MINISTRY OF EDUCATION

CURRICULUM GUIDELINES

GENERAL SCIENCE

GRADES – 7, 8, 9

DEPARTMENT OF EDUCATION
2010

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MINISTRY OF EDUCATION

MISSION STATEMENT

The mission of the Department of Education is to provide all persons in The Bahamas an opportunity to receive an education that will equip them with the necessary beliefs, attitudes, knowledge and skills required for work and life in a democratic, Christian society.

THE PHILOSOPHY

The Department of Education embraces a philosophy that all human beings have an undeniable right to an education, one that will enable them to understand their privileges and responsibilities in the community. The following principles are grounded in the Philosophy:

(i) A belief in the ability of the teaching/learning process to unlock and draw out the fullest potential of the individual;
(ii) An uncompromising commitment to the pursuit of excellence by teachers, learners and all who are associated with educational enterprises;
(iii) A belief in the value of the differing gifts and aptitudes of individuals, and in the importance of these differences in an inter-dependent society;
(iv) An appreciation of the natural and cultural heritage of The Bahamas;
(v) A recognition of The Bahamas as a part of a wider world community with which it must interact productively.

THE CURRICULUM

The curriculum developers have espoused, in part, the philosophies of John Dewey that "Knowledge is based on experience caused by the learner being in an active relationship with the environment" and Constructivism by Jean Piaget who proposes that "learners should be in an environment where they are engaged in questioning, hypothesizing, investigating, debating, analyzing and evaluating".

ASSUMPTIONS

The Curriculum Guidelines are based on the assumptions that follow:

(i) Students want to learn.
(ii) The physical classroom environment as well as the experiences both inside and outside the classroom affect learning.
(iii) Students have the capacity to construct mental interpretations and concepts of the instructional experiences.
(iv) Students have the prerequisite knowledge and skills as outlined in the Appendix.

DESIGN

The design used for the curriculum guidelines include components of several designs, namely:

(i) **Backward** – initially, the knowledge, skills and attitudes required of students in order to become successful in a Science course of study in Grade 10 – 12 were identified. These served as the basis for the selection of learner outcomes/specific objectives, content, instructional strategies and methods of assessment in the document.
(ii) **Skills-based** – the content is used to develop skills as learner outcomes give focus to skills.
(iii) **Spiral** – skills and concepts are developed at each grade level (and as far as possible in successive units).
(iv) **Multidisciplinary** – most skills are applicable in other disciplines in particular, Language Arts, Mathematics, Social Studies, Health and Family Life, Family and Consumer Sciences as well as Technical Studies. Cross references are made to highlight complementary and supplementary information in other units as well as other subjects.
(v) **Flexible** – it allows teachers the scope to modify the guidelines to accommodate students of high and low ability levels as well as students of different learning styles.
(vi) **Authentic** – the examples, problems and formative assessment used are relevant to the students.

OVERVIEW

INTENT

It is intended that the

1. curriculum would be used by teachers throughout The Commonwealth of The Bahamas to provide a measure of standardized instruction;
2. students having completed the three-year course of study as outlined, will have common knowledge, skills and attitudes relative to a variety of Science topics from the physical and biological science disciplines;
3. students completing this course of study should exhibit a level of Scientific literacy that would enable them to function in any of the Science subjects offered at the senior high school level;
4. student-focused instructional activities facilitate students in assuming responsibility for their learning;
5. use of these guidelines will provide students with many opportunities and experiences to develop identified skills that are assessed formatively thereby preparing students for summative assessment of the skills in the Bahamas Junior Certificate Examinations thereby increasing their level of success in these examinations.

PLANNING

Teachers are encouraged to use the curriculum as a guideline for planning lessons. The sequence of learner outcomes in the scope of work allows a number of closely related learner outcomes to be included in one lesson. An example would be an investigation in which several skills (formulating hypothesis, designing and conducting an investigation, using scientific equipment and materials, recognizing and controlling variables, making observations, predicting, collecting and processing data, drawing relevant conclusions) are included. It is important that the learner outcomes included in one lesson facilitate students in developing concepts.

In an effort to place more emphasis on students' active involvement in the teaching-learning process, there are a number of activities that require students to do research or set up prior to a lesson. It is therefore suggested that when Schemes of Work are developed, such activities requiring prior planning are indicated in the time sequence. Similarly, many opportunities are provided for group work and cooperative learning. It is important that planning include ample lead time prior to execution for such strategies.

It is recognized that no curriculum guidelines would perfectly suit the pace at which all students master the information and skills. Consequently, there are several activities and/or similar skills outlined for a topic/sub-topic. It is suggested that teachers may omit some of the activities for classes that readily acquire the information and skills while more activities might be used with classes that need more reinforcement. Alternatively, if scheduling makes time a constraint, the number of activities and/or the number of learner outcomes addressing the same skill for a topic may be reduced. While this flexibility allows modifications to meet students' needs, teachers are advised to ensure that this does not lead to insufficient time being allotted to complete the course of study or a speedy completion with excessive "revision" time.

It is essential that lesson planning should be based on students' need to develop defined skills and/or attitudes as well as knowledge.

The time allocation for the completion of units of work/topics for each grade level in the curriculum is based on three lessons of 50 minutes each per week for thirty (30) weeks.

INSTRUCTIONS

Throughout the curriculum guidelines there is a dual focus to the suggested instructional strategies: that they engage students actively in the learning process and that they are varied to allow students of different learning styles to benefit. Teachers are therefore encouraged to use the strategies indicated, or similar ones in order to maintain these foci.

To ensure ample time for the completion of the curriculum in the allotted three (3) year period, a concerted effort has been made by science curriculum committees to avoid duplication of information being taught at more than one school level and in more than one subject. While teachers are encouraged to extend the curriculum and experiences on a lesson basis to meet the needs and interests of students, especially in the case of "high fliers", care should be taken to avoid duplication of aspects of the senior high school curricula.

In the same manner that there are many common features of the Bahama Islands, there are significant differences. Teachers are therefore encouraged to include examples from the local in planning and instructions.

Formative assessment is an integral part of effective planning for instruction and as such should be ongoing. Hence, a variety of means of assessing activities, skill development and learner outcomes are included in the curriculum. It is suggested the assessments indicated, or similar methods, are used to assess students' progress in the identified skills, knowledge and attitudes. The traditional methods of assessment utilizing tests containing structured and objective/multiple choice questions similar to those used on the Bahamas Junior Certificate Examinations should still be used more as summative assessments at the end of units, mid-term and end of term assessment.

EVALUATION

As this is a draft document to be used and then evaluated, an evaluation form is included. Since the curriculum is being phased in, it is important that teachers complete and submit the Evaluation Form for seventh grade at the end of the first year, and eighth and ninth grades at the end of the second and third years respectively so that revisions could be made to each section after the year has passed to avoid a lengthy and tedious major revision of the whole curriculum at the end of three years.

INTRODUCTION

RATIONALE FOR SCIENCE EDUCATION IN THE BAHAMAS

To provide opportunities that engage and expose all 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 prepared 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 conservation.

OVERARCHING GOAL

To become critical thinkers, problem-solvers, innovators, visionaries, scientifically and technologically literate citizens who will appreciate, interpret and conserve the natural environment.

SUB-GOALS

- To develop analytical and evaluative skills thus becoming critical thinkers.
- To engage in scientific inquiry (including use of the scientific method) as a means of becoming problem solvers.
- To utilize creativity expressions to demonstrate the application of scientific knowledge and principles.
- To utilize scientific knowledge and the awareness of technological advances as a means of functioning effectively in the world.
- To formulate, present and defend arguments based on facts.
- To develop an appreciation for the safe and sustainable use of resources.
- To obtain the basic knowledge, skills and attitudes that are necessary for success in Biology, Chemistry, Physics or Combined Science studies in senior high school.

FOCUS

It is increasingly obvious that in this age of information, no course of study can apprise students with all of the basic information of a discipline. It is therefore necessary that students are equipped with the skills for acquiring information and processing the information as well as making decisions based on the processed information. The scientific method applied to problem solving highlights the skills that prepare students for life in the community. It is therefore important that all students are provided with extensive opportunities to develop these skills.

The combination of topics taken from a variety of scientific disciplines ensures that the students who complete this three-year course of study have a wide background in basic Science and technology.

GENERAL OBJECTIVES

1. Use materials and scientific equipment correctly and safely.
2. Make observations.
3. Utilize classification process.
4. Make inferences and draw conclusions.
5. Communicate information.
6. Recognize relationships.
7. Measure accurately.
8. Make predictions.
9. Collect, process and interpret data/information.
10. Formulate hypotheses.
11. Recognize and control variables.
12. Design, conduct and evaluate scientific investigations.
13. Formulate models.
14. Apply principles and concepts (scientific & technological) to make products.
15. Make informed, responsible and wise decisions.
16. Pursue new knowledge.
17. Demonstrate critical thinking.

RATIONALE FOR INCLUSIONS

Members of the Curriculum Revision Committee reviewed junior high school science curricula from Jamaica, Guyana, Canada (Atlantic) and United Kingdom. A comparative analysis was done for these areas: focus, format, goals, methodologies and content. The results of this analysis were used, in part, to inform this document.

Questionnaires designed to seek the input of the public were prepared and distributed to educators, students and members of the community in North Andros, Exuma, Grand Bahama, Long Island, New Providence, San Salvador and Spanish Wells. The analysis of data from the completed questionnaires was used in preparing this document.

The current General Science Curriculum was revised in 1997. The 2009 revised General Science Curriculum retains the biological and physical science components along with mathematical infusions. The modifications to the previous curriculum are:

(i) **Deletions**

- The strand "Science and Me" has been eliminated. Aspects of that strand could be included in the upper primary grade levels.
- The unit on Weather – the content for this unit is covered in the Social Studies Curriculum. Since Social Studies is a core subject, all students in junior high school will be exposed to the information.
- The Solar System unit has also been eliminated as it too is adequately covered by the Social Studies Curriculum.
- Ecosystems have been eliminated from the Ecology Unit. They have been included in the Biology Curriculum.
- The Unit on Vertebrates has been removed and placed in the primary level curriculum.

(ii) **Additions**

- A strand on Technology has been included in the curriculum in reflecting its inclusion of technology in the curricula reviewed from other countries.
- The life history of four economically important animals (crab, grouper, conch, lobster) and one plant (maize) have been included as a means of promoting wise conservation practices towards sustainable harvests of these organisms.
- Nutrition and the Digestive System are included as a means of promoting healthy nutrition as a means of reducing the increasing number of lifestyle disorders caused by poor diets.

(iii) **Rearranged**

- The Scope and Sequence comprises skilled-based learner outcomes/activities. This matrix facilitates checking that the identified skills are included throughout Grades 7, 8 and 9 instead of topics and sub-topics being indicated in the Scope and Sequence.

- The format of the Scope of Work has been slightly modified to show the learner outcomes in the first column as a means of emphasizing their importance. A final column has been included with suggested methods of assessment for the learner outcomes and instructional activities. This serves to reinforce focus on the identified skills. In addition, the varied methods of assessment included, satisfy the overwhelming input from the Public Perception Questionnaire that assessment should not be based exclusively on tests.

SCOPE AND SEQUENCE – TOPICS & CONTENT

MAJOR TOPIC	GRADE 7	GRADE 8	GRADE 9
Living Things	**Cells** (differences between animal & plant cells, specialization [e.g. root hair, guard, palisade, epidermal, epithelial, muscle, blood, reproductive], organization [tissue, organs, systems with examples]) **Classification** (six kingdoms with characteristics, seven invertebrate groups with characteristics and examples, four classes of arthropods with characteristics and examples)	**Linnaeus System** of Classification, Binomial System **Crab** (external features, habitat, life history, economic importance) **Nassau Grouper** (external features, habitat, life history, economic importance)	Classification of **plants** (life cycle [ephemerals, annuals etc.], height [herbs, shrubs, trees], [evergreen, deciduous], five phyla of plants) **Gum elemi**; (external features, economic importance) **Maize** (external features, life history, economic importance) **Queen Conch** (external features, habitat, life history, economic importance) **Spiny Lobster** (external features, habitat, life history, economic importance)
Matter	**States of Matter** (properties, molecular arrangement) Physical **changes** (definition, examples), Chemical **changes** (definition, examples)	**Atoms** (structure, differentiate between sub-atomic particles) **Elements** (definition, first 20 elements of periodic table (also Fe, Br, Zn, Hg, Pb, Ur - name, symbol) Periodic Table (definition, organization, groups, periods, metals versus non-metals, characteristics of groups, characteristics of periods, Physical and chemical properties Physical properties of metals and non-metals **Mixtures** (mixtures, solutions, solubility, saturated solutions, suspensions), dilute/concentrated, methods of separation (decantation, evaporation, distillation, filtration, magnetism, chromatography)	**Compounds** (definition, examples), molecules (definition, examples, formulae) **Equations** (word, simple chemical) **Acidity** (acids, bases, pH, common examples, neutralization reactions)

SCOPE AND SEQUENCE – TOPICS & CONTENT

MAJOR TOPIC	GRADE 7	GRADE 8	GRADE 9
Energy and Forces	**Magnetism** (lodestone, magnetic materials, poles, making magnets, destroying magnets, care for magnets, law of magnetism, force fields, definition of electromagnet **Energy** (definition, units, forms, classes [kinetic, potential], transformation) renewable and non-renewable sources of energy	Mass, units **Forces** (definition, common types[gravity, friction, magnetic, electrostatic, wind, water], Pressure and equations to calculate pressure **Machines** (six types of simple machines with three classes of levers, examples, identify effort, fulcrum and load for each), definition of complex machine, examples Work (definition, calculation, units) **Sound** (source, transmission, waves, characteristics, principle of selected musical instruments)	**Heat** (definition, methods of transmission, conductors & insulators, units, temperature, thermometers, flames) **Electromagnetic spectrum** **Light** (definition, speed, properties [straight lines, reflection, refraction, dispersion], transparency, luminousity, waves **Electricity** static (charged materials, insulators, law, lightning), current (conductors, current flow, parts of a circuit, parallel and series connections, batteries, direct versus alternating current, units, common voltage, fuse)
Ecology	**Feeding relationships** (consumers etc., trophic level, food chains, food webs, parasites etc.), Sun as ultimate source of energy. **Water** (physical properties, cycle, source, hard and soft, purification, solvent)	**Endangered species** (turtles, hautia, iguana, white crown pigeons, flamingo, orchids etc.) **Carbon Cycle** **Air** (properties, use, preparation of carbon dioxide, uses of carbon dioxide, test for carbon dioxide, oxygen preparation, test for oxygen, uses, properties) **Soil** (classification of particle size, types, fertility, porosity)	**Invasive species** (casuarinas, Poinciana, Bermuda grass, curly tail lizards etc., identification, effects, spread) **Nitrogen Cycle** **Land pollution** (litter etc., effects) **Solid waste disposal** and management (sorting and packaging waste, appropriate disposal)
Human Body	**Nutrition** (definition, food groups [food sources, function, deficiency diseases, tests], diet, balanced diet, specialized diet, medical/physical disorders contributed to by eating habits/diets	**Digestive System** – alimentary canal [structure, movement of food through, role of enzymes, digestive juices, location of ingestion, digestion, absorption, assimilation, egestion], end products of digestion	**Reproductive System** – male system (structure and function), female system (structure and function), puberty (definition, secondary sexual characteristics, menopause), fertilization, twins, pregnancy, birth, contraceptives, sexually transmitted infections (four)

SCOPE AND SEQUENCE – TOPICS & CONTENT

MAJOR TOPIC	GRADE 7	GRADE 8	GRADE 9
Technology	The use of microbes in food preservation in the advancement of man. (Making yogurt, cheese, wine) Discuss food preservation in terms of stopping spoilage such as drying for example fruit, and meats. Discuss technological advancements to reduce dangerous microbes in foods.	**Communication** underlying scientific principles of: lighthouse, telegraph, telephone, radio, television, fax, mobile phone, worldwide web.	Use of technology in designing housing in The Bahamas. (Students can design & construct model houses and test the temperatures in each.) Discuss the use of solar energy as compared to mains electricity. (Have students construct a simple solar panel, measuring the voltage and current produced) building materials (wood, concrete), roofing, windows, ceiling, lighting, plumbing.

SCOPE OF SKILLS GRADES 1 – 12

OBJECTIVES	GRADES 1 – 6	GRADES 7 – 9	GRADES 10 - 12
Use materials and scientific equipment correctly and safely.	√	√	√
Make observations.	√	√	√
Utilize classification process	√	√	√
Make inferences and draw conclusions	√	√	√
Communicate information.	√	√	√
Recognize relationships.	(√) Spatial	√	√
Measure accurately.	√	√	√
Make predictions.	√	√	√
Collect, process and interpret data/information.	(√) Collect data	√	√
Formulate hypotheses.	√	√	√
Recognize and control variables.			√
Design, conduct and evaluate scientific investigations.	√	√	√
Formulate models.	√	√	√
Apply principles and concepts (scientific & technological) to create products.		√	√
Make informed, responsible and wise decisions.	√	√	√
Pursue new knowledge.	√	√	√
Demonstrate critical thinking.	√	√	√

SCOPE AND SEQUENCE (SKILLS)

Use materials and scientific equipment correctly and safely

GRADE 7	GRADE 8	GRADE 9
◆ Use a microscope to observe examples of plant and animal cells. ◆ Use a slide, cover slip and pipette to make a wet slide of protozoans. ◆ Use a ruler to measure the dimensions of a model Queen Conch. ◆ Use a balance to measure the weight of a model adult Queen Conch. ◆ Use materials and equipment to demonstrate that matter has mass and volume. ◆ Use materials and equipment to demonstrate physical changes. ◆ Use materials and equipment to demonstrate chemical changes. ◆ Use bar magnets to demonstrate: attraction, repulsion, magnetic field, North and South Pole alignment. ◆ Use a simple pendulum and/or elastic band to demonstrate potential and kinetic energy. ◆ Use a thermometer to measure the temperature of boiling water. ◆ Use apparatus to show the inter-conversion of the states of matter for water. ◆ Use apparatus to show filtration of water. ◆ Use distillation apparatus. ◆ Use apparatus and materials to demonstrate the transpiration stream. ◆ Use spotting tiles and iodine to test for starch in foods. ◆ Use a microscope to view microbes.	◆ Use a ruler to measure the width of a model crab. ◆ Use a balance to measure the weight of a model crab. ◆ Use a ruler to measure the length of a model grouper. ◆ Use a balance to measure the weight of a model grouper. ◆ Use various household materials to make mixtures and solutions in the laboratory. ◆ Use apparatus and materials to show filtration of a mixture. ◆ Use apparatus and materials to show separation of a mixture by evaporation. ◆ Use apparatus and materials to show separation of a mixture by decantation. ◆ Use apparatus and materials to show separation of a mixture using magnets. ◆ Use apparatus and materials to show separation of a mixture by chromatography. ◆ Use apparatus and materials to show separation of a mixture by distillation. ◆ Manipulate parts of a lever to show three classes of levers. ◆ Use a bell jar and alarm clock to show that sound needs matter for its transmission. ◆ Use a tuning fork, string and cup telephone, or other relevant materials and apparatus to demonstrate that vibrations produce sound. ◆ Use a crucible or tongs to hold seeds for roasting. ◆ Use apparatus and materials to test for carbon dioxide in air.	◆ Use a ruler to measure the dimensions of a model lobster. ◆ Use a balance to measure the weight of a model lobster. ◆ Use apparatus and materials to prepare a compound. ◆ Safely use common household products, (beverages and pH paper) to determine their acidity, (alkalinity, and neutrality). ◆ Use apparatus and materials to demonstrate: heat, conduction, convection, flames for cooking vs. flames for light. ◆ Use a thermometer to measure temperature. ◆ Use apparatus to demonstrate properties of light. ◆ Use apparatus and materials to make simple series and parallel electrical circuits. ◆ Use an ammeter to measure electrical current. ◆ Use graduated cylinders and timers to measure water flow. ◆ Use voltmeters to measure potential difference.

SCOPE AND SEQUENCE (SKILLS)

Use materials and scientific equipment correctly and safely

GRADE 7	GRADE 8	GRADE 9
◆ Use a hand lens to observe fungi. ◆ Use equipment correctly and safely in preparing fruit preservatives.	◆ Use apparatus and materials to demonstrate air has weight. ◆ Use apparatus and materials to demonstrate air occupies space. ◆ Use apparatus and materials to demonstrate air has mass. ◆ Use apparatus and materials to prepare oxygen. ◆ Use materials to test for oxygen. ◆ Use apparatus and materials to prepare carbon dioxide. ◆ Use a ruler to measure the width of coarse sand particles. ◆ Use sieves to separate different sized soil particles. ◆ Use a stop watch to measure soil drainage. ◆ Use apparatus to determine the humus content of soil. ◆ Use apparatus to identify animals present in soil. ◆ Measure the pH of a soil sample. ◆ Use a microscope to observe villi.	

SCOPE AND SEQUENCE (SKILLS)

Make observations

GRADE 7	GRADE 8	GRADE 9
◆ Observe and identify specialized cells in plants. ◆ Observe and identify specialized cells in animals. ◆ Observe features of six kingdoms. ◆ Observe features of seven groups of invertebrates. ◆ Observe features of four classes of arthropods. ◆ Observe the external features of the Queen Conch. ◆ Observe differences in the gender of Queen Conchs. ◆ Observe diagrams of the life history of the Queen Conch. ◆ Compare the movement and speed of the conch with another type of mollusc. ◆ Observe and identify various changes in the states of water. ◆ Observe physical changes. ◆ Observe chemical changes. Observe differences between electromagnets and permanent magnets. ◆ Observe and record organisms in an area. ◆ Observe changes in water as it changes state. ◆ Observe the physical properties of water. ◆ Observe the condensation of water in a model water cycle. ◆ Observe the features of hard water. ◆ Observe the disappearance of solutes in water.	◆ Observe the characteristic features of white crabs. ◆ Add characteristic features on an outline diagram of a white crab. ◆ Observe differences in the gender of crabs. ◆ Observe diagrams of the life history of the white crab. ◆ Compare the movement and speed of the crab with another type of arthropod. ◆ Observe the characteristic markings of the Nassau Grouper. ◆ Observe differences in the gender of Nassau Groupers. ◆ Observe diagrams of the life history of the Nassau Grouper. ◆ Compare the movement and speed of the Nassau Grouper with another type of fish. ◆ Observe physical properties of common metals. ◆ Observe physical properties of common non-metals. ◆ Observe trends between elements in a group on the periodic table. ◆ Observe chemical properties of an element. ◆ Observe and identify forces as they affect motion of objects. ◆ Observe and record differences between the three classes of levers.	◆ Observe features of five phyla of plants. ◆ Observe features of herbs (herbaceous plants). ◆ Observe external features of shrubs. ◆ Observe external features of trees. ◆ Observe features of a deciduous plant. ◆ Observe external characteristic features of Gum Elemi trees. ◆ Observe the characteristic features of the Spiny Lobster. ◆ Observe differences in the gender of lobsters. ◆ Observe diagrams of the life history of the Spiny Lobster. ◆ Compare the movement and speed of the Spiny Lobster with another type of lobster/crawfish. ◆ Observe color changes of pH paper in various household substances. ◆ Observe and identify good conductors of heat and good heat insulators. ◆ Observe differences in heat transfer in solids (metals), liquids (water) and gases.

