant whose seeds are in one piece.
Motion	Any change in the position of an object.
Natural resources	A useful material that is taken from the environment.
Nerve	A bundle of nerve cells.
Nervous System	A control system made up of the brain, the spinal cord and the nerves.
Non-seed plant	A plant that does not form seeds.
Nutrients	Materials needed by living things for growth; materials in food that are used by the body.
Outer planets	The four planets farthest from the sun: Jupiter, Saturn, Uranus and Neptune.
Physical change	A change of the size, shape or state of matter.

WORD:	DEFINITION:
Physical property	A property of matter that can be observed or measured.
Planet	A large space object that moves around the sun.
Pollution	An unwanted matter that has been added to the air, water, or soil.
Precipitation	Water in the atmosphere that falls to Earth as rain, snow, hail or sleet.
Producer	A living thing that makes food by using the sun's energy.
Property	A thing that describes matter.
Recycle	To use something over again in a new way.
Reptiles	Cold-blooded animal with a dry body covered with scales.
Respiratory System	The transport system that brings oxygen into the body.
Root	The part of the plant that anchors the plant in the ground.
Rotation	The spinning motion of an object.
Seed	The part of a plant from which a new plant can grow.
Seed plant	A plant that can form new plants from seeds.
Simple machines	A device that changes the size or direction of a force.
Spider	Invertebrates that have two body segments (head and abdomen) and eight legs.
Spinal cord	A thick cord of nerves in the middle of the back. A tube of nerves that runs through your backbone to your brain.
Spore	A single cell that can grow into a new organism.
Spring scale	A tool that measures forces, such as weight.
Stem	The part of the plant that supports the leaves, flowers, or cones.
Sun	The star closest to Earth.
Temperature	A measure of how hot or cold something is.
Trachea	A soft tube in the respiratory system with rubbery rings around it.
Vectors	Animals that spread germs or diseases.
Vertebrates	Animals with backbones.
Volume	The amount of space that matter takes up.
Water Cycle	The path that water follows as it leaves the earth, goes into the air, and returns to the earth.
Weather	The condition of the air at a certain time and place.
Weathering	The breaking or wearing away of rocks.
Wind	Moving air.
Work	What is done when a force moves on an object.

SECTION F

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