SCOPE AND SEQUENCE (SKILLS)

Make observations

GRADE 7	GRADE 8	GRADE 9
◆ Observe a positive (colour) food test for starch. ◆ Recognize the signs of severe malnutrition. ◆ Observe differences in appearance of various microbes. ◆ Observe yeast cells under the microscope.	◆ Identify local endangered animal species. ◆ Identify local endangered plant species. ◆ Observe the physical properties of air. ◆ Observe the positive test for oxygen. ◆ Observe the chemical properties of oxygen. ◆ Observe physical properties of oxygen. ◆ Observe physical properties of carbon dioxide. ◆ Observe chemical properties of carbon dioxide. ◆ Observe soot. ◆ Observe the appearance of soil samples. ◆ Observe air displaced from a soil sample. ◆ Observe features of pig “tripe” / intestine. ◆ Observe features of deficiency diseases in photographs. ◆ Observe a “bolus”. ◆ Observe peristalsis. ◆ Colour using a code the parts of the digestive system. ◆ Observe a lighthouse (photo). ◆ Observe components of a telephone, computer and fax.	◆ Observe properties of light. ◆ Observe primary components of white light. ◆ Observe the effect of changing the voltage of a power source on lighting in a simple circuit. ◆ Identify local invasive species. ◆ Observe root nodules. ◆ Observe common items/materials that form litter. ◆ Describe features of the sperm cell that make it efficient in performing its role. ◆ Observe structures of the human male and female reproductive system. ◆ Describe the position of a fetus in an amniotic sac. ◆ Observe water saving plumbing gadgets. ◆ Observe photographs of houses with different height roofs. ◆ Observe photographs of houses with different height ceilings. ◆ Observe photographs of houses with solar panels.

SCOPE AND SEQUENCE (SKILLS)

Utilize classification process

GRADE 7	GRADE 8	GRADE 9
◆ Distinguish between plant and animal cells. ◆ Use features of organisms to classify them into kingdoms. ◆ Use features of organisms to classify them into phyla. ◆ Arrange organisms in a hierarchy according to similarities and differences in features. ◆ Use external features to identify the Queen Conch. ◆ Identify organisms belonging to the "conch" family. ◆ Use features of the Queen Conch to determine whether it is a juvenile. ◆ Classify changes in matter as physical or chemical. ◆ Classify magnetic and non-magnetic materials. ◆ Differentiate between kinetic and potential energy. ◆ Differentiate between renewable and non-renewable energy. ◆ Identify non-renewable energy sources that may be used in The Bahamas. ◆ Use feeding habits to classify organisms. ◆ Use the formation of suds to classify water. ◆ Use features to classify foods as containing starch, fat, simple sugars or fibre. ◆ Classify food nutrients as complex or simple. ◆ Identify the three food nutrients that must be digested. ◆ Identify where digestion begins and ends for each nutrient. ◆ Distinguish between saturated and unsaturated fats. ◆ Identify how different microbes are classified. ◆ Classify methods of food preservation.	◆ Use a dichotomous key to classify living things into taxonomic groups. ◆ Use the Linnaeus System to classify an organism. ◆ Use external features to identify white crabs. ◆ Identify organisms belonging to the "crab" family. ◆ Use features of the crab to determine whether it is a juvenile. ◆ Use the external features to identify the Nassau Grouper. ◆ Identify fish belonging to the "Grouper" family. ◆ Use features of the Grouper to determine whether it is a juvenile. ◆ Classify elements (first 20) into various groups on the Periodic Table. ◆ Classify elements (first 20) into periods on the Periodic Table. ◆ Classify elements into metal and non-metal groups on the Periodic Table. ◆ Classify elements as noble gases on the Periodic Table. ◆ Classify solutions as concentrated, dilute, saturated and super saturated. ◆ Recognize that all forces can be defined as push or pull. ◆ Classify examples of levers from given photographs / diagrams. ◆ Classify substances as combustible or non-combustible. ◆ Classify substances as oxides. ◆ Classify soils based on particle size. ◆ Classify soils based on colour. ◆ Classify soils based on pH values.	◆ Classify flowering plants based on the time taken to complete a life cycle. ◆ Classify flowering plants based on their height and stem features. ◆ Classify plants based on their habitat. ◆ Classify trees based on them shedding leaves. ◆ Use external features of plants to classify them into five phyla. ◆ Use features of maize plant to classify it. ◆ Compare and contrast methods of pollination in plants. ◆ Use external features to identify the Spiny Lobster. ◆ Identify animals belonging to the "lobster" family. ◆ Use features of the lobster to determine whether it is a juvenile. ◆ Classify molecular bonding as ionic or covalent. ◆ Identify acids. ◆ Identify bases. ◆ Differentiate between very weak acids, weak acids, strong acids, and very strong acids. ◆ Differentiate between very weak bases, weak bases, strong bases, and very strong bases. ◆ Classify materials as good or bad conductors of heat. ◆ Classify energy based on its wavelength (electromagnetic spectrum). ◆ Classify materials based on their transmission of light.

SCOPE AND SEQUENCE (SKILLS)

Utilize classification process

GRADE 7	GRADE 8	GRADE 9
	◆ Classify instruments of communication based on their scientific principle.	◆ Classify materials as good or bad conductors of electricity. ◆ Classify electrical circuits as series or parallel. ◆ Differentiate between static electricity and current electricity. ◆ Classify the types of bacteria that act in the Nitrogen Cycle. ◆ Classify solid waste as biodegradable or non-biodegradable. ◆ Classify/sort solid waste for disposal. ◆ Classify contraceptives as barrier, hormonal, or surgical. ◆ Classify types of light bulbs according to the relative amount of energy used.

SCOPE AND SEQUENCE (SKILLS)

Make inferences and draw conclusions

GRADE 7	GRADE 8	GRADE 9
◆ Draw conclusions on the function of specialized cells based on the features of the cells. ◆ Use external features of an organism to make inferences about its habitat or mode of life. ◆ Use statistics from studies of conch populations to draw conclusions on the effect of fishing on populations. ◆ Use features of a conch to determine whether it is mature. ◆ Make inferences on the state of matter based on properties given. ◆ Make an inference on the force field of a lodestone. ◆ Draw an inference on the force field of an electromagnet. ◆ Determine possible identity of a missing organism from a food chain based on organisms present. ◆ Use information given in a food web to determine the ecosystem. ◆ Use physical properties of a liquid to determine the possibility of it being water. ◆ Draw inferences from information on a diagram of the Hydrological Cycle to determine the effect of a missing component. ◆ Draw conclusions on the solubility of solutes in water based on investigations. ◆ Draw a conclusion about a woman, after menopause, who had a diet deficient in calcium and phosphorus. ◆ Use food tests to determine the nutrients present in an unknown food.	◆ Use features of a crab to determine whether it is ready to spawn. ◆ Use statistics from studies of Grouper populations to draw conclusions on the effect of fishing on populations. ◆ Use features of a grouper to determine whether it is spawning. ◆ Draw a conclusion on whether a material is metal or nonmetal based on its physical properties. ◆ Based on the end products from a method of separation of a mixture, conclude what the mixture was. ◆ Draw inferences on the solubility of a solute based on its physical appearance. ◆ Draw a conclusion on the solubility of a solute based on an investigation. ◆ Decide which material allows sound to pass through fastest. ◆ Use data to determine whether given species will become endangered. ◆ Draw conclusions on the presence of oxygen based on the test for oxygen. ◆ Draw conclusions on the presence of carbon dioxide based on the test for carbon dioxide. ◆ Draw a conclusion on the suitability of a soil for farming based on its drainage rate. ◆ Make an inference on the fertility of soil based on its colour.	◆ Use statistics from studies of lobster populations to draw conclusions on the effect of fishing on populations. ◆ Use features of a lobster to determine whether it is ready to spawn. ◆ Draw a conclusion about the acidity or alkalinity of common household substances. ◆ Make inferences on how local invasive species arrived in the area. ◆ Make an inference as to the circumstances under which most littering occurs. ◆ Draw conclusions on the length of time for common land pollutants to breakdown. ◆ Draw a conclusion about the point in a woman's menstrual cycle, based on relative levels of hormones shown on a graph. ◆ Draw a conclusion about the plausibility of a woman being pregnant, based on the level of progesterone indicated. ◆ Draw a conclusion about the possibility of conception at various points in the menstrual cycle.

SCOPE AND SEQUENCE (SKILLS)

Make inferences and draw conclusions

GRADE 7	GRADE 8	GRADE 9
	◆ Based on the foods digested by a digestive juice, draw a conclusion on the types of enzymes present in it. ◆ Based on information given, suggest the deficiency disease caused. ◆ Draw a conclusion about the digestive system of a baby who is lactose intolerant. ◆ Draw a conclusion about a person's diet whose gall bladder has been removed. ◆ Draw a general conclusion about the brightness of light in a lighthouse based on the distance it is designed to cover.	

SCOPE AND SEQUENCE (SKILLS)

Communicate information

GRADE 7	GRADE 8	GRADE 9
◆ Use annotated diagrams to show the functions of cell organelles. ◆ Make labeled diagrams to show observed features of cells. ◆ Make labeled diagrams to show observed features of tissues. ◆ Make labeled diagrams to show observed features of organs. ◆ Make labeled diagrams to show observed features of human body systems. ◆ Prepare a poster or PowerPoint presentation to show characteristics of six kingdoms. ◆ Prepare a poster or PowerPoint presentation to show characteristics of seven groups of invertebrates. ◆ Prepare a poster or PowerPoint presentation to show characteristics of four classes of arthropods. ◆ Make an oral presentation on classification of invertebrates. ◆ Make an oral presentation (with visual aids) to describe the life history of the Queen Conch. ◆ Participate in a debate on: the importance of observing the restricted size for catching conch OR the economic importance of the conch outweighs the need to protect it. ◆ Make an oral presentation with visual aids to describe the habitat of the conch. ◆ Use energy conservation equations to demonstrate the law of conservation of energy. ◆ Make diagrams of food chains. ◆ Make a diagram or PowerPoint presentation of a simple food web. ◆ Make an energy pyramid for a given food chain.	◆ Make an oral presentation (with visual aids) to describe the life history of the white crab. ◆ Participate in a debate on: the importance of observing the closed season for catching crabs OR the economic importance of the crab outweighs the need to protect it. ◆ Make an oral presentation with visual aids to describe the habitat of the crab. ◆ Make an oral presentation (with visual aids) to describe the life history of the Nassau Grouper. ◆ Participate in a debate on: the importance of observing the closed season for catching grouper OR the economic importance of the grouper outweighs the need to protect it. ◆ Describe the habitat of the grouper. ◆ Use correct chemical symbols to identify selected elements. ◆ Demonstrate electronically and with the aid of models, the structure of the atom. ◆ Use colour codes to identify metals, nonmetals and noble gases on the periodic table. ◆ Use S.I. units related to energy and forces correctly. ◆ Make an oral presentation with visual aids to relate types of forces to examples of their usefulness. ◆ Demonstrate forces as either a push or pull. ◆ Use apparatus to show that pressure is the force exerted on a unit area of a surface.	◆ Make an oral presentation (with visual aids) to demonstrate classification of plants into major groups. ◆ Use visual aids to describe the economic importance of Gum Elemi. ◆ Use visual aids to describe the life cycle of maize. ◆ Make an oral presentation (with visual aids) to describe the life history of the Spiny Lobster. ◆ Participate in a debate on the importance of observing the size limitation and closed season for catching lobster OR the economic importance of the lobster outweighs the need to protect it. ◆ Make an oral presentation with visual aids to describe the habitat of the lobster. ◆ Use models, videos, or drawings to illustrate molecules, compounds and their differences. ◆ Use colour-coded pH scales to show degrees of acidity and alkalinity. ◆ Demonstrate and explain differences between the three methods of heat transmission. ◆ Explain why a blue flame is better for cooking than a yellow /red flame. ◆ Demonstrate the bending of light through various materials.

SCOPE AND SEQUENCE (SKILLS)

Communicate information

GRADE 7	GRADE 8	GRADE 9
◆ Make menus for balanced diets. ◆ Make an oral presentation on the importance of a balanced diet. ◆ Make a rap about the importance of a balanced diet. ◆ Make diagrams to show molecular arrangements in states of matter. ◆ Make diagrams to explain physical changes. ◆ Use illustrations to explain the difference between chemical and physical changes. ◆ Draw lines to show force fields of magnets and define force field. ◆ Explain the importance of the North and South Poles on magnets. ◆ Explain the care and storage of magnets. ◆ Differentiate between electromagnets and permanent magnets. ◆ Describe the process of food preservation for two methods.	◆ Write a poem or song to differentiate between simple and complex machines including examples. ◆ Using apparatus, explain the advantage of using a movable pulley rather than a fixed pulley. ◆ Explain a table with information on energy and forces. ◆ Read and interpret graphs showing energy and forces. ◆ Make a presentation on local endangered species. ◆ Make a presentation on the need for conservation measures for one endangered species. ◆ Use a skit to demonstrate the way of life of an endangered species. ◆ Make a presentation to describe air. ◆ Write experimental reports on investigations to demonstrate the properties of air. ◆ Write an experimental report on an investigation to prepare oxygen. ◆ Write an experimental report on an investigation to demonstrate the presence of oxygen. ◆ Write an experimental report on an investigation to prepare carbon dioxide. ◆ Write an experimental report on an investigation to demonstrate the presence of carbon dioxide. ◆ Make a presentation on the Carbon Cycle. ◆ Present points in a debate on the effects of carbon dioxide emissions on the greenhouse effect.	◆ Use circuit boards to explain the path of electricity in a series circuit and in a parallel circuit. ◆ Use symbols to show parts of electrical circuits. ◆ Use apparatus/materials to show difference between static and current electricity. ◆ Differentiate between AC and DC. ◆ Make a presentation on two local invasive species. ◆ Dramatize the Nitrogen Cycle. ◆ Explain how Nitrogen is circulated in nature. ◆ Label a diagram of the Nitrogen Cycle. ◆ Make brochures to promote sorting household solid waste. ◆ Make a poster showing the method of solid waste disposal for the island. ◆ Use correct names for parts of the human male and female reproductive system. ◆ Make annotated diagrams of the human male and female reproductive systems, foetus in amniotic fluid. ◆ Make an oral presentation outlining the stages of birth. ◆ Construct a bar graph of STI's recorded over the past decade. ◆ Explain the importance of amniotic fluid. ◆ Explain the importance of family planning.

SCOPE AND SEQUENCE (SKILLS)

Communicate information

GRADE 7	GRADE 8	GRADE 9
	◆ Explain the differences between a red and blue flame. ◆ Write an experimental report comparing drainage rates of soils. ◆ Describe a soil sample. ◆ Make a diagram showing soil sedimentation (layers). ◆ Label the digestive system. ◆ Describe what happens to food in the different parts of the alimentary canal. ◆ Make an oral presentation on the purpose of mechanical digestion. ◆ Describe simply the type of lights used on lighthouses and why they are effective. ◆ Identify the locations of existing lighthouses on a map of The Bahamas. ◆ Write simple stories to describe the operation of the telephone, radio, television.	

SCOPE AND SEQUENCE (SKILLS)

Recognize relationships

GRADE 7	GRADE 8	GRADE 9
◆ Demonstrate the relationships between cells, tissues, organs and systems. ◆ Demonstrate the relationship between classification and characteristic features. ◆ Demonstrate the relationship between the phylum arthropoda and its classes. ◆ Recognize the relationship between demand for conch meals and the rate of fishing for conch. ◆ Recognize the relationship between rate of reproduction, predation rate and survival of conchs. ◆ Recognize the relationship between the colours of the conch (shell) to its environment. ◆ Recognize the relationship between the demand for conch and its price. ◆ Recognize the relationship between the season and conchs reproducing. ◆ Relate the molecular arrangement of a substance to its state of matter. ◆ Recognize that energy is needed for work to be done. ◆ Identify the relationship between organisms at successive trophic levels. ◆ Recognize the relationship between the numbers of types of organisms in a pyramid of numbers. ◆ Describe the relationship between availability of food and population increase. ◆ Recognize the relationship between a food web and food chains. ◆ Recognize the effects of deforestation on the Water Cycle.	◆ Demonstrate the relationships of the seven groupings in the Linnaeus System of classification. ◆ Describe the relationship between several species of the same genus. ◆ Recognize the relationship between demand for crab meals and the rate of catching crabs. ◆ Recognize the relationship between rate of reproduction, predation rate and survival of crabs. ◆ Recognize the relationship between the colours and external features of the crab to its environment. ◆ Recognize the relationship between the demand for crab and its price. ◆ Recognize the relationship between the season and spawning of crabs. ◆ Recognize the relationship between demand for grouper meals and the rate of fishing for grouper. ◆ Recognize the relationship between rate of reproduction, predation rate and survival of groupers. ◆ Recognize the relationship between the colours and external features of the grouper to its environment. ◆ Recognize the relationship between the demand for grouper and its price. ◆ Recognize the relationship between the season and spawning of grouper. ◆ Recognize the relationship between the subatomic particles found in the nucleus and those in the orbit of an atom.	◆ Recognize the relationship between demand for lobster meals and the rate of fishing for lobster. ◆ Recognize the relationship between rate of reproduction, predation rate and survival of lobsters. ◆ Recognize the relationship between the colours of the external features of the lobster to its environment. ◆ Recognize the relationship between the demand for lobster and its price. ◆ Recognize the relationship between the closed season and spawning of lobster. ◆ Recognize the potential union between positively and negatively charged atoms and ions to form compounds.

SCOPE AND SEQUENCE (SKILLS)

Recognize relationships

GRADE 7	GRADE 8	GRADE 9
◆ Explain the relative proportions of food groups in the food pyramid/ barrel. ◆ Relate dietary diseases to deficiency of specific nutrients. ◆ Explain the relationship between calorie intake, exercise and obesity. ◆ Relate conditions of diabetes, hypertension, elevated cholesterol, overweight/obesity to life expectancy. ◆ Compare a vegetarian diet to a fatty diet. ◆ Recognize the relationship between temperature, moisture and microbial growth.	◆ Recognize and explain the relationship between elements in the same group/Family of the Periodic Table. ◆ Recognize the relationship between the atomic structure and the position of the element in the Periodic Table. ◆ Relate the solubility of a solute to temperature. ◆ Recognize that factors such as temperature (and state of solute) can affect the solubility of a solute. ◆ Recognize the relationship between the lengths of the effort arm and resistance arm to the Mechanical Advantage. ◆ Recognize that a screw is a spiral inclined plane. ◆ Recognize and relate the use of a machine to the ease of work. ◆ Relate sound to vibrations of particles. ◆ Recognize that sounds vary according to the media. ◆ Describe the effect of natural disasters on small populations. ◆ Describe the effect of urbanization growth on small populations of species. ◆ Describe the role of over-harvesting/ over-fishing in increasing the number of endangered species. ◆ Recognize the effects of deforestation on the Carbon Cycle. ◆ Recognize the relationship between height and density of air. ◆ Relate common uses for oxygen to its properties. ◆ Relate common uses for carbon dioxide to its properties. ◆ Explain the relationship between the emission of carbon dioxide and global warming.	◆ Recognize the relationship between the availability of hydrogen and hydroxyl ions to the neutralization of acids with bases. ◆ Recognize that colour and temperature of a flame are dependent on available oxygen for combustion. ◆ Recognize the relationship between wavelengths of light and their use in modern technology. ◆ Observe the effect of changing the voltage of a power source on lighting in a simple circuit. ◆ Describe the relationship between the spread of invasive species and environmental and/or human factors. ◆ Relate population size/change to the amount of solid waste produced. ◆ Relate socio-economic groups with different composition of solid waste produced. ◆ Recognize and explain the relationship between abstinence/using contraceptives and number of pregnancies recorded. ◆ Recognize and explain the relationship between education and number of STI's recorded. ◆ Recognize and explain the relationship between emotional state and regularity of the menstrual cycle. ◆ Recognize and explain the relationship between breast feeding and protection of babies to illnesses. ◆ Recognize the relationship between height of ceiling and roof to temperature of room. ◆ Recognize the relationship between the brightness of lights and amount of energy used.

SCOPE AND SEQUENCE (SKILLS)

Recognize relationships

GRADE 7	GRADE 8	GRADE 9
	◆ Compare porosity of soil with the rate of drainage and leaching. Recognize the relationship between height and density of air. ◆ Explain the relationship between enzymes and the rate of digestion. ◆ Recognize and explain the relationship between the structure of the small intestine and its function in absorption. ◆ Relate carbon emissions to global warming and rising sea levels. ◆ Recognize the relationship between the location of lighthouses and the presence of reefs. ◆ Recognize the relationship between the use of satellites and efficiency of communication.	

SCOPE AND SEQUENCE (SKILLS)

Measure accurately

GRADE 7	GRADE 8	GRADE 9
◆ Measure accurately the temperature needed for water to make its phase changes. (Solid to liquid to gas and vice versa). ◆ Measure the length of a conch and its "claw" in cm. ◆ Measure the dimensions of a conch in cm. ◆ Measure the weight of an adult conch in grammes. ◆ Measure the length and width of an area studied. ◆ Read body temperature (clinical thermometer) to 0.5°C/F. ◆ Measure the ingredients used in food preservation.	◆ Measure the width of a model crab and its claw span in cm. ◆ Measure the dimensions of a model crab's body in cm. ◆ Measure the length of a model grouper in cm. ◆ Measure the weight of a model grouper in kilogrammes. ◆ Take accurate measurements of the temperature at which liquid begins to evaporate during distillation. ◆ Measure the weight of solute and volume of solvent used in determining solubility. ◆ Measure the weight and volume of substances used to prepare oxygen. ◆ Measure the weight and volume of substances used to prepare carbon dioxide. ◆ Measure the volume of water and soil used for soil investigations. ◆ Measure weight of soil and crucible used for soil investigations. ◆ Measure time for water to drain from soil samples. ◆ Read a bathroom scale to one pound/kilogramme. ◆ Measure height to 1" or 1 cm. ◆ Use a string to compare the length of the small intestine to the large intestine of an adult human. ◆ Measure the distance of the room.	◆ Measure the height of a mature maize plant. ◆ Measure the weight of a model lobster in kg. ◆ Measure the length of the tail, cephalothorax and antennae of a model lobster in cm. ◆ Measure the weight of a model adult lobster in kilogrammes. ◆ Use a thermometer to measure various temperatures using degrees Celsius and Fahrenheit ◆ Use a mini voltmeter to measure the voltage of batteries. ◆ Use an ammeter to measure the current flow in a circuit. ◆ Weigh waste items. ◆ Measure body temperature (clinical thermometer) to 0.5°C/F. ◆ Measure dimensions for constructing a model house.

SCOPE AND SEQUENCE (SKILLS)

Make predictions

GRADE 7	GRADE 8	GRADE 9
◆ Make predictions on the number of offspring produced and survived to maturity from one conch. ◆ Make predictions as to the conch population or habitats in 25 years should there be no restrictions on fishing. ◆ Make predictions as to the conch population or habitats in 25 years should restrictions be enforced. ◆ Predict which materials will be magnetic or non-magnetic. ◆ Predict the effect of a decrease in predators on the population of their prey. ◆ Predict the effect of an increase of a plant population on the population of its herbivorous consumers. ◆ Predict the effect of removing the second level consumers on the populations of first and third level consumers. ◆ Predict the effect of killing all decomposers in an ecosystem. ◆ Predict the effects of increased specific nutrients on the body of a person with a specified deficiency disease. ◆ Predict the effects of a diet with higher/lower calories on the body. ◆ Predict the effects of different diets on the body. ◆ Predict the shelf-life of food preserves based on the method of preservation.	◆ Make predictions on the number of offspring produced and survived to maturity from one crab. ◆ Make predictions on the number of offspring produced and survived to maturity from one grouper. ◆ Make predictions as to the grouper population or habitats in 25 years should there be no restrictions on fishing. ◆ Make predictions as to the grouper population or habitats in 25 years should restrictions be enforced. ◆ Make predictions about the behavior of an element based on its position in the periodic table. ◆ Based on the physical properties of a mixture, predict which method of separation will be most appropriate to separate it into components. ◆ Predict the level of solubility of a solute in a given solvent. ◆ Based on length of air tube predict which wind instrument will have the highest pitch. ◆ Predict the change in population of a local food that is in high demand (conch, grouper, and pineapples) over the next ten years. ◆ Predict the change in population of an endangered and protected species over the next ten years. ◆ Predict the amount of iron that would be present as rust on a nail. ◆ Predict the fertility of soil based on its colour.	◆ Make predictions as to the changes in plant populations in areas that show high selection by humans. ◆ Predict the number of maize plants that might develop from ears on one plant. ◆ Make predictions on the number of offspring produced and matured to survival from one lobster. ◆ Make predictions as to the lobster population or habitats in 25 years should there be no restrictions on fishing. ◆ Make predictions as to the lobster population or habitats in 25 years should restrictions be enforced. ◆ Predict the appearance of products of chemical reaction. ◆ Predict suitable uses of a substance in industry based on its pH value. ◆ Predict the compound to be formed from given reactants. ◆ Predict chemical formulae for products from simple reactions. ◆ Make predictions on which materials will be heat conductors and heat insulators. ◆ Make predictions on which materials will be electrical conductors and electrical insulators. ◆ Predict the occurrence of a local invasive species over the next three years. ◆ Predict whether additional invasive species will be introduced and/or newly introduced invasive species will spread during the next three years. ◆ Predict whether landfills will adequately service waste produced for the next 20 years.

SCOPE AND SEQUENCE (SKILLS)

Make predictions

GRADE 7	GRADE 8	GRADE 9
	◆ Predict the effects of a blockage (growth of tissue) in the small intestine. ◆ Predict the effects on daily life for a person whose gall bladder was removed. ◆ Predict what would happen if food was not properly chewed. ◆ Predict the time taken for sound from a radio to travel the length of the room.	◆ Use the statistics of STI infections recorded to predict future numbers. ◆ Use the statistics of teenage pregnancy cases to predict future numbers. ◆ Use results of surveys to predict change in population in ten years. ◆ Predict the effect drug abuse (including alcohol) has on the foetus. ◆ Predict the effect of using formulas to replace breast milk on the health of baby and its bonding with mother.

SCOPE AND SEQUENCE (SKILLS)

Collect, process and interpret data/information

GRADE 7	GRADE 8	GRADE 9
◆ Use measurements to draw a conch 1/3 of its size. ◆ Construct graphs to show the catch of conch over a five-year period. ◆ Construct graphs to show the number of conchs caught per month over a one-year period. ◆ Calculate the average number of conchs or weight of conchs caught per month. ◆ Use data recorded to characterize any change as chemical or physical. ◆ Make a bar graph showing the main populations of plants in an area studied. ◆ Make a bar graph showing the main populations of animals in an area studied. ◆ Find the percentage of the total population of organisms in an area for the most common organism. ◆ Calculate the percentages of the total population of organisms in a community that are: producers, herbivores, carnivores, decomposers. ◆ Conduct a survey to determine the percentage of persons interviewed who are at the correct Body Mass Index. ◆ Conduct a survey of classmates' diet for a week to determine the number of students whose diet is balanced (food pyramid/drum). ◆ Use statistics of diabetes, hypertension, elevated cholesterol, overweight/obesity in The Bahamas to construct bar graphs. ◆ Use data to calculate BMI.	◆ Use measurements to draw a crab 50% of its size. ◆ Use measurements to draw a grouper 10% of its size. ◆ Construct graphs to show the catch of grouper over a five-year period. ◆ Construct a graph to show the number of groupers caught per month over a one-year period. ◆ Calculate the average number of groupers or weight of groupers caught per month. ◆ Record temperature changes, color changes and changes of state that may occur when heating, cooling or mixing two or more substances. ◆ Use formula (Work = Force applied x Distance moved) to calculate energy used. ◆ Change the subject of the work formula (Work = Force applied x Distance moved) to calculate Force and Distance. ◆ Use a graph time and distance of separation between various pigments during a chromatography investigation to determine relative speeds of separation. ◆ Record quantities of solute added to a solvent. ◆ Calculate the solubility of a solute in a solvent. ◆ Calculate the rate of decrease in population of a species that is over-fished or over-harvested. ◆ Calculate the rate of increase in population of a species that is protected.	◆ Collect, process and interpret data from a survey conducted on plant population to show classification. ◆ Construct a bar graph to show the populations of the four most common flowering plants in a given area. ◆ Use measurements to draw the outline of a lobster ¼ of its size. ◆ Make graphs to show the catch of lobster over a five-year period ◆ Make graphs to show the number of lobsters caught per month over a one-year period. ◆ Calculate the average number of lobsters or weight of lobsters caught per month. ◆ Record times at which heat completed its travel through various metals in a conducto-o-meter. ◆ Construct a graph comparing conductivity of metals. ◆ Use data to derive the population of an invasive species in a given area ◆ Use a bar graph to show the types and number of items forming land pollutants ◆ Calculate the percentage of the most common pollutant in litter collected and classified in an area.

SCOPE AND SEQUENCE (SKILLS)

Collect, process and interpret data/information

GRADE 7	GRADE 8	GRADE 9
◆ Conduct a survey of the eating habits of obese persons. ◆ Construct a bar graph comparing nutrients in four food samples. ◆ Take a sample survey to determine the percentage of people in a community that eat foods preserved using a particular method.	◆ Construct pie and bar graphs to compare the percentage composition of gases in air. ◆ Calculate the drainage rate of soil samples. ◆ Calculate the percentage composition of water in a soil sample. ◆ Calculate the percentage composition of air in a soil sample. ◆ Calculate the percentage composition of humus in a soil sample.	

SCOPE AND SEQUENCE (SKILLS)

Formulate hypotheses

GRADE 7	GRADE 8	GRADE 9
◆ Formulate a hypothesis of an organism's habitat based on physical features of that organism. ◆ Formulate a hypothesis of an organism's classification based on its characteristics. ◆ Formulate a hypothesis on the effectiveness of farming conchs in a marine protected area. ◆ Formulate a hypothesis about water changing state under laboratory conditions. ◆ Formulate a hypothesis on the types of materials that are magnetic or non-magnetic. ◆ Formulate a hypothesis on the effect of changing a physical factor on the populations of organisms in an ecosystem. ◆ Formulate a hypothesis on the effect mandatory healthy diets in schools would have on the young generation.	◆ Formulate a hypothesis on the effect of a major decrease in rainfall on the population of crabs. ◆ Formulate a hypothesis on the effect of increasing the food supply for groupers on their population. ◆ Formulate a hypothesis on the effect of farming groupers in a marine protected area. ◆ Formulate a hypothesis suggesting the best method for separating a mixture. ◆ Formulate a hypothesis on the effect of temperature on the solubility of a substance. ◆ Formulate a hypothesis on the effectiveness of filtration as a method of purification. ◆ Formulate a hypothesis on whether a substance could sublime. ◆ Formulate a hypothesis on creating an oxygen – carbon dioxide balance in nature. ◆ Formulate a hypothesis on converting limestone rock into fertile soil. ◆ Formulate a hypothesis on the effect mandatory decrease in the number of vehicles would have on the health of people on a densely populated island. ◆ Formulate a hypothesis on the importance of Vitamin D in the diet of pregnant women. ◆ Formulate a hypothesis as to whether the liver can compensate for a malfunctioning pancreas.	◆ Formulate a hypothesis as to the effect on Gum Elemi of growing the plant in sandy soil. ◆ Formulate a hypothesis on whether seasons effect growth and/or productivity of maize. ◆ Formulate a hypothesis on the effect on lobster fishing of banning exports of lobster. ◆ Formulate a hypothesis on the products formed from a reaction involving an acid and base. ◆ Formulate a hypothesis on types of materials that are conductors or insulators of heat. ◆ Formulate a hypothesis on types of materials that are conductors or insulators of electricity. ◆ Formulate a hypothesis on whether a series or a parallel circuit is better for use in homes. ◆ Formulate a hypothesis on what can be done to make electromagnets stronger. ◆ Formulate a hypothesis as to whether nature would eventually eliminate invasive species in an ecosystem. ◆ Formulate a hypothesis as to whether human factors would change nature's cycling of Nitrogen. ◆ Formulate a hypothesis as to whether education would change people's bad practices in disposing of solid waste. ◆ Formulate a hypothesis as to whether there are advantages in breast feeding for mother and child.

SCOPE AND SEQUENCE (SKILLS)

Formulate hypotheses

GRADE 7	GRADE 8	GRADE 9
	◆ Formulate a hypothesis on the scientific principle used to invent the fax machine.	◆ Formulate a hypothesis as to the contraceptive which is most effective. ◆ Formulate a hypothesis on the impact of solar energy on The Bahamas both environmentally and economically. ◆ Formulate a hypothesis on the effect of one aspect of technology to its efficiency or usefulness in a house.

SCOPE AND SEQUENCE (SKILLS)

Recognize and control variables

GRADE 7	GRADE 8	GRADE 9
◆ Identify physical factors that affect populations in an ecosystem and attempt to control them in an investigation. ◆ Recognize and control the amount of water/pH/temperature in food preservation.	◆ Recognize and control physical factors that affect the physical properties of a substance. ◆ Control variables when comparing solubilities of substances. ◆ Recognize and control variables when testing for sound pitch. ◆ Explain the need for air-tight conditions in the preparation of oxygen. ◆ Demonstrate air-tight conditions. ◆ Identify a carbon-dioxide absorbent. ◆ Recognize and control variables in experiments comparing drainage rates in soils. ◆ Recognize and control variables in experiments comparing porosity in soils. ◆ Plan, conduct and evaluate an investigation to determine whether the number of calories used depends on the level of activity.	◆ Recognize variables in the process of germination of maize. ◆ Identify and eliminate the presence of chemicals or conditions that affect the reaction and products formed. ◆ Recognize factors that affect neutralization reactions. ◆ Control temperature, pressure, pH and concentration of substances as variables in reactions to produce compounds. ◆ Recognize variables that are controlled when using the conduct-o-meter. ◆ Recognize and control variables when setting up electrical circuits. ◆ Recognize and control variables when taking a survey (school, grade level) to compare behaviours to solid waste disposal. ◆ Recognize and compare the thickness, texture, colour and material when comparing exterior walls for buildings.

SCOPE AND SEQUENCE (SKILLS)

Design, conduct and evaluate scientific investigations

GRADE 7	GRADE 8	GRADE 9
◆ Plan, conduct and evaluate an investigation to show the properties of matter. ◆ Plan, conduct and evaluate an investigation to demonstrate physical changes. ◆ Plan, conduct and evaluate an investigation to demonstrate chemical changes. ◆ Plan, conduct and evaluate an experiment to show energy transformation/inter-conversion. ◆ Design an investigation to show the effect of changing one physical factor on the populations of organisms in an area. ◆ Conduct investigations to determine the presence of starch in unknown foods. ◆ Conduct and evaluate investigations to determine the presence of starch in locally grown foods. ◆ Plan an experiment to demonstrate that microbes accelerate decomposition.	◆ Design an activity to simulate grouper production and predation (including fishing). ◆ Plan, conduct and evaluate an investigation to demonstrate the physical properties of a substance. ◆ Plan, conduct and evaluate an investigation to demonstrate the chemical properties of a substance. ◆ Conduct and evaluate an experiment to dilute a liquid. ◆ Plan, conduct and evaluate an investigation to determine the solubility of a substance. ◆ Plan, conduct and evaluate an investigation to separate components of a mixture using evaporation. ◆ Plan, conduct and evaluate an investigation to separate components of a mixture using distillation. ◆ Plan, conduct and evaluate an investigation to separate components of a mixture using filtration. ◆ Plan, conduct and evaluate an investigation to separate components of a mixture using magnetism. ◆ Plan, conduct and evaluate an investigation to separate components of a mixture using chromatography.	◆ Plan, conduct and evaluate an investigation to determine the best temperature for maize germination. ◆ Plan, conduct and evaluate an investigation to determine which metals are best suited for making baking and cooking utensils for local food preparation industries. ◆ Plan, conduct and evaluate an investigation to determine which nonmetals are best suited for making good insulators for handles and mixing utensils in a local food preparation industry. ◆ Plan, conduct and evaluate an investigation to test the acidity of a substance. ◆ Plan, conduct and evaluate an investigation to demonstrate neutralization of an acid with a base. ◆ Plan, conduct and evaluate an assimilated investigation to show how an inverted image is formed on the retina. ◆ Plan, conduct and evaluate an investigation to determine whether lamps connected in series or parallel are better for homes. ◆ Plan, conduct and evaluate an investigation in which electromagnetism is used to lift things. ◆ Design, conduct and evaluate an investigation to determine the occurrence of a particular invasive species in an area. ◆ Design, conduct and evaluate an investigation to determine the most common land pollutant in the area. ◆ Conduct a survey to determine the extent to which the theme “Reduce, Reuse, Recycle” is implemented. ◆ Plan an investigation to determine which method of contraceptive is most effective.

SCOPE AND SEQUENCE (SKILLS)

Design, conduct and evaluate scientific investigations

GRADE 7	GRADE 8	GRADE 9
	◆ Plan, conduct and evaluate an investigation to determine the effects of temperature on the solubility of known quantities of solute in known volumes of water. ◆ Design, conduct and evaluate an investigation into using less force to affect movement of a larger load. ◆ Plan, conduct and evaluate a simple experiment to show how mechanical advantage is increased when using a lever or pulley. ◆ Plan, conduct and evaluate an experiment to show that sound is caused by vibrations. ◆ Design an assimilated investigation to show the effect of over-fishing on an endangered or threatened local species. ◆ Design, conduct and evaluate an experiment that shows that oxygen/air is needed for combustion. ◆ Design, conduct and evaluate an investigation to determine the level of awareness of global warming in the community. ◆ Design, conduct and evaluate an investigation to show the extent to which people are utilizing one safe practice to reduce carbon dioxide level in the atmosphere. ◆ Design, conduct and evaluate investigations to compare soil porosity. ◆ Design, conduct and evaluate investigations to compare drainage in different soils. ◆ Design, conduct and evaluate investigations to compare pH in soils. ◆ Design, conduct and evaluate investigations to compare the humus composition in soils. ◆ Design, conduct and evaluate an experiment to show sedimentation.	◆ Plan an investigation to determine whether breast-fed babies are less susceptible to infection. ◆ Design a simple investigation to determine the best available materials for constructing buildings for humid climates. ◆ Design a simple investigation to determine the best type of windows for constructing buildings in tropical climates.

SCOPE AND SEQUENCE (SKILLS)

Formulate models

GRADE 7	GRADE 8	GRADE 9
◆ Make models of a plant and an animal cell to show the main features. ◆ Make a model of the life history of the Queen Conch. ◆ Make a model of a food web including the Queen Conch. ◆ Make a model of an adult conch. ◆ Make models to represent the molecular arrangements in the three states of matter. ◆ Make a model diagram showing changes of states of matter and the processes involved in these changes. ◆ Make a model of a food chain. ◆ Make a model of a simple food web.	◆ Make a model (visual) of the life history of the white crab. ◆ Make a model (visual) of a food web including the white crab. ◆ Make a model of a white crab. ◆ Make a model of the life history of the Nassau Grouper. ◆ Make a model of a food web including the Nassau Grouper. ◆ Make a model of an adult grouper. ◆ Make a model to show the electronic configuration of an atom. ◆ Make models of instruments that measure force. ◆ Make models of can phones. ◆ Make a model of the carbon cycle. ◆ Make a model showing a soil profile from the parent rock upward. ◆ Make a model of a food drum. ◆ Make a model (other than a drum or pyramid) that represents proportions of food groups in a balanced diet. ◆ Make a model of the human digestive system. ◆ Make a model of villi. ◆ Make a model lighthouse or telephone.	◆ Make a model showing the internal structure of a maize grain. ◆ Make a model (visual) of the life history of the Spiny Lobster. ◆ Make a model (visual) of a food web including the Spiny Lobster. ◆ Make a model of an adult lobster. ◆ Use colorful balls and sticks to make models of molecules and compounds. ◆ Make a model of pin hole camera. ◆ Make models of electrical circuits. ◆ Make a model of an electromagnet. ◆ Make a model of the Nitrogen Cycle. ◆ Make a model of a landfill. ◆ Make a model of a foetus in the amniotic sac. ◆ Construct a model house including technology.

SCOPE AND SEQUENCE (SKILLS)

Apply principles and concepts (scientific & technological) to make products

GRADE 7	GRADE 8	GRADE 9
◆ Use sea shells to make jewelry or an ornament. ◆ Use the conch shell claw to make a product. ◆ Apply knowledge of magnetism to make a simple household product. ◆ Identify an organism (predator) that might be introduced into a community/ecosystem to control a pest (prey). ◆ Make a healthy, economical, marketable snack using locally grown food materials. ◆ Make a healthy drink using locally grown fruit/vegetables. ◆ Apply principles of food preparation/preservation to prepare/preserve a food or drink.	◆ Design a pen for crabs. ◆ Apply principles of mixtures to form dilute, concentrated and saturated solutions for various industries. ◆ Use methods of separation to extract coconut oil. ◆ Use knowledge of distillation and water purification for beverage making. ◆ Design a gadget that might be used in the safe production of oxygen. ◆ Design equipment to utilize an alternate fuel/energy source. ◆ Design a filter to remove unburnt carbon (soot). ◆ Design a fire extinguisher. ◆ Prepare recycled paper. ◆ Design a portable unit for preparing compost.	◆ Use the leaf of a palm or banana tree to make simple products. ◆ Make an item using Gum Elemi. ◆ Make an item from some part of the maize plant. ◆ Design a model plant/nursery for lobster farming. ◆ Use knowledge of acids and bases to make a product. ◆ Design a pot or baking pan that is efficient in its function. ◆ Make a simple solar oven or water heater. ◆ Design a simple miniature building where natural cooling is utilized. ◆ Make a product based on one of Reduce, Reuse, Recycle waste. ◆ Design a sorter for household solid waste.

SCOPE AND SEQUENCE (SKILLS)

Make informed, responsible and wise decisions

GRADE 7	GRADE 8	GRADE 9
◆ Purchase conchs of the designated size. ◆ Advocate peers, relatives or the community to practice energy conservation measures. ◆ Advocate peers, relatives or the community to use renewable energy (solar). ◆ Demonstrate care and sensitivity to the local environment. ◆ Recognize hazards and take actions to control the risks from these hazards. ◆ Select non-corrosive metal nuts and bolts. ◆ Refrain from indiscriminate killing of garden organisms. ◆ Make a lifestyle change to eat healthy (Use water as main drink with juices and milk; Reduce, or eliminate eating snacks; Eat healthy snacks). ◆ Make a decision to attain and maintain the personal BMI recommended for healthy living. ◆ Read food labels for information on use of additives (for preparation).	◆ Advocate for residents to become good stewards of the white crab habitat. ◆ Design and prepare an infomercial to encourage students to become stewards of the grouper population. ◆ Produce an item to persuade fishermen to observe the restriction laws for fishing grouper. ◆ Purchase grouper caught during the designated period. ◆ Avoid conditions that increase/decrease solubility of a substance. ◆ Determine which simple machines will be most effective for given jobs. ◆ Refrain from eating protected species except during the legal season. ◆ Advocate peers, relatives or the community to practice conservation to protect small population species. ◆ Advocate limiting the amount of trees that are removed from an area and conservation of green spaces. ◆ Start a garden. ◆ Start a compost heap. ◆ Advocate soil conservation measures. ◆ Identify and adopt practices to maintain a healthy digestive system. ◆ Follow safety tips in the use of mobile phones.	◆ Use the Gum Elemi as a shade plant or hedge. ◆ Use maize and its products as a staple in the diet. ◆ Grow maize in back-yard gardening. ◆ Purchase lobster caught according to regulations. ◆ Demonstrate knowledge of the safe usage of acids, bases, and other household chemicals and mixtures. ◆ Demonstrate knowledge of the proper disposal of acids, bases and other household chemicals and mixtures. ◆ Demonstrate knowledge of the best colour flame for cooking. ◆ Select materials best suited for removing hot pots or pans. ◆ Use knowledge of metals to select the best cooking ware and utensils for the local food preparation industries. ◆ Use knowledge of light reflection / absorption in choosing colours for a room. ◆ Use knowledge of electrical conductivity in choosing materials which could be used to increase or decrease current flow when necessary. ◆ Use knowledge of static electricity in choice of (a) clothing material, (b) shelter in the open during a storm. ◆ Advocate the need to refrain from bringing into the country unknown species that are not previously approved by the Ministry of Agriculture & Marine Resources. ◆ Cultivate leguminous plants. ◆ Apply the three R's Reduce, Reuse, Recycle in dealing with solid waste. ◆ Identify and adopt practices to prevent contracting STI's.

SCOPE AND SEQUENCE (SKILLS)

Make informed, responsible and wise decisions

GRADE 7	GRADE 8	GRADE 9
		◆ Identify and adopt practices that promote health and hygiene of reproductive organs. ◆ Make informed, responsible and wise decisions for materials and designs to be used in constructing buildings in tropical conditions. ◆ Select materials for the construction industries that are cost effective, stronger and less reactive with the environment.

SCOPE AND SEQUENCE (SKILLS)

Pursue new knowledge

GRADE 7	GRADE 8	GRADE 9
◆ Compare the use of the two kingdom with six kingdom systems of classification. ◆ Research the use of conchs in other countries. ◆ Research new alternatives to reduce the use of non-renewable energy sources. ◆ Find out the eating habits (not previously known) of five organisms found locally. ◆ Read a newspaper or magazine article on the nutritional value of a food. ◆ Read labels on foods to determine their nutritional value and additives. ◆ Research five diseases caused by microbes. ◆ Research the effects and signs of ailments caused by microbes. ◆ Research to identify microbes used in decomposition and garbage disposal. ◆ Research the use of microbes in food production.	◆ Read articles on the effect of urban development on white crab habitats. ◆ Read articles on the effects of climate change on reefs and, by extension, grouper populations. ◆ Read articles on the influence of humans on the habitat of the Nassau Grouper. ◆ Discover the latest theories of the atom and the arrangement of its subatomic particles. ◆ Research additional trends (periods) of element classification in the periodic table. ◆ Discover another method for separating mixtures in the food preparation and construction industries. ◆ Research the latest information on the effects of loud noises to the human ears. ◆ Research the latest uses of sound in modern technology. ◆ Find out two species that have become extinct in the past five years. ◆ Find out about two species that have become endangered in North, Central or South America in the past ten years. ◆ Comment on an article or report in the mass media on the effects of global warming. ◆ Research and compare five points of interest about graphite and five on diamond. ◆ Find out information on the main types of fossil fuels. ◆ Find out information on methods for growing plants in urban situations/limited soil. ◆ Research the use of technology in improving soils.	◆ Research additional uses/benefits of Gum Elemi. ◆ Research products of maize. ◆ Find out what happens to lobsters between catch and marketing abroad. ◆ Find out the names of three acids found in substances used in the home. ◆ Find out the names of three bases found in substances in the home. ◆ Identify invasive species found locally. ◆ Find out information about natural predators of invasive species found locally. ◆ Trace the path showing the spread of local invasive species. ◆ Find out methods of enriching nitrogen-poor soils. ◆ Research methods of solid waste management in small island states. ◆ Use information researched to describe how knowledge, attitudes and behaviours toward breast feeding have changed over time. ◆ Find out latest information on the advantages of breast feeding for mother and child. ◆ Find out the latest information on the effectiveness of named contraceptives. ◆ Find out the latest information on treating named STI's. ◆ Research alternative sources of energy for The Bahamas. ◆ Research latest materials used in windows, hurricane shutters, roofs.

SCOPE AND SEQUENCE (SKILLS)

Pursue new knowledge

GRADE 7	GRADE 8	GRADE 9
	◆ Research gastric bypass surgery, acid reflux or any other digestive disorders. ◆ Interview a lighthouse keeper/attendant. ◆ Research the basic scientific principle for each of: flashing lights, telegraph, fax machines, telephone, radio, television, computer, mobile phone, worldwide web.	

SCOPE AND SEQUENCE (SKILLS)

Demonstrate critical thinking

GRADE 7	GRADE 8	GRADE 9
◆ Explain why protozoans are referred to as "animal-like protists". ◆ Show the importance of measures taken to ensure that the supply of conchs always surpasses the demand for it. ◆ Justify whether chemical or physical reactions better characterize a substance. ◆ Suggest measures that restaurants and cooks could adopt to help improve the health of people in The Bahamas.	◆ Critically assess the value of the Binomial System. ◆ Write a short story to persuade residents of the importance of protecting the habitat of the white crab. ◆ Write a letter to the Minister of Agriculture and Marine Resources advocating a particular law, method of catching or boosting grouper populations. ◆ Present a case for the use of alternate fish (e.g. "rock fish") in the grouper family for use instead of the Nassau Grouper. ◆ Suggest reasons why water and a number of other chemicals do not undergo sublimation under laboratory conditions. ◆ Suggest reasons why mixtures like milk and "Pepto Bismal" are considered suspensions and not solutions. ◆ Justify whether chemical or physical reactions better characterize a substance. ◆ Justify the need for biodiversity to be kept. ◆ Respond to the question: Does every species have an intrinsic value? ◆ Explain whether trees are more useful as oxygen producers or as carbon-dioxide absorbers. ◆ Assess the economic and ecological factors in the selection of a main source of energy. ◆ Evaluate the importance of bacteria in the carbon cycle.	◆ Formulate a proposal to increase the number of Gum Elemi trees grown throughout The Bahamas. ◆ Justify maize being promoted as a staple crop in The Bahamas. ◆ Evaluate whether changes in weather patterns and other natural influences impact the lobster population to the same extent as fishing. ◆ Make suggestions about how a simple reaction like neutralization could be used in medicine and other industries. ◆ Suggest a reason why certain electrical conductors like gold are not used in electrical wires and why metals such as copper are used widely. ◆ Suggest reasons why even though The Bahamas is surrounded by much water, it still cannot use hydro-electricity. ◆ Suggest why metals like aluminum and copper are used in the electronics industry. ◆ Compare the positive and negative effects of Poinciana trees and Bermuda Grass. ◆ Suggest methods to prevent the introduction of invasive species into the country/island. ◆ Justify the need to cultivate legumes in home gardens. ◆ Explain to what extent it is beneficial to place plant cuttings or humus around plants as a source of nitrogen.

SCOPE AND SEQUENCE (SKILLS)

Demonstrate critical thinking

GRADE 7	GRADE 8	GRADE 9
	◆ Identify one factor that would interrupt the carbon cycle and state the long-term effects. ◆ Compare the value of using organic fertilizers with inorganic fertilizers.	◆ Write a news article or comic provoking action against littering. ◆ Evaluate the methods of solid waste disposal used in small island states and justify which method is most efficient and effective. ◆ Suggest reasons for changes in STI contractions over the years. ◆ Suggest reasons for changes in teenage pregnancy cases (if any) over the years. ◆ Compare the efficiency and effectiveness of various contraceptives. ◆ Evaluate the advantages and disadvantages of utilizing named contraceptives. ◆ Suggest reasons for differences in contraceptive usage among various races, ages, socio-economic classes of persons. ◆ Describe the economic and social implications of using or refraining from using contraceptives. ◆ Suggest reasons why The Bahamas must find alternative sources of energy. ◆ Assess photos of a few houses to rate their efficiency in reducing electrical usage to cool the building.

STANDARDS AND BENCHMARKS

GRADE: 7

Use materials and scientific equipment correctly and safely.

- Use a microscope to observe examples of plant and animal cells.
- Use bar magnets to demonstrate: attraction, repulsion, magnetic field, North and South Pole alignment.
- Use apparatus to show filtration of water.

Make observations.

- Observe characteristic features and identify specialized cells in plants or humans.
- Observe characteristics of seven groups of invertebrates.
- Observe changes in water as it changes state.

Utilize classification process.

- Use features of organisms to classify them into kingdoms.
- Use features of maize plant to classify it.
- Differentiate between examples of kinetic and potential energy.
- Use feeding habits to classify organisms.

Make inferences and draw conclusions.

- Use external features of an organism to make inferences about its habitat or mode of life.
- Make inferences on the state of matter based on properties given.
- Draw conclusion on the solubility of solutes in water based on investigations.

Communicate information.

- Use energy conservation equations to demonstrate the law of conservation of energy.
- Make an oral presentation describing the double circulation of blood.
- Describe a process of food production using microbes.

Recognize relationships.

- Demonstrate the relationships between cells, tissues, organs and systems.
- Recognize the relationship between a food web and food chain.
- Recognize the relationship between temperature, moisture and microbial growth.

Measures accurately.

- Measure the height of a mature maize plant.
- Measure the length and width of an area studied.
- Take the pulse for one minute.
- Measure the ingredients used in food preservation.

Make predictions.

- Predict the number of maize plants that might develop from ears on one plant.
- Predict the effect of a decrease in predators on the population of their prey.
- Predict the effect of the increase of a plant population on the population of its herbivorous consumers.

STANDARDS AND BENCHMARKS

Collect, process and interpret data/information.

- Find the percentage of the total population of organisms in an ecosystem for the most common organism.
- Make a bar graph showing the population of animals in an ecosystem.
- Determine the percentage of each blood group in the population surveyed.

Formulate hypotheses.

- Formulate a hypothesis as to the effect on gum elemi of growing the plant in sandy soil.
- Formulate a hypothesis on whether seasons effect growth and/or productivity of ears of maize.
- Formulate a hypothesis as to whether there is an advantage in having a particular blood group.

Recognize and control variables.

- Recognize variables in the process of germination for maize.
- Recognize and control variables (activity, anxiety) when taking pulse rate.
- Recognize and control the amount of water/pH/temperature in food preparation or preservation.

Design, conduct and evaluate scientific investigations.

- Plan, conduct and evaluate an investigation to determine the best temperature for maize germination.
- Design an investigation to show the effect of changing one physical factor on the populations of organisms in an ecosystem.
- Plan, conduct and evaluate an investigation to determine how exercise affects pulse rate.

Formulate models.

- Make models of a plant and an animal cell to show the main features.
- Make models to represent the molecular arrangements in the three states of matter.
- Make a model of a food chain.

Apply principles and concepts (scientific & technological) to make products.

- Make an item (ornament, model, or bush medicine) using gum elemi.
- Identify an organism (predator) that might be introduced into a community/ecosystem to control a pest (prey).
- Apply principles of food preparation/preservation to prepare/preserve a food or drink.

Make informed, responsible and wise decisions.

- Use the Gum elemi as a shade plant or hedge.
- Recognize hazards and take actions to control the risks from these hazards.
- Read food labels for information on use of additives (for preparation).

Pursue new knowledge.

- Research products of maize.
- Find out the eating habits (not previously known) of five organisms found locally.
- Research five diseases caused by microbes.

Demonstrate critical thinking.

- Justify maize being promoted as a staple crop in The Bahamas.
- Justify whether chemical or physical reactions better characterize a substance.
- Pose a question on the circulatory system which extends knowledge.

STANDARDS AND BENCHMARKS

GRADE: 8

Use materials and scientific equipment correctly and safely.

- Use a balance to measure the weight of an organism.
- Use apparatus and materials to prepare carbon dioxide.
- Use spotting tiles and iodine to test for starch in foods.

Make observations.

- Observe the appearance of soil samples.
- Observe air displaced from a soil sample.
- Observe a positive (colour) food test for a simple sugar.

Utilize classification process.

- Use a dichotomous key to classify living things into taxonomic groups.
- Classify elements into various groups on the Periodic Table.
- Classify examples of levers from given pictures / diagrams.

Make inferences and draw conclusions.

- Use data to determine whether given species will become endangered.
- Draw a conclusion on the suitability of a soil for farming based on its drainage rate.
- Based on dietary information given, suggest the deficiency disease caused.

Communicate information.

- Make an oral presentation (with visual aids) to describe the life history of the crab.
- Write an experimental report on an investigation to prepare oxygen.
- Describe what happens to food in the different parts of the alimentary canal.

Recognize relationships.

- Demonstrate the relationships of the seven groupings in the Linnaeus System of classification
- Recognize the relationship between the lengths of the effort arm and resistance arms to the Mechanical Advantage
- Recognize and explain the relationship between the structure of the small intestine and its function in absorption

Measure accurately.

- Measure the weight of solute and volume of solvent used in determining solubility.
- Measure time for water to drain from soil samples.
- Use a string to measure and compare the length of the small intestine to the large intestine of an adult human.

Make predictions.

- Make predictions as to the grouper population or habitats in 25 years should there be no restrictions on fishing and should restrictions be enforced.
- Make predictions about the behavior of an element based on its position in the periodic table.
- Based on the physical properties of a mixture, predict which method of separation will be most appropriate to separate it into components.

STANDARDS AND BENCHMARKS

Collect, process and interpret data/information.

- Use measurements taken to draw a grouper 10% of its size.
- Use formula (Work = Force applied x Distance moved) to calculate energy converted in various problems.
- Calculate the drainage rate of soil samples.

Formulate hypotheses.

- Formulate a hypothesis on the effect of temperature on the solubility of a substance.
- Formulate a hypothesis on converting limestone rock into fertile soil.
- Formulate a hypothesis on the effect mandatory healthy diets in schools would have on the young generation.

Recognize and control variables.

- Control variables when comparing solubility of substances.
- Recognize and control variables in experiments comparing drainage rates in soils.
- Recognize and control variables in experiments comparing porosity in soils.

Design, conduct and evaluate scientific investigations.

- Design an activity to simulate grouper production and predation (including fishing).
- Plan, conduct and evaluate an investigation to separate components of a mixture using evaporation.
- Plan, conduct and evaluate an investigation to separate components of a mixture using filtration.

Formulate models.

- Make a model to show the electronic configuration of an atom.
- Make models of can phones.
- Make a model of the human digestive system.

Apply principles and concepts (scientific & technological) to make products.

- Design a filter to remove unburnt carbon (soot).
- Design a (carbon dioxide) fire extinguisher.
- Design a portable unit for preparing compost.

Make informed, responsible and wise decisions.

- Advocate limiting the amount of trees that are removed from an area and conservation of green spaces.
- Advocate for energy-saving measures.
- Follow safety tips in the use of mobile phones.

Pursue new knowledge.

- Read articles on the effects of climate change on reefs and, by extension, grouper populations.
- Find out two species that have become extinct in the past five years.
- Research the use of technology in improving soils.

Demonstrate critical thinking.

- Critically assess the value of the Binomial System.
- Explain whether trees are more useful as oxygen producers or as carbon-dioxide absorbers.
- Assess the economic and ecological factors in the selection of a main source of energy.
- Evaluate the importance of bacteria in the carbon cycle.

STANDARDS AND BENCHMARKS

GRADE: 9

Use materials and scientific equipment correctly and safely.

- Use apparatus and materials to prepare a compound.
- Use apparatus and materials to demonstrate: heat, conduction, convection, flames for cooking vs. flames for light.
- Use a thermometer to measure temperature.
- Use apparatus and materials to make simple series and parallel electrical circuits.

Make observations.

- Observe properties of light.
- Observe the effect of changing the voltage of a power source on lighting in a simple circuit.
- Observe photographs of solar panels.

Utilize classification process.

- Classify flowering plants based on the time taken to complete a life cycle.
- Classify materials as good or bad conductors of heat or electricity.
- Classify solid waste.
- Classify types of contraceptives.

Make inferences and draw conclusions.

- Use statistics from studies of conch or lobster populations to draw conclusions on the effect of fishing on populations.
- Draw a conclusion about the acidity or alkalinity of common household substances.
- Make an inference as to the circumstances under which most littering occurs.

Communicate information.

- Use circuit boards to explain the path of electricity in series circuit and in a parallel circuit.
- Explain how Nitrogen is circulated in nature.
- Make brochures to promote sorting household solid waste.

Recognize relationships.

- Recognize the relationship between demand for conch meals and the rate of fishing for conch.
- Recognize that colour and temperature of a flame are dependent on available oxygen for combustion.
- Relate population size/change to the amount of solid waste produced.

Measure accurately.

- Measure the dimensions of a conch in cm.
- Use a mini voltmeter to measure voltage of batteries.
- Measure body temperature (clinical thermometer) to 0.5°C/F.

Make predictions.

- Make predictions on the number of offspring produced and mature to survival from one lobster.
- Predict the compound to be formed from given reactants.
- Predict chemical formulae for products from simple reactions.
- Use the statistics of STI infections recorded to predict future numbers.

Collect, process and interpret data/information.

- Collect, process and interpret data from a survey conducted on plant population to show classification.
- Calculate the average number of lobsters or weight of lobsters caught per month.
- Record times at which heat completed its travel through various metals in a conducto-o-meter to compare relative conductivity.

STANDARDS AND BENCHMARKS

Formulate hypotheses.

- Formulate a hypothesis on what can be done to make electromagnets stronger.
- Formulate a hypothesis as to whether nature would eventually eliminate invasive species in an ecosystem.
- Formulate a hypothesis as to whether education would change people's bad practices in disposing of solid waste.

Recognize and control variables.

- Control temperature, pressure, pH and concentration of substances as variables in reactions to produce compounds.
- Recognize and control variables when taking a survey (school, grade level) to compare behaviours to solid waste disposal.
- Recognize and compare the thickness, texture, colour and material when comparing walls for buildings.

Design, conduct and evaluate scientific investigations.

- Plan, conduct and evaluate an investigation to determine which metals are best suited for making baking and cooking utensils for local food preparation industries.
- Plan, conduct and evaluate an investigation to test the acidity of a substance.
- Design a simple investigation to determine the best type of windows for constructing buildings in tropical climates.

Formulate models.

- Use colorful balls and sticks to make models of molecules and compounds.
- Make a model of pin hole camera.
- Make a model of an electromagnet.

Apply principles and concepts (scientific & technological) to make products.

- Design a pot or baking pan that is efficient in function.
- Make a product based on one of Reduce, Reuse, Recycle waste.
- Design a sorter for household solid waste.

Make informed, responsible and wise decisions.

- Demonstrate knowledge of the safe usage of acids, bases, and other household chemicals and mixtures.
- Cultivate leguminous plants.
- Apply the three R's Reduce, Reuse, Recycle in dealing with solid waste.
- Identify and adopt practices to prevent contracting STI's.

Pursue new knowledge.

- Find out the names of three bases found in substances used in the home.
- Find out information about natural predators of an invasive local species.
- Find out latest information on the advantages of breast feeding for mother and child.

Demonstrate critical thinking.

- Suggest reasons why even though The Bahamas is surrounded by much water, it still cannot use hydro-electricity.
- Compare the positive and negative effects of Poinciana trees and Bermuda Grass.
- Assess photos of a few houses to rate their efficiency in reducing electrical usage to cool the building.

COMPARISON OF BENCHMARKS FOR GRAVEL LEVELS

Grade	Use materials and scientific equipment correctly and safely.	Make observations.	Utilize classification process.	Make inferences and draw conclusions.	Communicate information.	Recognize relationships.	Measure accurately.	Make predictions.
7	Use microscope, filtration apparatus, graduating cylinders, triple beam balance	Use features in classification	Classify organisms into kingdoms and phyla	Make inferences on the habitat of organisms based on their external appearance	Clearly and sequentially explain a process orally	Recognize the position of a component in a system and its relationship to other components in the system	Measure to 0.001g , liquids to 0.5 ml or cm^3	Predict the effect of one step in a series of steps being missing
8	Use of apparatus for preparation of carbon dioxide, oxygen	Observe changes during an investigation e.g. colour	Use dichotomous key to classify organisms	Draw a valid conclusion based on observations and/or results	Write an experimental report	Recognize direct relationships (directly proportional)	Measure volume of gas 0.5 ml or cm^3	Based on data predict an outcome if there are no interferences
9	Thermometers, Bunsen burner, components of electrical circuits	Use observations to confirm properties	Compare life histories of different types of plants	Apply scientific information to formulate conclusions of situations in every day experiences	Prepare an effective means of communicating information to the public	Recognize indirect relationships (inversely proportional)	Read to 1°C, 0.1 amps, 0.1 volts	Predict the outcome if one variable is taken into account

COMPARISON OF BENCHMARKS FOR GRAVEL LEVELS

Grade	Collect, process and interpret data/information.	Formulate hypotheses.	Recognizes and controls variables.	Design, conduct and evaluate scientific investigations.	Formulate models.	Apply principles and concepts (scientific & technological) to make products.	Make informed, responsible and wise decisions.	Pursues new knowledge.
7	Calculate percentages and construct bar graphs	Formulates hypothesis	Recognize variables	Plan and conduct simple investigations	Make models of cells	Create an ornament	Read labels and make decisions based on the information given	Conducts research in literature to find information on a given topic
8	Calculate rates; make scale-diagrams	Formulates a hypothesis that may be easily tested	Recognize variables and attempts to control one	Select an appropriate method of separation for an unknown mixture	Make models of atoms	Design a gadget based on a scientific principle studied	Make decisions to conserve energy	Identify a topic or question of interest and related to the information studied to research independently
9	Collect and process data from survey instruments	Formulates a hypothesis that may not be easily tested	Recognize and control more than one variable	Plan, conduct and evaluate an investigation to verify a hypothesis	Make molecules of simple molecules	Design and make a gadget based on a scientific principle studied	Make decisions to manage solid waste	Interview people to acquire information

Grade	Demonstrate critical thinking.
7	Pose a question on content studied that would extend their knowledge
8	Compare benefits and disadvantages, formulate an opinion and defend it
9	Suggest possible resolutions to the dilemma between the need for ecological conservation and economic development

SCOPE OF WORK
GRADE 7
STRAND: LIVING THINGS

TOPIC: CELLS **DURATION: 7 lessons**

<table>
<tr><th>LEARNER OUTCOMES</th><th>CONTENT</th><th>ACTIVITIES</th><th>RESOURCES</th><th>METHOD OF ASSESSMENT</th></tr>
<tr><td>Make a temporary (wet), slide.
- produce stained slides.</td><td>A cell is the basic unit of structure and function in living things.</td><td>Use the microscope to observe an example of plant cells.</td><td>Science For Junior High
2nd Edition

Microscope, slide, cover slip, dropping pipette, iodine, water, onion or Rheo cells</td><td>Rubric for assessing correct use and handling of microscope and making a wet slide.</td></tr>
<tr><td>Describe observed features of a cell.</td><td>Cell membrane, cell wall, nucleus, vacuoles.</td><td>Make labeled diagrams to show observed features of cells as seen through the microscope.</td><td>As above</td><td>Rubric for assessing labeled diagram.</td></tr>
<tr><td>Relate cell organelles to their functions.</td><td>Cell membrane/cell wall – cell covering for protection, nucleus controls activities of the cell, mitochondria – site of energy production. vacuole – storage, chloroplasts – pigment.</td><td>Add notes to diagrams of a plant cell and an animal cell showing their organelles.</td><td>Diagram of a plant cell showing organelles and diagram of an animal cell showing organelles.</td><td>Rubric for assessing labeled diagram.</td></tr>
<tr><td>Distinguish between a typical plant cell and a typical animal cell.</td><td>Differences between the plant and animal cell.<table><tr><th>Plant Cell</th><th>Animal Cell</th></tr><tr><td>Has Cell Wall</td><td>Has Cell Membrane</td></tr><tr><td>Has Chloroplast</td><td>Lacks Chloroplast</td></tr><tr><td>One large vacuole</td><td>Many small vacuoles</td></tr></table></td><td>Use a microscope to observe parts of the plant cell and animal cell.
Observe drawings of an animal and a plant cell.</td><td>Science For Junior High
2nd Edition</td><td>Differences given in matrix on worksheet.</td></tr>
<tr><td>Make models of cells to show main features.</td><td><table><tr><th>Plant Cell</th><th>Animal Cell</th></tr><tr><td>Has Cell Wall</td><td>Lacks Cell Wall</td></tr><tr><td>Has Chloroplast</td><td>Lacks Chloroplast</td></tr><tr><td>One large vacuole</td><td>Many small vacuoles</td></tr></table></td><td>Make models of plant and animal cells to show main features.</td><td>Styrofoam, seeds, pasta, coloured paper, glue, markers, toothpicks</td><td>Rubric for assessing models.</td></tr>
</table>

SCOPE OF WORK
GRADE 7
STRAND: LIVING THINGS

TOPIC: CELLS

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Use a microscope to observe and identify specialized cells in animals.	epithelial, muscle, blood, reproductive	Use a microscope and prepared slides to observe and identify specialized cells in animals. Make posters of specialized cells.	*Integrated Science for Caribbean Schools* BK. 1	Correct use and handling of microscope. Correct identification of observed features.
Use a microscope to observe and identify specialized cells in plants.	Specialized cells include root hair, guard, palisade, vascular, reproductive etc.	Use a microscope and prepared slides to observe and identify specialized cells in plants. Make posters of specialized cells.	*Integrated Science for Caribbean Schools* BK. 1	Correct use and handling of microscope. Correct identification of observed features.
Draw conclusions on the function of specialized cells based on the features of the cells.	Red blood cells – increased surface area for transporting oxygen, epithelial cells – thin for absorption, root hairs – increased surface area for absorption, sperm – small size and tail – mobility, palisade cells – abundance of chloroplasts – photosynthesis, muscle cells stripes/fibres – contraction.	As individuals or in pairs use observed features to brainstorm possible functions for the identified specialized cells. Make labeled diagrams to show observed features of organs and tissues.	*New Understanding Science* Bk. 1	Correct functions of cells identified. Rubric to assess posters of specialized cells.
Explain how cells are organized to form tissues, organs, systems with examples.	cells → tissues→ organs→ systems → organism Digestive, reproductive	Make a model to show the relationship between cells, tissues, organs and systems.		Relationship shown in model(s).

SCOPE OF WORK
GRADE 7
STRAND: LIVING THINGS

TOPIC: CELLS

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Demonstrate the relationships between cells, tissues, organs and systems.	cells → tissues → organs → systems → organism	Make labeled diagrams to show observed features of human body systems.	*Integrated Science for Caribbean Schools* BK. 1 *Science For Junior High* 2nd Edition	Labeled diagrams.
Classify samples as cells, tissues, organs or systems.	Photograpsh/drawings of cells identified above, tissues – epithelial tissue, muscular tissue, bone tissue, organs – leaf, kidney, lung, stomach, intestines, ovary, testis, brain, biceps, heart, eye etc. system, floral male and female systems, plant vascular system, 10 human systems.	Classify samples as cells, tissues, organs or systems.	Photographs of a variety of cells, tissues, organs and systems. Worksheet	Correct classification.

SCOPE OF WORK
GRADE 7
STRAND: LIVING THINGS

TOPIC: CLASSIFICATION **DURATION: 8 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Classify living things into six kingdoms based on characteristics.	The six Kingdoms of living things include; monera, protista, fungi, plant and animal kingdoms. Viruses are not classified as living things, because they only come alive while in a living organism.	Use pictures of living things and place them into the five kingdoms. Observe characteristics of living things in each kingdom.	Photographs of organisms, characteristics of kingdoms	Worksheet
Explain why protozoans are referred to as “animal-like protists”.	Single cell simple organisms that lack chlorophyll.	Compare diagrams or photographs of protozoans and protists. −search pond water for protozoans.	Microscope, prepared slides of protozoans and protists, diagrams/photographs of protozoans and protests.	Logical reasons.
Use the characteristics of the seven invertebrate groups to classify local organisms.	Invertebrates include protozoans, coelenterates, flatworms, round worms, echinoderms, mollusks, arthropods.: external appearance, habitat, shape, appendages.	Classify local invertebrates into phyla.	Photographs, specimens, characteristic features handout *Science For Junior High* 2nd Edition	Organisms correctly classified.
Make oral presentation on an invertebrate phylum.	As above	In groups, make an oral presentation on one invertebrate group.	Pictures of local animals	Rubrics for assessing oral presentations.

SCOPE OF WORK
GRADE 7
STRAND: LIVING THINGS

TOPIC: CLASSIFICATION

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Observe features of four classes of arthropods.	Myriapods – many similar segments, many legs, head with antennae, crustaceans – cephalothorax, abdomen, legs on cephalothorax, antennae, hard exo-skeleton, arachnids – cephalothorx and abdomen, eight waling legs, insects – three segments head, thorax, abdomen, six walking legs, wings.	Prepare a poster or PowerPoint presentation to show characteristics of four classes of arthropods.	*Science For Junior High* 2nd Edition	Rubrics for assessing visual presentations or posters.
Demonstrate the relationship between the phylum arthropoda and its classes.	The four classes of arthropods include **insects**, **crustacean**s, **arachnids**, and **myriapods** all have exo-skeleton and jointed legs.	In small groups to classify organisms in a hierarchy according to similarities and differences in features.	*Science For Junior High* 2nd Edition	Hierarchy shown with similarities of arthropods; differences separating organisms in one class from the other classes.
Formulate a hypothesis of an organism's habitat based on physical features of that organism.	Examples: Earthworms have no eyes – live in soil, chitons/curves have flat, hard exo-skeletons for life on rocks and survive waves.	Observe organisms, then formulate a hypothesis. Use external features of an organism to make inferences about its habitat or mode of life.	*Integrated Science for Caribbean Schools* Bk. 1	Plausibility of hypothesis (based on features observed).
Formulate a hypothesis of an organism's classification based on its characteristics.	Example: a crayfish is a crustacean because of its skeleton, body parts, legs.	Observe the organism's external features.	*Integrated Science for Caribbean Schools* BK. 1	Plausibility of hypothesis (based on features observed).
Use sea shells to make jewelry or an ornament.	Some invertebrates like bivalves and gastropods, outgrow and leave their shells. These may be used to make ornaments or jewelry.	Use sea shells to make jewelry or an ornament.	String, poster board, hairclips, bottles etc.	An item made or decorated creatively and carefully.

SCOPE OF WORK
GRADE 7
STRAND: LIVING THINGS

TOPIC: QUEEN CONCH DURATION: 8 lessons

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Observe the external features of the Queen Conch.	The Queen Conch- Scientific name- *Strombus gigas* is a large, marine, gastropod mollusc. External features: operculum, eyes, foot, mantle, claw, shell. Shell has defined/sharp edges. The mantle is brown/ orange in colour with a bright pink flaring lip in mature adults. It has a grey mottled head with long black eye stalks and proboscis.	Observe the external features of the Queen Conch and record a description of the features identified.	*Shelly the Conch* by Katherine Orr Diagram of the Queen Conch The Queen Conch Fact Sheet: Prepared by the Dept. of Marine Resources © 2007	Description of the external features of the Queen Conch to distinguish it from the Hawkwing, Milk Conchs.
Measure the length of a conch and its "claw" in cm.		Measure the length of a conch and its "claw" in cm.	Adult conch or a life-size model of a conch, ruler	Accuracy of measurement to 0.1 cm.
Measure the width of a conch in cm.		Measure the width of a conch (widest part) in cm.	Adult conch or a life-size model of a conch, ruler	Accuracy of measurement to 0.1 cm.
Measure the weight of *an adult* conch in grammes.		Measure the weight of *an adult* conch in grammes	Adult conch or a life-size model of a conch, triple beam balance	Accuracy of measurement to 0.5 g.
Use measurements to draw a conch 1/3 of its size.		Make a diagram of a conch 1/3 of its size.	Adult conch or a life-size model of a conch	Accuracy of measurements, accuracy of features drawn.
Observe differences in the genders of Queen Conchs.	Males have a verge, females have an egg groove.	Observe a verge in males and an egg groove in females.	Male and female adult conchs or diagrams or photographs of adult conchs	Identification of a verge and an egg groove.

SCOPE OF WORK
GRADE 7
STRAND: LIVING THINGS

TOPIC: QUEEN CONCH

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Describe the life history of the Queen Conch.	In spring and summer, female conch lays eggs, male sheds sperms on egg mass on sand. Veligers hatch, live and metamorphose in surface water. Fall to sand and grows shell in spiral as a juvenile – an outward, flared lip as adult in grass bed. The conch becomes sexual mature at 3 to 4 years, stop growing in length and thickens its characteristic flared lip. The horns/spines become dull with age.	In groups, make oral presentation (with visual aids) to describe the life history of the Queen Conch.	*Shelly the Conch* by Katherine Orr *The Life Story of the Queen Conch* by Katherine Orr	Rubric for assessing oral presentations.
Recognize the relationship between the colours of the conch shell to its environment.	Shell is easily camouflaged in sand and among grass beds.	Observation of photographs and completing a worksheet.	Photographs of conchs in their habitat.	Clearly stated relationship.
Recognize the relationship between the season and spawning of conch.	Warm months, more food available for veligers, less strong wave action.	Brainstorm reasons that show a relationship between the season and spawning of conch.	Posters showing seasons when conchs mate (closed and open seasons)	Logical points to support the relationship shown.
Recognize the relationship between rate of reproduction, predation rate and survival of conch.	Conch reproduces in large numbers to ensure that some survive predation by a variety of organisms.	Brainstorm reasons that show a relationship between the rate of reproduction, predation rate and survival of conch.	Photograph of predators on juvenile and adult conchs.	Logical points to support the relationship shown.

SCOPE OF WORK
GRADE 7
STRAND: LIVING THINGS

TOPIC: QUEEN CONCH

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Make predictions on the number of offspring produced and matured to survival from one conch.	One female may lay up to six egg masses each containing about 300 eggs per season.	Calculate the number of eggs produced by one conch in a season (6 x 300) and guess the number eaten each year by predators before they reach adulthood.	*Shelly the Conch* by Katherine Orr	Plausible prediction with reasons stated.
Make predictions as to the conch population or habitats in 25 years should there be no restrictions on fishing.	As above	Make predictions as to the conch population or habitats in 25 years should there be no restrictions on fishing.	Calculator	Plausible prediction with reasons stated.
Make predictions as to the conch population or habitats in 25 years should restrictions be enforced.	As above It is illegal to catch juvenile conchs	Make predictions as to the conch population or habitats in 25 years should restrictions be enforced.		Plausible prediction with reasons stated.
Construct graphs to show the catch of conchs over a five-year period.	Statistics from Department of Marine Resources.	Construct graphs to show the catch of conchs over a five-year period.	Statistics from Department of Marine Resources. Or statistics from a local (island) source.	Rubrics for assessing graphs.
Calculate the average number of conchs or weight of conchs caught per month.	Statistics from Department of Marine Resources.	Calculate the average number of conchs or weight of conchs caught per month.	Interview fishermen or statistics from Department of Marine Resources, calculator	Correct calculation utilizing available data.
Use statistics from studies of conch populations to draw conclusions on the effect of fishing on populations.	Statistics from Department of Marine Resources.	Examine statistics and maps. Interview fishermen.	Statistics from Department of Marine Resources. Fishermen	Plausible conclusion clearly stated with reasons given.
Recognize the relationship between demand for conch meals and the rate of fishing for conch.		Class discussion Conduct school survey to see how much conch is eaten in a week/month etc.		Relationship between demand for conch meals and the rate of fishing for conchs shown as a direct relationship.

SCOPE OF WORK
GRADE 7
STRAND: LIVING THINGS

TOPIC: QUEEN CONCH

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Recognize the relationship between the demand for conch and its price.	Current price for conchs compared with the price 10 years ago	Class discussion. Interview fishermen.		Relationship between demand for conch meals and its price shown as a direct relationship.
Examine the economic importance of the Queen Conch.	Gross income for a fisherman from one "haul" of conchs.	Interview fishermen, craftsmen (make conch shell ornaments and/or jewelry), conch vendors.		Statement including an evaluation of the conch as an economically important marine organism with reasons to support the statement.
Explain the importance of observing the restricted size for catching conch OR the economic importance of the conch outweighs the need to protect it.	As in previous lessons.	Participate in a debate on the importance of observing the restricted size for catching conch OR the economic importance of the conch outweighs the need to protect it.	Information from previous activities.	Rubric for assessing debates.
Make a hypothesis on the effectiveness of farming conchs in a marine protected area.	Marine protected areas have minimal natural predators and absence of mankind predators, populations of conch would increase greatly.	Formulate a hypothesis on the effectiveness of farming conchs in a marine protected area.		Plausible hypothesis clearly stated with reasons given.
Use the conch shell to make a product.	Ornaments: lamp stands, ladles, jewelry, accessories, lime (CaO).	Use the conch shell to make a product.	Observe products made locally.	Rubric for assessing a model or product.
Purchase conchs of the designated size.	Conchs must have a flared lip in order to be caught.	Purchase conchs of the designated size.		Long-term behaviour.
Research the use of conchs in other countries.		Research the use of conchs in other countries. Record findings and results of over fishing.	Internet	Rubric for assessing research.
Show the importance of measures taken to ensure that the supply of conch always surpasses the demand for it.	Prohibition on size of conchs caught allows juveniles to attain maturity and reproduce.	Write a paragraph showing the importance of measures taken to ensure that the supply of conch always surpasses the demand for it.		Clearly written points that show the positive effects that the restrictions on size of conch caught has on ensuring sustainable catch.

SCOPE OF WORK
GRADE 7
STRAND: MATTER

TOPIC: CHANGES IN MATTER **DURATION: 5 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Use materials and equipment to demonstrate that matter has mass and volume.	All matter consists of molecules /atoms and therefore has mass and takes up space (volume).	Experiments to show air has mass and volume.	Balloons, cord, ruler, gas jar, cover slip, water, pneumatic trough/basin *New Integrated Science for the Caribbean* Book 2; Internet: skool.ie::junior cycle	Rubric for assessing conducting investigations.
Make inferences on the state of matter based on properties given.	Solids have definite volume and shape, do not allow penetration, cannot easily be poured, and can not be compressed. Liquids have no definite shape but a definite volume, can be poured, penetrated and non-compressible. Gases have no definite shape, completely fill the volume of the container and are compressible.	Puzzle or game with clues given about materials to determine the state of matter.	Puzzle, game	Number of substances correctly identified (state).
Make diagrams to show molecular arrangements.	Solid – molecules closely packed with regular arrangement. Liquid – molecules loosely packed irregular arrangement, gases – molecules widely spaced with no pattern.	Make diagrams to show molecular arrangements of different states of matter for a substance.	Diagrams showing different states of matter for a few substances Internet: school.discovery.education.com skool.ie::junior cycle	The closer packed the molecules, the denser the substance. Clarity of diagrams. Correct comparison shown.
Relate the molecular arrangement of a substance to its state of matter.	Solid – molecules closely packed with regular arrangement. Liquid – molecules loosely packed irregular arrangement, gases – molecules widely spaced with no pattern.	Identify states of matter from various diagrams.	Diagrams showing different states of matter for a few substances, textbooks: *New Integrated Science for the Caribbean* Book 2; *Science for Junior High* Second Edition	Number of diagrams correctly identified.
Make models to represent the molecular arrangements in the three states of matter.	Solid – molecules closely packed with regular arrangement. Liquid – molecules loosely packed irregular arrangement, gases – molecules widely spaced with no pattern.	Make models to represent the molecular arrangements of the three states of matter.	Plasticine, toothpicks, straws, a box partitioned into 3 parts, marbles. *Science for Today and Tomorrow*	Models showing relative differences between the three states of matter.

SCOPE OF WORK
GRADE 7
STRAND: MATTER

TOPIC: CHANGES IN MATTER

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Make a model diagram showing changes of states of matter and the processes involved in these changes.	When changing from solid to liquid, molecules become more widely spaced. When moving from liquid to gas they become further spaced. Molecules moving from gas to liquid molecules are more closely spaced. From a liquid to solid, molecules become closely packed.	Make a model diagram showing changes of states of matter and the processes involved in these changes.	Plasticine, toothpicks, straws	Relative positions of molecules in models, labeling of models.
Plan and conduct an investigation to show the properties of matter.	Simple experiments to demonstrate the properties of a solids, liquids and gases.	Demonstrate: how liquids and gases can flow easily, be penetrated easily, takes the shape of containers; how solids are not penetrated easily, have a fixed shape and how both solids and liquids are non-compressible.	Giant flavor injector or a piston, water, sand, wooden blocks, conical flask with rubber stoppers, medicine dropper, a clear large diameter tubing, cotton balls, dowel/sticks, string. balloons	Rubric for assessing conducting investigations.
Observe physical changes.	A temporary change to a substance or item when the original appearance may be regained i.e. shape, size, and state.	Change shape and size of plasticine balls, cutting strips of papers, evaporating and melting wax, and condensing water.	Plasticine balls, paper, scissor, wax, container with a cover or lid, water, heating source	Accurate description of appearances changed and restored to original.
Plan and conduct an investigation to demonstrate physical changes.	Water changes to steam (water vapour) then steam to water to ice and ice to water –changes are reversible.	Plan and conduct an investigation to demonstrate physical changes using the changes of state of water.	Ice, water, beaker, source of heat, freezer	Rubric for assessing conducting investigations.
Use materials and equipment to demonstrate physical changes.	Water changes to steam (water vapour) then steam to water and water to ice. These physical changes of water are reversible.	Plan and conduct an investigation to demonstrate physical changes in changes of state of water.	Ice, water, beaker, stirrer, graduated cylinder, tongs, source of heat, freezer	Handling of apparatus and materials.
Observe and identify various changes in the states of water.	Water changes to steam (water vapour) then steam to water and water to ice. These physical changes of water are reversible. (Ability to be poured in each of the three states. Reversible reactions.)	Solid – ice, liquid – water, gas – water vapour.	Ice, water, beaker, stirrer, graduated cylinder, tongs, source of heat, freezer	Describing of observations of shape, volume, colour.

SCOPE OF WORK
GRADE 7
STRAND: MATTER

TOPIC: CHANGES IN MATTER

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Plan and conduct an investigation to demonstrate chemical changes.	Appearance and composition of a substance changes and cannot be returned to the original appearance – an irreversible reaction.	Plan and conduct an investigation to demonstrate chemical changes using iron filings and water or iron filings, sulphur powder and heat.	Balance, iron filings, dropping pipette, water, Petri dishes, sulphur powder, heating source and test tubes, retort stand and clamp, *New Integrated Science for the Caribbean* Book 2	Rubric for assessing investigations.
Predict the amount of iron that would be present as rust on a nail.	Iron combines with oxygen to form rust (iron oxide); this is an irreversible reaction.	Predict the amount of iron that would be present as rust on a nail that is left to "rust" for a period of two weeks.	Cut iron nails, Petri dishes	Proximity of estimation to actual percentage of weight of nails.
Use materials and equipment to demonstrate chemical changes.	Iron combines with oxygen to form rust (iron oxide); this is an irreversible reaction.	Use materials and apparatus in an investigation to demonstrate chemical changes using iron filings and water.	Balance, iron filings, dropping pipette, water, Petri dishes	Correct and safe use of materials and apparatus.
Observe chemical changes.		Observe rust, iron sulphide.	Rusty iron nails, iron filings, sulphur, iron sulphide	Number and accuracy of observations made.
Classify changes in matter as physical or chemical.	Physical changes are reversible, chemical changes are irreversible as a new substance is formed.	Observe experiment with iron and sulphur heated; magnetizing a piece of iron; burning coal to ash.	Iron filings, sulphur powder, test tube, magnet, iron nail, coal, heat source	Correct classification of changes as chemical or physical
Use data recorded to characterize any change as chemical or physical.	Physical changes are reversible, chemical changes are irreversible and a new substance is formed.	Use data recorded to characterize any change as chemical or physical.	Cue cards with description of changes (scientific and everyday) skoool.ie::junior cycle, *Science for Junior High* Second Edition	Correct classification of changes as chemical or physical.
Formulate a hypothesis based on physical and chemical changes.	Physical changes are reversible, chemical changes are irreversible and a new substance is formed.	Formulate a hypothesis based on physical and chemical changes.	Examples of physical and chemical changes (textbook) *Science for Junior High* Second Edition	Plausibility of hypothesis with logical reasons given.
Formulate a hypothesis about water changing state under non-laboratory conditions.	Effects of high or low temperature and pressure on water as it changes state.	Formulate a hypothesis about water changing state under non-laboratory conditions.		Plausibility of hypothesis with logical reasons given.

SCOPE OF WORK
GRADE 7
STRAND: FORCES & ENERGY

TOPIC: MAGNETISM **DURATION: 5 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Formulate a hypothesis on the types of materials that are magnetic or non-magnetic.	Any material which has iron or nickel or cobalt in it will be magnetic. All non-metals and metals without iron are non-magnetic.	Write hypothesis. Use magnet and various materials to test for magnetism.	Magnets, various samples of metallic and non-metallic materials.	Plausibility of hypothesis with logical reasons given.
Predict which materials will be magnetic and which non-magnetic.	Any non-metal or metal which is not iron or iron compound will be non-magnetic. Examples are gold and silver will not be magnetic.	Based on hypothesis, place given list of materials as magnetic or non-magnetic.	Magnets, various samples of metallic and non-metallic materials.	Plausibility of prediction with logical reasons given.
Classify magnetic and non-magnetic materials.	Not all metals are magnetic. All magnetic materials are metals or metallic compound.	Test given materials for magnetic property and classify as magnetic or non-magnetic.	Variety of magnetic and non-magnetic materials plus variety of shaped magnets.	Number of items/materials correctly classified.
Use bar magnets to demonstrate: attraction, repulsion, magnetic field, North and South Pole alignment.	Attraction brings poles and materials together. Repulsion pushes poles and materials from each other. Like poles repel. Unlike poles attract. The area of magnetic force around a magnet is the magnetic field.	Suspend bar magnets freely and observe alignment. Observe and record which poles attract and which repel.	A variety of magnets, string	Rubric for assessing investigations.
Explain the importance of the North and South Poles on magnets.	When hung freely by a string a bar magnet aligns itself north to south. The strongest areas of attraction or repulsion is near the poles of a magnet.	Suspend bar magnets freely and observe alignment.	A variety of magnets, string	Oral explanation – correct information.
Explain the care and storage of magnets.	Special ways of care and storage include pulling them apart instead of sliding apart; Avoid long attraction to opposite site poles; Keep away from magnetic materials; store in original packing; do not mix or store loosely.	Research places where magnets should not be stored e.g. with sensitive electronics, credit card, tapes etc. Explain in writing, the care and storage of magnets.	Physics resource books ("O" Level Physics)	Number of valid points included in written explanation.

SCOPE OF WORK
GRADE 7
STRAND: FORCES & ENERGY

TOPIC: MAGNETISM

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Observe an electromagnet.	Electromagnets are made of iron core wrapped in insulated wire attached to a power source.	Make and manipulate a simple electromagnet.	Battery, insulated wire, nail, paper clips Bar magnet	Valid observations and description.
Differentiate between electromagnets and permanent magnets.	Electromagnets are temporary magnets which work when a passing current magnetizes an iron core around which an insulated conductor wire is wrapped. The strength of an electromagnet can change when needed, that of the permanent cannot.	Compare the behaviour of an electromagnet with that of a bar magnet. List differences.	Pictures of electromagnets in small and large functions e.g. industry	Worksheet – number of differences given.
Draw lines to show force fields of magnets and define force field.	Force field is the area of attraction around a magnet.	Use iron filings, paper and bar magnets to observe and draw magnetic field.	Iron filing, bar magnets, paper	Diagram showing force field for one magnet.
Make an inference on the force field of a lodestone.	The force field of a lodestone exists all around the stone.	Manipulating lodestone under sheet of paper with iron filings on top.	Lodestone	Clearly stated inference with reasons.
Draw an inference on the force field of an electromagnet.	The force field operates from the pole outward with bar magnets, so the force field should be from the end of the nail outward.	Manipulate electromagnets.	Electromagnet made by students (as above) Iron filing, paper	Inference – clearly stated with reason.
Apply knowledge of magnetism to make a simple household product.	Many simple everyday uses of magnets exist around us e.g. shower curtains, cupboards doors etc.	Make small gadgets which use magnets.	Magnets, assorted materials	Rubric for assessing products.

SCOPE OF WORK
GRADE 7
STRAND: FORCES & ENERGY

TOPIC: ENERGY **DURATION: 6 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Differentiate between kinetic and potential energy.	Define energy. K.E. is energy in action (motion). P.E. is stored energy in a body due to its position, tension or chemical make up.	Classify given energy examples as P.E. or K.E. Complete table on forms of energy and what they do.	Worksheet Science text	Worksheet – correct classification; additional examples of P.E and K.E. correctly classified.
Use a simple pendulum and/or elastic band to demonstrate potential and kinetic energy.	A pendulum held to the side and an elastic band stretched both have P.E. Each of them when released has K.E.	Manipulating pendulum and elastic band. Observing and recording their action when released.	Pendulum, elastic band Understanding Science 1	Demonstration; accurate observations, clear recording.
Use the correct SI units for energy.	The S.I. unit for energy is written as 'joules' or 'J'.	Practice allotting the correct form of the S.I unit of energy to given readings.	Worksheet	Correct use of SI units for energy.
Plan and conduct an experiment to show energy transformation/inter-conversion.	Using basic introductory skills of the scientist. E.g. Chemical $\longrightarrow$ Heat (& light)	Planning and conducting experiment. Example: use a lighted peanut to heat a measured amount of water.	Peanut, pin, test tube, water, thermometer	Rubric for assessing investigations.
Use energy transformation diagrams to demonstrate the law of conservation of energy.	Law: **Energy is neither created nor destroyed but is changed from one form to another**. e.g. 1. A flash light turned on Chemical $\longrightarrow$ light (heat is wasted) 2. Radio playing music Electrical $\longrightarrow$ sound (heat is wasted)	Make energy transformation diagrams and describe energy changes in diagrams given.	Pictures/charts of energy conversions. Worksheet	Number of energy transformations correctly identified.
Demonstrate that energy is needed for work to be done.	A force must be applied through a distance before work is done. Energy exerted to provide the force to displace an object. Work is done when an object is **displaced**. [W = f x d].	Solve problems to show work done in various situations. W = f x d simple practical examples for determining mass/force – walk distance, calculate amount of work done	Worksheets using force measurements	Solving problems correctly; the correct S.I. units.

SCOPE OF WORK
GRADE 7
STRAND: FORCES & ENERGY

TOPIC: ENERGY

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Differentiate between renewable and non-renewable energy.	**Non-renewable** energy sources cannot be replenished once used up. They include all fossil fuels (gasoline, oil, gas, coals) **Renewable** energy sources can be replenished in a short period of time. Examples: water, wind, nuclear, bio-fuels, biomass, solar, and geothermal. They are often referred to as alternative energy sources.	Research renewable and non-renewable sources of energy. (Define renewable and non-renewable. Give examples of each form. Which renewable and non-renewable forms are found in The Bahamas?)	Internet	Rubrics for assessing research (include definitions, examples, and forms found in The Bahamas).
Identify renewable energy sources that may be used in The Bahamas.	Renewable energy sources in the Bahamas include solar and wind.	Brainstorming, class discussion.	Information researched.	Plausible renewable energy sources with logical reasons.
Research new alternatives to reduce the use of non-renewable energy sources.	Solar and wind are known.	Research solar, wind, energy from ocean wave, ocean thermal energy, waste to energy.	Internet	Rubric for assessing research.

SCOPE OF WORK
GRADE 7
STRAND: ECOLOGY

TOPIC: FEEDING RELATIONSHIPS **DURATION: 10 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Use feeding habits to classify organisms.	Organisms may be classified according to the food that they eat. Definitions of the terms: Producers, consumers, herbivores, carnivores and omnivores.	Classify common organisms.	Photographs of common organisms Ecosystems of the Bahamas The Bahamas National Trust. *Wondrous West Indian Wetlands.*	Organisms classified correctly.
Find out the feeding habits of five organisms found locally.	As above.	Research to find out the feeding habits (not previously known) of five organisms found locally.	Biology/Ecology resource books The Bahamas National Trust publications.	Feeding habits of organisms stated correctly.
Measure the length and width of an area studied.	Select an area minimum 10m x 10m in the schoolyard, adjacent undeveloped, open land or a similarly easily accessible site.	Use metre rulers and tape measures to measure length and width of an area to be studied and record the results.	Metre rulers and tape measures	Length and width of area studied measured correctly and accurately to 1 cm.
Observe and record organisms in an area studied.	**Definition of ecosystem**: An ecosystem consists of a group of plants and animals interacting with each other and with their non-living environment. Examples: Rocky Seashore, Mangrove, Coral Reef, Blackland Coppice.	Use quadrats in area (measured above). Identify each type of organism and record the number of each organism.	Quadrats	Organisms in an area observed and recorded correctly.
Make a bar graph showing the population of plants in an area studied.	A population consists of all the organisms of one species living in a particular habitat.	Use results obtained during the field trip to draw a bar graph showing the population of 3 – 5 plants in an ecosystem.		Rubric for assessing collecting and processing data (Bar graphs).

SCOPE OF WORK
GRADE 7
STRAND: ECOLOGY

TOPIC: FEEDING RELATIONSHIPS

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Make a bar graph showing the population of animals in an area.	Math skill: Bar graphs.	Use results obtained during the field trip to draw a bar graph showing the populations of animals in an area.	Data from field trip. Graph or square paper	Bar graphs drawn correctly that show the populations of animals.
Find the percentage of the total population of organisms in an ecosystem for the most common organism.	Math skill: Percentages.	Use results obtained during the field trip to calculate the percentage of the most common organism in the total population.	Data from field trip. Calculator	Correct process in calculating percentage.
Draw diagrams of food chains.	**Definition of food chain**: A food chain is a feeding relationship in which nutrients or chemical energy is transferred from producers through various levels of consumers to decomposers. Producer → herbivore → carnivore → decomposers Producer → 1st level consumers→ 2nd level consumers → 3rd level consumers/decomposers	Draw a diagram of a food chain including three or four organisms (if possible from area studied).	Photographs of organisms, index cards with names.	Diagrams of food chains drawn correctly.
Make models of food chains.	As above	Make models of food chains.	*New Integrated Science for the Caribbean*, Second Edition , book 1 by Lucy Durgadeen, Steve West & Eugenie Williams, Toy plants and animals, index cards	Rubric for assessing models.
Determine possible identity of a missing organism from a food chain based on organisms present.	Producer → 1st level consumers → 2nd level consumers → 3rd level consumers/decomposers	Suggest the identity of organisms in food chains with one missing organism.	Photographs	Plausible suggestions made.

SCOPE OF WORK
GRADE 7
STRAND: ECOLOGY

TOPIC: FEEDING RELATIONSHIPS

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Make a model of a simple food web.	**Definition of food web:** A food web is a combination of two or more food chains that share some of the same organisms.	Use cards with drawings of organisms on one side and its information on the other. Use strings to connect organisms. Students will dramatize the model made.	Cue/index cards; string. *Science for Junior High* by Nevillett Pearce	Accuracy of connections of organisms and energy flow.
Recognize the relationship between a food web and food chain.	Food web consists of linked food chains. It shows alternative foods for organisms – unlike food chains.	Identify and make diagrams of food chins in a food web.		Number of food chains identified and drawn correctly.
Make an energy pyramid for a given food chain.	**Definition of energy pyramid:** A diagram which shows the relative amount of energy available from organisms at different feeding levels. Producers are at the base of the pyramid.	Draw an energy pyramid for a given food chain.	General Science, Silver Burdett Science Programs	Energy pyramid drawn correctly.
Identify the relationship between organisms at successive trophic levels.	Each step in the pyramid is called a trophic level. The size of the box represents the relative amount of energy at that level.	Identify organisms at successive trophic levels. Describe how energy is lost from one level to another.	Diagrams of food chains and energy pyramids.	Clear description of feeding/energy relationships.

SCOPE OF WORK
GRADE 7
STRAND: ECOLOGY

TOPIC: FEEDING RELATIONSHIPS

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Recognize the relationship between the numbers of types of organisms in a pyramid of numbers.	Pyramid of numbers is a diagram that shows the relative number of organisms at each level in a food chain. The area of each block in the pyramid represents the number of organisms at that level in the food chain. Some energy is lost at each level. More organisms are needed to sustain the net level.	Observe a pyramid of numbers and guess the number of organisms at each level. Use data of number of organisms to construct a pyramid of numbers.	*Science for Junior High* by Nevillett Pearce	Plausible numbers given, labeled diagram of pyramid of numbers.
Describe the relationship between availability of food and population increase.	Generally with an abundance of food, population increases, scarcity of food causes decrease in populations.	Class discussion. Select a certain type of food, e.g. candies; share 12 among groups of different numbers of students, e.g. 12, 6, 4, 2, 1. Describe the relationship between the availability of food and population increase.		Relationship clearly described.
Predict the effect of removing the second level consumers on the population of first and third level consumers.	Define consumers: Consumers are organisms that eat other organisms. Animals are consumers. Consumers are classified as first, second and third level consumers. As the second level consumers are removed, the population of the first level consumers increases whereas the population of the third level consumers decreases.	Examine food chains with the second level consumers missing, make predictions.	Worksheets with diagrams of food chains.	Plausible predictions of the effects on the populations of first and third level consumers.

SCOPE OF WORK
GRADE 7
STRAND: ECOLOGY

TOPIC: FEEDING RELATIONSHIPS

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Predict the effect of killing all decomposers in an ecosystem.	Define decomposers: Decomposers are organisms that get their food by breaking down the remains of dead animals and plants. Fungi and bacteria are examples of decomposers. Without decomposers, dead organisms would take a very long time to decay.	Examine a diagram of a food chain with decomposers at the end. Predict the effect of killing all the decomposers.	Diagram of food chain.	Plausible prediction of killing decomposers.
Calculate the percentages of the total population of organisms in a community that are producers, herbivores, carnivores, decomposers.		Use data given in a matrix or pyramid of numbers for populations in a community. Calculate the percentage of the total population of each type of organism (producers, herbivores, carnivores and decomposers) in a community.	Data of numbers of producers, herbivores, carnivores, decomposers in a community.	Correct process in calculations.
Formulate a hypothesis on the effect of changing a physical factor on the populations of organisms in an area.	Organisms are suited to a specific temperature, moisture, salinity, acidity and oxygen level. A sudden, large change in any one factor could result in decrease in the population.	Formulate a hypothesis on the effect of changing a physical factor on the populations of organisms in an area.		Plausible hypothesis formulated.
Design an investigation to show the effect of changing one physical factor on the populations of organisms in an area.		Identify the organism and physical factor. Prepare an outline plan of an investigation.		Rubric for assessing an outline plan.

SCOPE OF WORK
GRADE 7
STRAND: ECOLOGY

TOPIC: FEEDING RELATIONSHIPS

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Identify an organism (predator) that might be introduced into a community/ecosystem to control a pest (prey).	Define predator and prey: A predator is an animal that captures or feeds on other animals. The prey is the animal that is hunted and killed by another animal for food. Organisms used to control pests: The mosquito fish controls mosquitoes. Snakes e.g. the Bahamian Boa Constrictor controls rats.	Identify a pest, conduct research to find an organism that feeds on the pest.	Biology resource books, Internet. *Science for Junior High* by Nevillett Pearce	Organisms identified feed on pest; resources cited.
Demonstrate care and sensitivity to the local environment.	Plants and animals live harmoniously in the natural environment. Organisms are valuable in their own right.	Participate in an appropriate project.		Demonstration of care for the environment.
Refrain from indiscriminate killing of garden organisms.	Honeybees pollinate flowers, earthworms enrich soil.	Refrain from indiscriminate killing of garden organisms.		Long-term behavior.

SCOPE OF WORK
GRADE 7
STRAND: ECOLOGY

TOPIC: WATER **DURATION: 6 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Use a thermometer to measure the temperature of boiling water.	Define temperature and boiling. The correct procedure for using a thermometer whose bulb is completely in the liquid without touching the bottom or sides of the flask.	Apply heat to flask until the water in it boils. Measure and record the temperature of the boiling water.	Thermometers with Celsius and Fahrenheit scales. 250 mL flat-bottomed flasks Hot plates	Correct use of a thermometer; accuracy of temperature measured.
Use (distillation) apparatus to show the inter-conversion of the states of matter for water.	Water can exist in three forms: ice (solid), water (liquid) and water vapour/steam (gas) depending on its temperature.	Use (distillation) apparatus to show the inter-conversion of the states of matter for water.	Bunsen burner or hot plate, tripod, gauze, distillation apparatus, water, conical flask, delivery tube, small beaker, kettle, cold glass/mirror.	Rubric for assessing investigations.
Observe changes in water as it changes state.	Ice melts, volume changes, “steam” given off, condensation on container. Water “bubbles” vapour/steam given off and rises. Steam causes glass to become cloudy with droplets of water. Water freezes sides and bottom of container first. As water solidifies it becomes opaque.	In as above	As above	Number of observations made.
Use apparatus to show filtration of water.	Filtration is the process of separating insoluble solids from water. Filter paper acts as a fine strainer/sieve. The filtrate is the liquid that passes through the filter paper. The residue is the solid that remains in the filter paper. Filter paper folded correctly. Apparatus set up correctly. Filter paper moistened for proper seating. Mixture poured correctly in filter funnel.	Set up the filtration apparatus and filter a sample of muddy water.	Filter funnel, filter paper, retort stand and ring support, beaker, gas jar or graduated cylinder.	Rubric for assessing correct and safe use of equipment and materials.

SCOPE OF WORK
GRADE 7
STRAND: ECOLOGY

TOPIC: WATER

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Observe the physical properties of water.	Physical Properties of water Water is a colourless, odourless. Tasteless liquid. It has a boiling point of 100^{o} C or 212^{o} F. It has a freezing point of 0^{o}C or 32^{o}F. It is neutral to litmus (pH = 7). Water changes the colour of anhydrous copper (II) sulphate from white to blue.	Observe filtered water and perform investigations to determine b. pt., pH and reaction with anhydrous copper sulphate and cobalt chloride paper.	*Science for Junior High* by Nevillett Pearce Worksheet Thermometer, beaker, ice, hot plate, pH paper, cobalt chloride paper, anhydrous copper sulphate powder	Physical properties of water correctly identified and observations of water made. Rubrics for assessing investigations.
Use physical properties of a liquid to determine the possibility of it being water.	The physical properties of a substance can be used to identify it. **Do not have an open flame near to acetone or ethanol.**	Use physical properties of three unidentified liquids to determine the possibility of one being water.	White vinegar, ethanol/acetone, water Worksheet	Observations and conclusions recorded clearly.
Observe the features of hard water.	Water hardness is caused by dissolved calcium and magnesium salts, e.g. calcium hydrogencarbonate. Hard water does not lather easily with soap. Scum forms instead. Deposits formed in kettles known as "fur".	Add 2 drops soap solution to about 10 cm^3 of each sample of water in a test tube. Observe scum (bathing tub) or "fur" (kettle or Thermos/vacuum flask).	Samples of water (seawater, well, tap water).	Correct observations made.
Use the formation of suds to classify water.	Soft water is water that lathers easily with soap. Hard water does not lather easily with soap. Scum forms instead.	Add 2 drops soap solution to about 10 cm^3 of each sample of water in a test tube. Mix well, observe and use observations to classify water samples.	Test tubes, soap solution, samples of water, dropping pipette *Science for Junior High* by Nevillett Pearce	Height of suds used as an arbitrary scale to classify water as soft or hard.

SCOPE OF WORK
GRADE 7
STRAND: ECOLOGY

TOPIC: WATER

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Observe the disappearance of solutes in water.	A large number of substances dissolve in water to form solutions. It is therefore referred to as the Universal Solvent.	Observe and record what happens when various substances e.g. table salt, sugar and copper (II) sulphate are added to water in a beaker and stirred.	*Science for Junior High* by Nevillett Pearce	Correct observations made.
Observe the condensation of water in a model water cycle.	The water cycle shows forms of water that exist in nature and how they change form one form to another.	Project: Make a model water cycle.	Website, Ask.com How to make a model water cycle.	Rubric for assessing models.
Draw inferences from information on a diagram of the Hydrological Cycle to determine the effect of a missing component.	The water cycle involves the following processes: transpiration, respiration, evaporation, condensation and precipitation.	Class discussion on the complete Hydrological Cycle. Draw inferences on the effect of one component of the cycle being drastically reduced/ missing for three components (scenarios).	A chart of the water cycle. Worksheet	Identify missing components and state the expected effect(s) caused by each.
Recognize the effects of deforestation on the Water Cycle.	Trees absorb water through their roots. The water then evaporates from their leaves in the process of transpiration. This water forms clouds that produce rain. Deforestation severely reduces transpiration and rainfall. Reduced rainfall makes available less water to be evaporated into the air which can lead to drought.	Research Conduct reach to discover the effects of deforestation on the water cycle.	*Balanced Science 1* by Jones, Jones & Marchington	Rubric for assessing research.

SCOPE OF WORK
GRADE 7
STRAND: HUMAN BODY

TOPIC: CLASSIFICATION OF FOODS **DURATION: 6 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Recognize the signs of severe malnutrition.	Malnutrition is the result of an inadequate or unbalanced diet, digestive difficulties, absorption problems, or other medical conditions.	Clip and compile pictures of malnourished individuals. List functions of components.	Newspapers, magazines, internet, scissors, glue	Observations and identification.
Use features to classify foods as starch, fat, simple sugars or fibre.	Outward appearance (colour, consistency, feel), chemical tests Starchy – grains, pastries Fat- meats, oils Sugar – fruit, desserts, candies Fibre – vegetables, fruit	Classify food based on features. List features used to classify foods.	Various foods	Criteria for classification.
Classify foods as complex and may be digested, complex and are not digested or not requiring digestion.	Digestion converts foods into simpler chemical forms that can be absorbed by the body. Complex digestible foods include carbohydrates, proteins. Complex indigestible food substances include cellulose/fiber. Water, vitamins, minerals do not require digestion.	Categorize foods into groups. Cut and paste pictures of foods in each category.	Newspapers, magazines, internet, scissors, glue	Number of foods classified correctly.
Classify the three food nutrients that must be digested.	Carbohydrates, proteins, fats.	Categorize various food items into groups. List food items belonging to each group. Bring one food item that belongs to each group.	Newspapers, magazines, internet, scissors, glue	As above
Use a triple beam balance to measure servings of food in grammes.	Food servings can be quantified in serving sizes, cups, or grams. Grams provide exact measurement of food for consumption.	Measure commonly eaten foods from all food groups. Compare grams versus cups versus servings.	Triple beam balance, internet, beakers, Petri dishes, evaporating dishes	Use of apparatus; accuracy of measurement.

SCOPE OF WORK
GRADE 7
STRAND: HUMAN BODY

TOPIC: CLASSIFICATION OF FOODS

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Use spotting tiles and iodine to test for starch in foods.	Iodine solution reacts with cooked starch producing a deep purple or blue/black colour.	Test food items for starch.	Spotting tiles, iodine, starch-rich foods	Rubric for assessing correct and safe use of apparatus and materials; observations made.
Observes a positive (colour) food test for starch.	Iodine solution reacts with starch producing a deep purple.	As above	As above	Observations made and recorded.
Observe a positive (colour) food test for fat.	When ethanol is used to test for fats in foods, a remaining translucent spot indicates the presence of oil (or fat) in the food sample.	Test food sample for fats.	Ethanol, water bath, paper (filter), food samples, test tubes	Observations made.
Use food tests to determine the nutrients present in an unknown food.	Tests for starch and fat.	Test various foods for nutrients.	Food samples (sugar canes, cassava etc.) iodine, paper (filter), test tubes, spotting tiles	Rubric for assessing investigations.
Distinguish between saturated and unsaturated fats.	Fat that occurs naturally in living matter contains varying proportions of saturated (animal) and unsaturated (plant) fat**.**	Make a list of foods that contain saturated and unsaturated fats.	Biology and nutrition resource books	Foods correctly classified according to the main type of fat content.
Compare an analysis of four food samples to the nutrients found in each.	Nutrients include carbohydrates, fats, proteins, minerals, vitamins, and water.	Construct a bar graph comparing food and the nutrients in them.	Food items (meat, white fish, whole wheat bread, and baked beans), or food labels	Bar graphs
Conduct investigations to determine the nutrients in an unknown food sample.	Tests for the presence of starch and fat.	Test unknown foods for nutrients.	Food samples (sugar canes, cassava etc.), iodine, ethanol, paper (filter), test tubes, spotting tiles	Rubric for assessing conducting investigations.

SCOPE OF WORK
GRADE 7
STRAND: HUMAN BODY

TOPIC: BALANCED DIETS **DURATION: 3 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Conduct investigations to determine the nutrients in an unknown food sample.	Test for the presence of starch and fat.	Test unknown foods for nutrients.	Food samples (sugar canes, cassava etc.) iodine, ethanol, paper (filter), test tubes, spotting tiles	Rubric for assessing conducting investigations.
Conduct investigations to determine the nutrients in locally grown foods.	Test for the presence of carbohydrates, fats, proteins. Present.	Test unknown foods for nutrients.	Food samples (sugar canes, cassava etc.) Biuret solution, Benedict's solution, iodine, ethanol, water bath, paper (filter), test tubes, stopwatch, spotting tiles	Rubric for assessing conducting investigations.
Read a newspaper or magazine article on the nutritional value of a food.	Local and international literary materials.	Write a short report.	Newspapers, magazines, fast food nutrition facts, food labels	Comprehension of information, simply and clearly written report on the article with personal comments.
Read and interpret nutrition fact labels on foods.	Nutrition facts are found on (most) packaged food labels. They contain important information about the nutrients found and the quantity in food.	Clip and compile nutrition facts from food labels. Peruse newspapers, magazines for articles on nutritional value. Acquire nutrition facts from popular fast food restaurants. Compare the nutrient values of different foods.	Newspapers, magazines, fast food nutrition facts, food labels	Comprehension of information, simply and clearly written report on the article with personal comments.
Make menus for balanced diets.	A balanced diet consists of food from all food groups in their required amounts.	Make menus for hypothetical restaurants/ special occasions (birthday, wedding, class party). List foods from each food group.	paper, markers, stencils,	Menu – balanced diet and appropriate menu for occasion.
Make an oral presentation on the importance of a balanced diet.	Adequate nutrients from all food groups prevent malnutrition and other bodily dysfunctions.	Oral presentation (small groups).		Rubric for assessing oral presentation.

SCOPE OF WORK
GRADE 7
STRAND: HUMAN BODY

TOPIC: FOOD PYRAMIDS/DRUMS **DURATION: 4 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Make a rap or song about the importance of a balanced diet.	Adequate nutrients from all food groups help maintain proper bodily function and prevent deficiency diseases.	Make a song or rap about the importance of a balanced diet.		Rubric for assessing oral presentation.
Explain the relative proportions of food groups in the food pyramid/ barrel.	A food pyramid is a guide that helps in planning types and relative proportions of foods to be consumed each day. The area of each section represents the relative proportion of that food group which is needed.	Class discussion. Worksheet on the Food Drum and/or Food Pyramid	food pyramid or drum chart, worksheets	Rubric for assessing models.
Make a food drum or pyramid.	As above	Construct a food pyramid or drum.	paper, markers, stencils, newspaper, cardboard, glue, brushes	Rubric for assessing models.
Make a model that represents proportions of food groups in a balanced diet.	See food pyramid or drum for relative proportions.	In groups, decide on a figure and proportions then make a model (other than a drum or pyramid) that represents proportions of food groups in a balanced diet.	chart paper, glue, newspapers, magazines, cardboard, paint brushes	Rubric for assessing models.
Conduct a survey of classmates' diet for a week to determine the number of students whose diet is balanced (food pyramid/drum).	A balanced diet consists of food from all food groups. A matrix for each student to include number of servings required for each food group, and space to enter the actual servings taken in.	Complete individual student's sheet. Compile data into one matrix. Determine the number of students whose diet is balanced (food pyramid/drum).	Handout with servings shown for common foods/drinks, survey matrix.	Data and correct compilation of number of students with balanced diet.

SCOPE OF WORK
GRADE 7
STRAND: HUMAN BODY

TOPIC: HEALTHY DIETS **DURATION: 1 lesson**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Formulate a hypothesis on the effect mandatory healthy diets in schools would have on the young generation.	Cafeteria/lunch vendor menus Young people tend to eat more sweets and less vegetables and fruits. Students may elect to eat their preferred foods after school or they eat what is available at school and develop a taste for healthy food.	Group discussion on advantages and disadvantages of monitoring foods sold at school. Formulate a hypothesis on the effect mandatory healthy diets in schools would have on the young generation.		Hypothesis clearly stated with plausible reasons.
Compare a fatty diet to a vegetarian diet.	Examples of foods that would be included in each diet.	Handouts with information on popular fast foods and vegetarian meals. Make a poster to compare typical fatty and vegetarian diets.	Chart paper, rulers, magazines, newspapers	Comparisons made.
Make a healthy, economical, marketable snack using locally grown food materials.	Food materials may be from all food groups (and limited the amount of additives).	Use locally grown foods to make a healthy snack (at home). Compile and share recipes in class. Optional - Sample snacks in class.	Packaging materials, shrink-wrap plastic, markers, containers, print labels, computers, paper,	Recipe for snack.
Make a healthy drink using locally grown fruit/vegetables.	Healthy drinks are rich in nutrients (vitamins), as natural as possible without many additives.	Compile/share recipes. Use fruits vegetables to make a healthy drink (at home).	Fruits, vegetables, ice, spoons, cups, blender	Recipe for drink.
Make dietary changes to promote a healthy lifestyle.	Use water as the primary beverage, drink juices and milk instead of soft drinks, reduce, or eliminate unnecessary or unhealthy snacking (“fast foods”, sugary and fatty foods).	Keep a daily food journal. List foods and times of ingestion. Have a fellow students highlight healthy /unhealthy food choices in different colours. Suggest healthy alternative food choices that can be made in the future.	Journal	Reflective entries in journal showing attitude change.

SCOPE OF WORK
GRADE 7
STRAND: HUMAN BODY

TOPIC: DIETARY DEFICIENCY DISEASES **DURATION: 4 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Make a decision to limit intake of food to recommended servings.	Servings of foods as indicated by food pyramid/drum.	Choose the correct serving size of common foods based on recommendations.	Food pyramid, measuring apparatus, photographs	Behaviour.
Evaluate the nutritional value of a meal.	Nutritional value of foods is based on the amount of useful nutrients found in them. These are often shown on food labels.	List nutrients found in common foods and the relative amount.	Food labels (four)	Number of points made with supporting reasons.
Relate dietary diseases to deficiency of specific nutrients.	As above Vitamin A, B1, B6, B12, C, D, K Minerals iodine, iron, calcium, phosphorus, carbohydrates, protein	List deficiency diseases and the specific nutrient associated with them. Match deficiency diseases (photographs) with specific nutrients associated with them.	Worksheet	Match deficiency disease with deficiency of a particular nutrient.
Plan nutritionally-balanced meals to avoid dietary-deficiency diseases.	Deficiency diseases are caused by a lack or insufficiency of a certain dietary nutrient.	Plan three balanced meals using foods from all food groups in required amounts.	Handout, poster, nutrition resource books	Balanced meals.
Observe features of deficiency diseases in photographs.	Deficiency diseases for above mentioned nutrients.	Observe then describe features of deficiency diseases.	Photographs	Observations and descriptions.
Based on information given, suggest the deficiency disease caused.	As above	Discuss ways to prevent deficiency diseases. Use index cards (some with photographs others with description of deficiency disease) to identify the specific nutrients deficient in each case. Examine meals/diets to determine missing nutrient(s).	Index cards with photographs and descriptions of deficiency diseases. Meals or diets that are not balanced.	Correct identification of deficiency diseases.

SCOPE OF WORK
GRADE 7
STRAND: HUMAN BODY

TOPIC: DIETARY NEEDS FOR WOMEN **DURATION: 2 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Predict how the foetus of a pregnant woman would be affected if there was insufficient calcium and phosphorus in her diet.	Calcium and phosphorus are instrumental in the development of strong teeth and bones. Baby would probably develop rickets and thin layer of enamel on teeth.	Record a prediction for how the foetus of a pregnant woman would be affected if there was insufficient calcium and phosphorus in her diet.	Information on benefits of calcium and phosphorus in the diet. Worksheet	Plausible predictions with reasons stated.
Formulate a hypothesis on the importance of Vitamin D in the diet of pregnant women.	Vitamin D plays an important role in the maintenance of organ systems, uptake of calcium and bone growth.	List advantages and disadvantages of having vitamin D in the diet of pregnant women for the uptake of calcium.	Worksheet as above	Plausible hypothesis with reasons stated.
Observe features of Rickets in photographs of persons with the disease.	Rickets is a disorder caused by a lack of vitamin D, calcium, or phosphorus. It leads to softening and weakening of the bones.	Describe the appearance of a person with rickets.	Photographs	Description of observations made.
Draw a conclusion about a post-menopausal woman whose diet was deficient in calcium and phosphorus.	Calcium and phosphorus are instrumental in the development and maintenance of strong teeth and bones. There appears to be a relationship between aging and loss of calcium which causes weakening of the bones.	Brainstorm why people seem to become shorter with age and why bone fractures take longer to heal. List causes and features of osteoporosis.	Diagrams or photographs comparing changes in body features with aging.	Conclusions stated with reasons.
Predict how improper absorption of calcium and phosphorus would affect a person's health.	Effect on bones, general body function – bones more easily fracture, teeth readily decay and become damaged.	Predict how improper absorption of calcium and phosphorus would affect a person's health.		Plausible predictions with reasons stated.
Predict the effects of increased specific nutrients on the body of a person with a specified deficiency disease.	Increasing intake of a specific nutrient should reverse the effects of a deficiency disease.	Predict the effects of increased specific nutrients on the body of a person with a specified deficiency disease.		Plausible predictions with reasons stated.

SCOPE OF WORK
GRADE 7
STRAND: HUMAN BODY

TOPIC: BODY MASS INDICES **DURATION: 2 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Collect height and weight data of classmates.	Height (centimeters/inches) Weight (kilograms/pounds)	Measure height of classmates. Weigh classmates. Record data.	Measuring tape, scale (digital for accuracy)	Collection of data.
Use data to calculate BMI.	Body Mass Index (BMI) uses height and weight to determine amount of body fat.	Compare calculations to BMI charts.	BMI charts	Processing of data.
Make a poster showing the suggested BMI for common heights for male and female classmates.	130 cm – 150 cm	Make a poster.	cardboard, paper, glue, scissors, markers, rulers	Rubric for assessing visual aids.
Conduct a survey to determine the percentage of persons interviewed who are at the correct Body Mass Index.	Grade level, school or community population.	Conduct survey for height and weight of selected number of the target population. Compile surveys. Calculate percentages.	Survey Matrices	Collection and processing of data.
Make dietary changes that will help to attain and maintain the personal BMI recommended for healthy living.	Use water as the primary beverage, drink juices and milk instead of soft drinks, reduce, or eliminate unnecessary or unhealthy snacking, reduce intake of fatty foods. Exercise regularly.	Keep a daily food journal. List foods and times of ingestion. Cardiovascular activities.	Journal, highlighters	Reflective entries in journal.

SCOPE OF WORK
GRADE 7
STRAND: HUMAN BODY

TOPIC: DIETARY RELATED HEALTH DISORDERS **DURATION: 2 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Relate conditions of diabetes, hypertension, elevated cholesterol, overweight/obesity to life expectancy.	Obese persons have an increased risk of developing illnesses such as diabetes, hypertension, and heart disease, all of which may lead to premature death.	Use statistical data to compare life expectancy among people with illnesses such as diabetes, hypertension, heart disease. Make a poster to relate the symptoms of illnesses/conditions named to treatment and prevention.	Statistical data (national), cardboard, paper, glue, scissors, markers, rulers	Rubric for visual aids.
Use statistics of diabetes, hypertension, elevated cholesterol, overweight/obesity in The Bahamas to construct bar graphs.	Graphs show occurrences comparing genders or age groups.	Interpret data. Construct graph. Compare occurrence of named diseases/disorders among genders, and age groups.	graph paper, data	Graphs – accuracy; comparisons.
Explain the relationship between caloric intake, obesity and exercise.	The calorie is a measure of energy produced from the foods. Increased caloric intake results in obesity or mass storage of surplus energy-rich molecules as fat in the body. Exercise expends some of this stored energy, and the obese person loses weight.	Class discussion based on data showing persons' caloric intake and energy needed. Oral presentation. Make a flow chart.	cardboard, paper, glue, scissors, markers, rulers *Human and Social Biology for the Tropics* – P. Gadd	Clearly identified and explained relationships.

SCOPE OF WORK
GRADE 7
STRAND: TECHNOLOGY

TOPIC: INTRODUCTION TO TECHNOLOGY **DURATION: 7 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Define technology.	Technology is the application of science to make life easier.	Brainstorm (back to the 'wheel') Compare opening a juice can with the tab and opening one without the tab. Explain the results and identify it as technology.	Juice cans	Written definition.
Describe the relationship between "pure science" and technology.	Technology is applied science. Light rays travel in straight lines is the basic principle for the camera.	Make a pinhole camera. Examine photographs and features of modern cameras.	Cereal box/ shoe box, wax paper, large pin (photographic paper if available)	Simple explanation of the pinhole camera.
Use a microscope to view microbes.	Correct steps in usage, handling and storage of the microscope.	Make simple diagrams representing microbes seen.	Compound microscopes, prepared glass slides showing a variety of fungi	Steps in using microscope, outline diagrams of microbes seen.
Observe differences in structure of various microbes.	Many microbes are named in part due to their shape and their method of movement. Many microscopic organisms may have flagella, cilia or move by pseudopodia. The coloration of microbes can also give indication as to whether the organism has the ability to photosynthesize food, while the structure may indicate that the organism hunts prey.	Observe photographs and make simple diagrams comparing microbes.	Resource books, Internet	Differences observed, features shown in diagrams.

SCOPE OF WORK
GRADE 7
STRAND: TECHNOLOGY

TOPIC: MICROBES

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Identify how different microbes are classified.	Many microbes are named in part due to their shape and their method of movement. Many microscopic organisms may have flagella, cilia or move by pseudopodia. The coloration of microbes can also give indication as to whether the organism has the ability to photosynthesize food, while the structure may indicate that the organism hunts prey.	As above Worksheet showing various microbes. Classify them according to appearances and criteria given.	As above Worksheet Information sheets	The number of microbes correctly identified.
Observe yeast cells under the microscope.	Spherical cells some showing budding.	Make simple diagrams.	Compound microscopes, prepared or temporary slides of yeast cells.	Steps in using microscope, diagrams.
Use a hand lens to observe fungi.	Moulds are common examples of fungi. Bread mould has thread like structures that comprise the organism along with reproductive "swellings" that are held upright.	Observe bread mould with hand lens.	Bread mould, Petri dish, hand lens	Use of hand lens; description of bread mould.
Recognize the relationship between temperature, moisture and microbial growth.	Microbes grow and reproduce quickly in warm and most conditions. Temperatures too hot or cold slow down the growth rate as does dry conditions.	Discuss a growth curve showing the number of bacteria and the rate of increase at different temperatures.	Graphs showing the number of bacteria and the rate of increase at different temperatures.	Describe the relationship between rate of growth of bacterial colonies and temperature.
Conduct an experiment to demonstrate that microbes accelerate decomposition.	Microbes help to break down organic and inorganic substances.	Package orange peels and fruit within a zip lock bag and watch the substance decay over time.	Zip lock bags, fruit/vegetable matter	Rubric for assessing investigations.

SCOPE OF WORK
GRADE 7
STRAND: TECHNOLOGY

TOPIC: FOOD PRESERVATION **DURATION: 7 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Apply principles of food preservation to preserve a food or drink.	Heating, pasteurization, freezing, salting, adding sugar, drying, fermenting.	At home, prepare one food sample using a principle based on information about microbes.	*Human and Social Biology for the Tropics* – P. Gadd	Application of principle to the method of preserving food.
Predict the shelf-life of food preserves.	The length of time that food preserves are kept fresh is called its shelf-life. Some methods of food preservation give longer shelf-life than others e.g. vacuum packed.	Predict the shelf-life for different food preserves and state reasons for predictions.	Variety of preservatives – bottled tomatoes, dried conch, salt beef, corned beef, canned peaches (vacuum packed), sweet pickles	Plausible prediction with logical reasons.
Classify methods of food preservation.	Boiling, pasteurization, evaporation – kill microbes; salt, sugar, syrup, acidity – prevent microbial growth; freezing, cooling – slow down microbial activity; vacuum-packed – prevent entry of microbes.	Classify methods of food preservation.	As above	Methods of food preservation grouped with valid reasons given for grouping.
Describe the process of food preservation for two methods.	As above	With the aid of diagrams, write stepwise instructions for the two methods of food preservation.	Food and nutrition resource books	Basic essential steps included, details given, logical sequence, clear description.
Use of equipment correctly and safely in preparing fruit preservatives.	Boil guavas in syrup or tomatoes in water and add salt, tamarinds with sugar.	At home, use of equipment correctly and safely in preparing fruit preservatives.	pot, slotted cooking spoon, bottles/jars, pot holder and heat source	Rubric for correct and safe use of equipment and materials.
Measure the ingredients used in food preservation.	A certain amount of sugar or salt would make the environment unsuitable for microbial growth Too much would affect the flavour and/or texture and appearance of the food. Too little would allow microbial growth and spoilage.	Measure accurately the required amounts of sugar/salt, water and fruit.	As above	Correct measurement of ingredients.

SCOPE OF WORK
GRADE 7
STRAND: TECHNOLOGY

TOPIC: FOOD PRESERVATION

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Recognize and control the amount of water/pH/temperature in food preservation.	As above	Recognize and control the amount of water/pH/temperature in food preservation.	Resource books	Identification and control of variables.
Take a sample survey to determine the percentage of people in a community that eat foods preserved using a particular method (irradiation, ozonation, drying, boiling).	Methods of preservation used in common foods and beverages indicated on labels.	As a group, prepare and administer sample survey, collect and analyse data. Compute the percentage.	Survey questionnaire	Correct calculations.
Read food labels for information on use of additives (for preservation).	Methods of food preservations additives – salt etc.	Read and note methods of food preservation and additives to improve shelf-life on food labels of common foods.	Variety of food labels	List of identified foods and their additives for preservation.

SCOPE OF WORK
GRADE 8
STRAND: LIVING THINGS

TOPIC: CLASSIFICATION **DURATION: 3 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Use a dichotomous key to classify living things into taxonomic groups.	Linnaean taxonomy is a system of classification that divides all living things into hierarchical groups based on their characteristics.	Create dichotomous keys to organize characteristics of organisms for classification. Use the dichotomous key to classify living things.	*Science For Junior High* 2nd Edition Worksheet on Linnaeus classification system	Worksheet Assessment. Appropriate keys, characteristics correct classification.
Use the Linnaeus System to classify an organism.	Living things are divided into large groups, the groups are then divided into smaller groups and so on until the smallest group has only one "kind" of organism.	Work in groups to classify a common organism (domestic cat, man, ground spider) as far as possible into: kingdom, phylum, class, order, family, genus, species. Make a poster to illustrate the classification of the organism.	*Biology For Life*	Rubric for assessing visual aids.
Demonstrate the relationships of the seven groupings in the Linnaeus System of classification.	The Linnaean taxonomy hierarchy from largest to smallest: 1. kingdom 2. phylum 3. class 4. order 5. family 6. genus 7. species	Worksheet on classifying animals.	*Integrated Science for Caribbean Schools* Bk. 1	Correct classification.
Describe the relationship between several species of the same genus.	Definitions of genus and species. A species is a group of organisms that closely resemble each other physically, behaviorally and internally. They usually mate among themselves and produce fertile offspring. Features of some species in a genus are very similar. However, inbreeding will not produce fertile offspring.	Research a given genus and describe the common features of several species within this genus.	*Science For Junior High* 2nd Edition	Rubric for assessing research.
Critically assess the value of the Binomial System.	It is systematic method of classifying all organisms. It assists Biologists in understanding organisms based on their close relatives.	Class discussion. Research the importance of the Binomial System.	Biology resource books	Advantage(s) of the Binomial System.

SCOPE OF WORK
GRADE 8
STRAND: LIVING THINGS

TOPIC: CRAB **DURATION: 5 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Observe the characteristic markings of the crab.	The land crabs, *Cardisoma guanhumi* are terrestrial and return to the sea only to drink or breed. The body is protected by a smooth carapace, consists of a cephalothorax and abdomen. Connected to its cephalothorax are five pairs of appendages covered with tactile setae (hair). At its front are two pairs of antennae and two pincers, one larger than the other.	Make markings on a diagram of the crab.	Diagram of the land crab.	Worksheet with diagram of the crab. Accuracy of markings.
Identify organisms belonging to the "crab" family.	Hermit crabs, blue land crabs/ white land crabs and black land crabs, are all related.	Presentation on related organisms.	Pictures of land crabs. Worksheet with a varied types of crabs.	rubric for assessing visual aids.
Compare the movement and speed of the land crab with another type of arthropod.		Compare the movement and speed of the land crab with another type of arthropod.	Crabs, cockroaches, woodlice	Description of movement and relative speed of organisms.
Use a ruler to measure the width of a model crab.		Measure the width of a model crab and its claw span in cm.	Ruler, measuring tape	Accuracy of measurements.
Use measurements to draw a crab 50% of its size.		Use width measurement (above) and length of carapace in cm. to draw a crab 50% of its size.		Diagram drawn accurately.
Use a balance to measure the weight of a crab.		Measure the weight of a crab.	Balance, adult crab or a life-size model of a crab	Accuracy of measurement.
Observe diagrams of the life history of the crab.	Once hatched *C. guanhumi* molts through five larval periods before it undergoes metamorphosis into the stage when the appendages first appear. The next metamorphosis produces the juvenile crab, which closely resembles the adult form.	Observe diagram of the life history of the crab.	Chart on the life cycle of the crab – Nature Conservancy	Identification of stages in the life history of the crab.

SCOPE OF WORK
GRADE 8
STRAND: LIVING THINGS

TOPIC: CRAB

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Observe diagrams of the life history of the crab.	Each metamorphosis is accompanied by a molting of the cuticle. The following molt, named the puberty molt, precedes full sexual maturation. Molting regulates the life cycle of the crab.	Observe diagram of the life history of the crab. Describe the Life History of the crab.	Chart on the life cycle of the crab Animal diversity web (http://animaldiversity.ummz.umich.edu) *Mystical Cat Island* by Eric Moncur Worksheet with diagrams of the Life History of the crab.	Worksheet – Description of the life history of the white crab.
Observe differences in gender of the Land Crab.	In adults, the sexes can be distinguished by abdominal shape. The female abdomen widens becoming triangular in shape and then semi-elliptical. The male's abdomen is narrower.	Observe differences in gender.	Male and female adult crabs, diagrams, models or photographs of adult crabs.	Description of the differences in gender – worksheet.
Make a model of a land crab.		Make a model of a crab.	Male and female adult crabs, diagrams or photographs of adult crabs.	Rubric for assessing a model.
Design a pen for land crabs.		With specifications design a pen for crabs.		Rubric for assessing a model or product.
Make an oral presentation (with visual aids) to describe the life history of the crab.	As above	Oral presentation on the life history of the crab.	Diagrams, pictures or models of land crab, poster of the life history.	Rubric for assesing oral presentation.
Use features of a land crab to determine whether it is ready to spawn.	Females gain substantial weight. After fertilization, females carry their eggs on their backs for approximately two weeks. At this point, the eggs begin to hatch, and she shakes them off into the ocean.	Observe photographs of adult female crabs to determine whether a crab is ready to spawn.	Animal diversity web (http://animaldiversity.ummz.umich.edu)	Identification of "berried" crabs.

SCOPE OF WORK
GRADE 8
STRAND: LIVING THINGS

TOPIC: CRAB

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Use features of the crab to determine whether it is a juvenile.	As a juvenile, it is typically tan or brown in color with orange legs. As an adult, its coloring ranges from blue to violet, though some females are white or ashy gray.	Compare features of juveniles and adults.	Diagram of the land crab, pictures of land crab.	Identification of juvenile crabs with correct reasons given.
Recognize the relationship between the colours and external features of the crab to its environment.		Observation of colours and external features of the crab and its habitat.	Pictures of land crabs in natural habitats.	Description of the colouration of the crab and blending with the environment in its natural habitat.
Make an oral presentation with visual aids to describe the habitat of the crab.	The crab spends most of its time in its burrow when not foraging or migrating to mate and spawn.	Oral presentation on the habitat of the crab, including burrows, soil type, vegetation and proximity to water.	Pictures of land crabs, pictures of crabs in habitat.	Rubric for assessing oral presentations.
Make a model (visual) of a food web including the crab.	Crabs fall prey to large birds, mammals, and other crabs but humans are the largest threat with respect to predation. They are omnivores and consume leaves, fruits, and grasses, but also feed on insects, carrion, and feces.	Model (visual) of food web.	Pictures, diagrams	Rubric for assessing a model.
Read articles on the effect of urban development on crab habitats.		Discuss articles read.	Articles from internet, books magazines etc.	Points made that show threats to crab populations posed by urbanization.
Write a short story to persuade residents of the importance in protecting the habitat of the white crab.		Write a short story.		Points made: threats to the habitats, economic importance of crabs, life history, importance to diversity and food webs.
Recognize the relationship between the rainy season and spawning of crabs.	Mating begins during the rainy season. Reproductive cycle heavily depends on the rainy season.	Describe the relationship between rainy season and spawning of crabs.	Notes on life cycle and behavior of white crabs.	Relationship clearly shown.

SCOPE OF WORK
GRADE 8
STRAND: LIVING THINGS

TOPIC: CRAB

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Formulate a hypothesis on the effect of a major decrease in rainfall on the population of crabs.	The reproductive cycle heavily depends on the rainy season; therefore a major decrease in rainfall will result in a decline in the population.	Formulate a hypothesis on the effect of a major decrease in rainfall on the population of crabs.	Notes on life cycle and behavior.	Hypothesis on the effect of a major decrease in rainfall on the population of crabs clearly stated with valid reasons.
Recognize the relationship between rate of reproduction, predation rate and survival of crabs.	Reproduction and the predictability of behavior (i.e. movement toward the sea to spawn during the rainy season could lead to over-harvesting and a decline in numbers.	Dramatic presentation to demonstrate that constant rate of reproduction with increase in predation would reduce the number of crabs that survive.	Notes on life cycle, reproduction and behavior of land crabs.	Rubric for assessing dramatic presentation. Relationship between rate of reproduction, predation rate and survival of crabs clearly shown.
Make predictions on the number of offspring produced and the number that survive to maturity from one crab.	Females carry their eggs (which can number anywhere between 20,000 and 1,200,000) many giant land crabs do not survive the larval stage as a result of predators and other factors. Therefore many offspring are produced in comparison to those who survive to full maturity.	Make predictions on the number of offspring produced and the number that survive to maturity from one crab.	Notes on life cycle, reproduction and behavior of land crabs.	Large number given as the number produced, a significantly smaller number given as the number that would survive.
Make predictions as to the crab population or habitats in 25 years should there be no restrictions on catch.	No restrictions on crab catch will result in over-harvesting and a decline in the crab population.	Make predictions as to the crab population or habitats in 25 years should there be no restrictions on catch.		A number far less than given in previous assessment.
Recognize the relationship between demand for crab meals and the rate of catching crabs.	The demand for crab meals will result in an increase in the rate of catching crabs.	Discuss the relationship between demand for crab meals and the rate of catching crabs.		Points raised during discussion: increase in human population, increase crab “dishes”, crab fest.

SCOPE OF WORK
GRADE 8
STRAND LIVING THINGS

TOPIC: CRAB

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Use statistics from studies of crab populations to draw conclusions on the effect of catching crabs on populations.		Draw conclusions on the effect of catching crabs on populations.	Statistics from Department of Marine Resources Or statistics from Department of Agriculture and Fisheries.	Conclusion clearly stated and based on data.
Recognize the relationship between the demand for crab and its price.	The higher the demand for crabs the more expensive the crab becomes.	Class discussion on the price of crabs on different islands, from vendors and prepared crab meals.	Statistics from Department of Marine Resources Or statistics from Department of Agriculture and Fisheries.	Relationship shown between the increase in demand for crab in markets away from the crab habitats and causes their price to increase.
Participate in a debate on the importance of observing the closed season for catching crab OR the economic importance of the crab outweighs the need to protect it.		Participate in a debate on the importance of observing the closed season for catching crab OR the economic importance of the crab outweighs the need to protect it.		Rubric for assessing debates.

SCOPE OF WORK
GRADE 8
STRAND: LIVING THINGS

TOPIC: NASSAU GROUPER **DURATION: 5 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Observe the characteristic markings of the Nassau Grouper.	The Nassau Grouper The Nassau Grouper -Scientific name *(Epinephelus striatus)* is a saltwater fish found in the tropics. It usually has five dark brown bands around its body, a black saddle-like patch near its tail fin, a dark streak running from its nose through its eye and a wide "tuning-fork" pattern on their forehead.	Observe and identify features of Nassau Grouper. Make markings on the diagram of the Nassau Grouper.	Diagram (Picture) of the Nassau Grouper The Nassau Grouper Fact Sheet: Prepared by the Dept. of Marine Resources © 2007	Worksheet with diagram of the Nassau Grouper – accuracy of markings.
Identify fish belonging to the "Grouper family".	The grouper family (serranadae) is very large in size and includes the yellow fin grouper, tiger grouper, black grouper, rock hind, Jew fish, gag and red grouper among many others.	Identify fish belonging to the "Grouper family".	Pictures/ sides of fish belonging to the "Grouper family".	Number of fish correctly identified as a part of the grouper family.
Measure the length of a model grouper in cm.		Measure the length of a model grouper in cm compare the length with maximum lengths recorded.	Ruler, measuring tape, adult grouper or model of the adult grouper.	Accurate measurements correctly recorded in cm.
Use measurements to draw a grouper 10% of its size.		Use measurements to draw a grouper 10% of its size.	Measurements of actual size.	Diagram drawn correctly.
Use a balance to measure the weight of grouper in kilogrammes.		Use a balance to measure the weight of a model grouper in kilogrammes.	Balance, life size model (or adult Nassau Grouper).	Accurate measurements correctly recorded in kg.

SCOPE OF WORK
GRADE 8
STRAND: LIVING THINGS

TOPIC: NASSAU GROUPER

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Observe diagrams showing the life history of the Nassau Grouper.	Eggs (1mm) hatch about 23-40 hours after fertilization. Juveniles float on currents, developing to a size of 1-1. 25 inches over 35-50 days during which they are carried by flood tides to nursery habitats. Early juveniles up to 10 months old settle to the bottom living in nursery areas such as creeks and inshore algal beds up to a length of 2 inches. At about 2" they move to shallow patch reefs until adulthood when they move to deeper reefs.	Observe diagrams of the life history of the Nassau Grouper. Describe the life history of the Nassau Grouper.	Diagram or chart of the life history of the Nassau Grouper **www.breef.org**	Oral description of the life history of the Nassau Grouper.
Make a model (Visual) of the life history of the Nassau Grouper.		Make a model (Visual) of the life history of the Nassau Grouper	Chart, diagram of the life history of the Nassau Grouper.	Rubric for assessing a model.
Make an oral presentation (with visual aids) to describe the life history of the Nassau Grouper.		Make an oral presentation (with visual aids) to describe the life history of the Nassau Grouper.	Chart of Nassau grouper, pictures of the Nassau grouper.	Rubric for assessing oral presentation.
Use features of the Grouper to determine whether it is a juvenile.	Juvenile Nassau Groupers are known to weigh less than three pounds and are approximately 120- 400 mm in length.	Identify fish as juvenile Nassau Groupers based on external features.	Slides of juvenile groupers.	Number of juvenile fish correctly identified.
Use features of a grouper to determine whether it is ready to spawn.	Groupers aggregate in large schools and undergo a colour change from olive to black on top and white underneath when ready to spawn.	Observe photograph of a grouper. Use features of the grouper observed to determine whether it is ready to spawn.	Video of Nassau grouper when it is spawning.	Conclusion formed with valid reasons based on features observed.

SCOPE OF WORK
GRADE 8
STRAND: LIVING THINGS

TOPIC: NASSAU GROUPER

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Make an oral presentation with visual aids to describe the habitat of the grouper.	The Nassau Grouper is most abundant in clear water with high relief coral reefs or rocky substrate. As adults, they are usually found near shallow, high relief coral reefs and rocky bottoms to depths of 90 meters.	Make an oral presentation with visual aids to describe the habitat of the grouper.	Diagram of the Nassau Grouper Fact Sheet: Dept. of Marine Resources © 2007	Rubric for assessing oral presentations.
Recognize the relationship between the colours and the external features of the grouper to its environment.	The colour pattern serves as camouflage for groupers.	Describe the colours and patterns of the natural environment of the grouper. Compare the relationship between the colours and external features of the grouper to those of its environment.	Pictures or slides of the Nassau Grouper in natural habitat during different stages of its life cycle.	Description showing a correlation which assists in camouflage.
Make a model (visual) of a food web including the Nassau Grouper.	As a carnivorous predator, the Nassau grouper has a diet that consists mainly of fish, shrimps, crabs, lobsters, and octopuses. It is preyed upon by larger fish sharks, humans.	Make a model (visual) of a food web including the Nassau Grouper.	Pictures, diagrams, plasticine, Styrofoam.	Rubric for assessing a model.
Describe the effects of climate change on reefs and by extension, grouper populations.		Read articles on the effects of climate change on reefs and by extension, grouper populations. Discussion on the effects of climate change on reefs and grouper populations.	Articles from scientific journals, internet, etc.	Points: global warming, increase in water temperature, some organisms die, corals die, reefs no longer have living organisms, groupers no longer survive in habitats.

SCOPE OF WORK
GRADE 8
STRAND: LIVING THINGS

TOPIC: NASSAU GROUPER

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Make predictions on the number of offspring produced and the number that mature to survival from one grouper.	Of the million or more eggs that are released by each female, less than 1% will survive long enough to grow into adults due to predation during the larval and juvenile stages, interruption of natural habitat, pollution, environmental and climatic changes.	Make predictions on the number of offspring produced and the number that mature to survival from one grouper.	Fact Sheet: Dept. of Marine Resources © 2007	Large number offered as the number of offspring produced and a much smaller number given as those surviving to adulthood.
Recognize the relationship between rate of reproduction, predation rate and survival of groupers.	If the Nassau Grouper continues to be overharvested the numbers will continue to decline as the rate of predation exceeds the rate of reproduction.	Dramatic presentation to demonstrate that constant rate of reproduction with increase in predation would reduce the number of groupers that survive.	Fact Sheet: Dept. of Marine Resources © 2007	Rubric for assessing dramatic presentation. Relationship between rate of reproduction, predation rate and survival of groupers clearly shown.
Design an activity to simulate grouper production and predation (including fishing).		Design an activity to simulate grouper production and predation (including fishing).		Demonstration of rate of production, rate of predation and rate of survival demonstrated in the activity.
Make predictions as to the grouper population or habitats in 25 years should there be no restrictions on fishing and should restrictions be enforced.	Should there be no restrictions on catching the Nassau Grouper the populations in 25 years will decrease due to overfishing because the grouper will be caught faster than it can reproduce to sustain the population.	Predict, with reasons, what will happen to the grouper population or habitats in 25 years should there be no restrictions on fishing and should restrictions be enforced.	Fact Sheet: Dept. of Marine Resources © 2007 Worksheet with columns comparing both scenarios.	A number far less than given in assessment (two) above for no restrictions. A number far greater for restrictions enforced. Valid, logical reasons stated.
Recognize the relationship between demand for grouper meals and the rate of fishing for groupers.	The demand for grouper meals will result in an increase in the rate of catching groupers.	Class discussion. Describe the relationship between demand for grouper meals and the rate of fishing for grouper.		Points include: increase in human population, increase in demand for grouper meals (home and restaurants, residents and tourists), poachers. Relationship clearly described.

SCOPE OF WORK
GRADE 8
STRAND: LIVING THINGS

TOPIC: NASSAU GROUPER

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Use statistics from studies of Grouper populations to draw conclusions on the effect of fishing on populations.		Use statistics from studies of Grouper populations to draw conclusions on the effect of fishing on populations.	Statistics from the Department of Marine Resources	Clearly stated valid conclusion based on the statistics reviewed.
Construct graphs to show the catch of grouper over a five year- period.		Construct graphs to show the catch of grouper over a five year- period.	Statistics from the Department of Marine Resources	Rubric for assessing a bar graph/ chart.
Construct a graph to show the number of groupers or weight of groupers caught per month over a one-year period.		Construct a graph to show the number of groupers or weight of groupers caught per month over a one-year period.	Statistics from the Department of Marine Resources	Rubric for assessing a bar graph/ chart.
Recognize the relationship between demand for grouper and its price.	The higher the demand for the Nassau grouper, the more expensive it becomes.	Class discussion.		Points raised: difference in price on islands, vendors/markets, food dishes.
Formulate a hypothesis on the effect of increasing the food supply for groupers on their population.	Increasing the food for Nassau grouper will result in less competition among other predators for food and a better chance of survival.	Formulate a hypothesis on the effect of increasing the food supply for groupers on their population.		Logical, clearly stated hypothesis with supportive reasons.
Formulate a hypothesis on the effect of farming groupers in a marine protected area.	Marine reserves are designed to help protect the Nassau Grouper so that they can develop to full maturity and therefore reproduce to sustain the species. Farming groupers in these protected areas will result on a decline in numbers.	Formulate a hypothesis on the effect of farming groupers in a marine protected area.	Dept. of Marine Resources © 2007	Logical, clearly stated hypothesis with supportive reasons.

SCOPE OF WORK
GRADE 8
STRAND: LIVING THINGS

TOPIC: NASSAU GROUPER

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Design and produce an infomercial to encourage students to become stewards of the grouper population.		Design and produce an infomercial to encourage students to become stewards of the grouper population.	Notes on the conservation of the Nassau Grouper	Rubric for assessing oral/visual presentations.
Produce an item to persuade fishermen to observe the restriction laws for fishing grouper.		Produce an item (news flash, comic strip, flyer, fishing item) to persuade fishermen to observe the restriction laws for fishing grouper.	Notes on the conservation of the Nassau Grouper	Rubric for assessing a visual aid/product.
Recognize the relationship between the closed season and the spawning of grouper.	The closed season for the Nassau Grouper is observed during the months when they spawn in aggregations. This allows them to reproduce uninterrupted resulting in an increase in numbers.	Explain the relationship between the closed season and the spawning of grouper.		Relationship clearly shown groupers reproduce (and the juveniles develop) is the same as the closed season to allow survival of offspring.
Advocate a particular law, method of catching or boosting grouper populations.		Write a letter to the Minister of Agriculture and Marine Resources advocating a particular law, method of catching or boosting grouper populations.	Notes on the conservation of the Nassau Grouper	Points include: populations of grouper, threats, methods of conservation, need for conservation. Persuasiveness and logical argument.
Present a case for the use of alternative fish (e.g. “rock fish”) in the grouper family for use instead of the Nassau Grouper.		Present a case for the use of alternative fish (e.g. “rock fish”) in the grouper family for use instead of the Nassau Grouper.	Statistics/ information from BREEF, or department of marine resources	Number of valid points included, logical argument.
Participate in a debate on the importance of observing the closed season for catching the grouper OR the economic importance of the grouper outweighs the need to protect it.		Participate in a debate on the importance of observing the closed season for catching the grouper OR the economic importance of the grouper outweighs the need to protect it.	Statistics/ information from BREEF, or Department of marine resources	Rubric for assessing oral presentations.

SCOPE OF WORK
GRADE 8
STRAND: MATTER

TOPIC: PERIODIC TABLE **DURATION: 6 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Compare subatomic particles in terms of mass and charge.	Charge: proton +1, electron -1, neutron 0, mass: proton 1, neutron 1, and electron 1/1836.	Compare the relative mass of electrons and protons by making 1836 dots in pencil to one in pen.	Paper, pen, pencil, Internet: school.discoveryeducation.com skoool.ie::junior cycle	Comparison of the relative mass of protons and electrons.
Recognize the relationship between the subatomic particles found in the nucleus and those in the orbit of an atom.	Neutrons and protons are found in the nucleus and have the same relative mass, electrons have negligible mass and are found in orbits around the nucleus.	Compare the relative mass and charge of the nucleons and the electrons.	Diagrams or tables of atomic compositions Internet: Skoool.ie::junior cycle school.discoveryeducation.com	Relationship clearly stated.
Make a diagram to show the electronic configuration of an atom.	Example: oxygen has 8 protons, 8 neutrons in the nucleus and 8 electrons = 2 in the inner orbit and 6 in the second orbit.	Make a diagram to show the electronic configuration of an atom.	Markers or colour pencils	Diagram showing correct number, relative positions and charge of protons, neutrons and electrons.
Discover the latest theories of the atom and the arrangement of its subatomic particles.		Conduct research as a class.	*Science for Junior High* Second Edition pages 83-84 Internet: Skoool.ie::junior cycle school.discoveryeducation.com	A recent theory of the atom structure simply stated.
Use correct chemical symbols to identify selected elements.	Definition – short form First 20 elements of periodic table (also Cu, Fe, Br, I, Zn, Hg, Pb, Ur) - name, symbol).	Make and play games matching name or picture of elements with chemical symbol.	Cue cards, student made games	Correct identification of symbols.
Classify elements into various groups on the Periodic Table.	Periodic table as a means of classifying elements according to characteristics. The periodic table is divided into groups (columns) and periods (rows).	Locate a symbol given the Group and Period reference. Identify the group for a given symbol. Identify the period for a given symbol.	Periodic tables Internet: skoool.ie::junior cycle	Correct location of periods and groups.

SCOPE OF WORK
GRADE 8
STRAND: MATTER

TOPIC: PERIODIC TABLE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Recognize and explain the relationship between elements in the same group/Family of the Periodic Table.	Elements in the same group are characterized by having the same number of electrons in the outermost orbit.	Make diagrams for atoms of given elements showing electrons in the outermost orbit.	Periodic tables Internet: skoool.ie::junior cycle	Diagrams showing outermost orbit for given atoms.
Classify elements as noble gases on the Periodic Table.	Elements in Group 8 are called noble or inert gases as they are nonreactive due to the presence of the complete (maximum) number of electrons in the outermost orbit.	Make diagrams for atoms of given elements showing electrons in the outermost orbit.	Periodic tables	Diagrams showing outermost orbit for given atoms.
Observe trends among elements in a group on the periodic table.	From top to bottom of a group, trend shows elements are less reactive (electrons in outermost orbit further from nucleus).	Observe diagrams showing the orbits and the electron in the outermost orbit for group 1.	Pictures/diagrams, periodic tables Internet: school.discoveryeducation.com	Relevant observations.
Classify elements into periods on the Periodic Table.	Elements in a period have the same outermost orbit (K, L, M, and N).	Identify the period for an element based on the outermost orbit of its atom.	Diagrams/pictures, periodic tables Internet: skoool.ie::junior cycle	Correct identification of periods.
Observe trends of elements in the same period (period 2) on the periodic table.	Successive elements across a period show an increase in the number of electrons in the outermost orbit.	Observe diagrams showing the electrons in the outermost orbits for elements in period 2.	Internet: skoool.ie::junior cycle school.discoveryeducation.com	Relevant observations made.
Recognize the relationship between the atomic structure and the position of the element in the Periodic Table.	The outermost named (letter) orbit determines the period, the number of electrons in that orbit and it determines the group.	Observe atomic structure diagrams for the first 20 elements.	Electronic configuration diagrams, *A New Certificate Chemistry* Chap: Periodicity	Relationships identified in matrix on worksheet.
Make predictions about the behavior of an element based on its position in the periodic table.	Elements in Groups 1, 2, 6 and 7 as well as elements in Periods 1, 2 and 3 tend to be more reactive.	Make predictions about the behavior of an element based on its position in the periodic table.	Periodic table, *A New Certificate Chemistry* Chap: Periodicity	Plausible predictions with reasons.

SCOPE OF WORK
GRADE 8
STRAND: MATTER

TOPIC: PERIODIC TABLE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Classify elements into metal and non-metal groups on the Periodic Table.	The periodic table is divided into two by a thickened zig-zag line. Non- metals are found to the right of this line and metals to the left.	Draw a zig-zag line to separate metals from non-metals on the Periodic Table.	Periodic Tables, *A New Certificate Chemistry* Chap: Periodicity Internet: skoool.ie::junior cycle	Correctly drawn line. Identification of metals and non-metals based on this zig-zag partition.
Use colour codes to identify metals, nonmetals and noble gases on the periodic table.	As above	Use colour codes to identify metals, nonmetals and noble gases on the periodic table.	Periodic Tables, *A New Certificate Chemistry* Chap: Periodicity Internet: skoool.ie::junior cycle	Three groups correctly identified by colours.

SCOPE OF WORK
GRADE 8
STRAND: MATTER

TOPIC: PHYSICAL & CHEMICAL PROPERTIES DURATION: 3 lessons

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Observe physical properties of common metals.	Metals are shiny, solid (except for mercury); are good heat and electrical conductors; are malleable; have high melting and boiling points.	Observe a variety of common metals and describe their characteristics.	Aluminium, copper, steel, silver, gold, lead, iron, metals heating source, hammer, 6 volts battery, wax, skoool.ie.junior cycle, *Science for Junior High* Second Edition	Valid observations.
Observe physical properties of common non-metals.	Non-metals usually are dull, granular; can be liquids, gases or solids; do not conduct heat or electricity well and have relatively low melting and boiling points.	Observe a variety of non-metals and describe characteristics.	Carbon, iodine, sulphur, chlorine, oxygen, heating source, 6volts battery, skoool.ie.junior cycle, *Science for Junior High* Second Edition	Valid observations.
Draw a conclusion about whether a material is metal or nonmetal based on its physical properties.	As above	Observe materials given and draw conclusions about whether the materials are metals or nonmetals based on their physical properties.	A variety of items/materials (metals and non-metals)	Correct conclusions.
Recognize and control factors that affect the physical properties of a substance.	Controlling temperature and concentration of a substance.	Plan and conduct an investigation to determine the effects of temperature and changes in concentration on the physical properties of a substance.	Heating source, cold water bath, wax, solute, beaker, thermometer	Plan, implementation of the experiment, lab report. Rubric
Plan and conduct an investigation to demonstrate the physical properties of a substance.	Physical properties include: state of matter, colour, texture, boiling point, melting point, conductivity, electrical conductivity, smell, freezing point.	By simple test and observations determine the colour, odour (do NOT inhale directly) texture, boiling point, melting point, conductivity, electrical, conductivity of selected substances.	Water, colourful plastics, copper wire, lead, salt water, beaker, heating source, 6 volt battery, freezer, scented substance, alcohol, thermometer, volt meter	Rubric for assessing investigations.
Plan and conduct an investigation to demonstrate the chemical properties of a substance.	pH, reaction with oxygen, reaction with acids, alkalis and water, flammability.	By simple tests (demonstrations) determine the pH; reactivity with acids, bases, water and oxygen and flammability of selected substance.	Water, hydrogen peroxide, alcohol, iron filings, acid, base, pH paper, beakers, heating source, paper	Rubric for assessing investigations.

SCOPE OF WORK
GRADE 8
STRAND: MATTER

TOPIC: MIXTURES & SOLUTIONS **DURATION: 7 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Use various household materials to make mixtures in the laboratory.	Define: mixture – two, or more, substances combined together that may be easily separated by physical means.	Make and/or separate simple mixtures using common materials.	Goggles, fruits, bowls, spoons, salt, water, mineral oil, cooking oil, black pepper, rice, flour, starch, iron filings, sulfur powder, tossed salad, conch salad, leaves, stones. *Science for Junior High* Second Edition Internet: skoool.ie::junior cycle	Worksheet – matrix, products of investigations.
Use various household materials to make solutions in the laboratory.	Define solution – two, or more, substances combined together that may not easily be separated by physical means. One substance (solute) completely dissolves (disappears) in the other substance (solvent).	Make simple solutions using common materials.	Lime juice, Kool-Aid, water, jello, alcohol, dye, sugar, salt, beakers, stirring rods, Internet: skoool.ie:: junior cycle, school.discoveryed ucation.com	Worksheet – matrix, products of investigations.
Plan and conduct an investigation to determine the solubility of a substance.	A substance's solubility in a second substance (usually a liquid) is a measure of how much of the first substance dissolves in the second. Definitions of: solute, solvent, solution, solubility, saturated, supersaturated.	Plan, conduct and record an investigation to determine the relative solubilities of substances in water.	One of: sugar, salt, copper sulphate, Kool-Aid and water; balance, beaker, stirring rod Internet: skoool.ie::junior cycle	Rubric for assessing investigations.
Predict the relative solubility of a solute in water.	Generally, crystals dissolve in water. Definitions for: aqueous, suspension.	Predict the level of solubility of a solute in a given solvent.	Selected previously (one of: sugar, flour, baking soda salt, copper sulphate, kool-aid and water); balance, beaker, stirrer	Plausible prediction.
Formulate a hypothesis on the effect of temperature on the solubility of a substance.		Formulate a hypothesis on the effect of temperature on the solubility of a substance.		Plausible hypothesis clearly stated.

SCOPE OF WORK
GRADE 8
STRAND: MATTER

TOPIC: MIXTURES & SOLUTIONS

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Recognize that factors such as temperature and concentration can affect the solubility of a solute.	As temperature is increased, solubility of a substance increases. As pressure increases the solubility of a gas increases. As the amount of solvent increases, the solubility of a substance increases.	Perform an investigation to show that temperature changes affect the solubility of a substance.	Sugar or salt, and water; balance, beaker, stirring rod, thermometer, graduated (measuring) cylinder	Rubric for assessing investigations.
Control variables when comparing solubility of substances.	Temperature, pressure, constant solvent, volume of solvent and the nature (form/appearance) of solvent are variables. Avoid conditions that increase/decrease solubility of a substance contrary to its intended state.	As above keeping pressure and volume of solvent constant.	As above	Variables identified and controlled during experiment.
Measure the weight of solute and volume of solvent when determining solubility.	Mass of solute and the volume of solvent used affect the solubility of the solute in the solvent.	Measure the weight of solute and volume of the solvent used when determining solubility in experiments above.	Triple beam balance, beakers, solute, solvent, stirring rod, graduated cylinder	Accuracy of measurements; correct and safe use of materials and balance, graduated cylinder and thermometer.
Record quantities of solute added to a solvent.	Mass is measured in grammes to (0.1g accuracy).	Record mass in gramme units for investigation above.		Recording of quantities of solute used with appropriate units.
Draw a conclusion on the solubility of a solute based on an investigation.	The larger the amount of solute dissolved in a solvent at a given temperature, the less soluble the solute becomes in that solvent.	A part of the experiment above.	As above	Valid conclusion based on the results obtained.

SCOPE OF WORK
GRADE 8
STRAND: MATTER

TOPIC: MIXTURES & SOLUTIONS

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Suggest reasons why mixtures like milk and "Pepto Bismol" are considered colloidal mixture and not solutions.	A substance which is suspended throughout the solvent giving it a homogeneous appearance forms a colloidal mixture. Although similar to a colloidal mixture, a suspension is less homogeneous mixture with larger more visible particles.	Observe milk and suggest reasons why it is termed a colloidal mixture.	Milk, test tube and a flashlight	Description of observations and reasonable suggestions given.
Classify solutions as concentrated, dilute, saturated and super saturated.	The amount of solute in a solvent is a measure of the concentration of the solution – the larger the amount of solute for a given volume of solvent, the greater the concentration of the solution. Dilute solutions have relatively little solute. Supersaturated solution has more solute than its normal solubility because one variable has been changed.	Classify a variety of solutions as concentrated, dilute, saturated and super saturated.	Starch, water, sugar, salt, beaker, heating source, stirrer, Kool-Aid, thermometer, Internet: skoool.ie:: junior cycle Worksheet with information given on solubilities, mass of solute and volume of solvent.	Valid classification based on observations recorded on worksheet matrix.
Conduct an experiment to dilute a liquid.	Increasing the amount of water in a solution of water and a known solute, will eventually cause the solution to become diluted. Correct techniques.	Conduct an experiment to dilute a solution.	beaker, stirrer, copper sulphate solution, soda, potassium permanganate solution, bicarbonate soda solution, or Kool Aid and water, beaker, stirrer	Rubric for assessing investigations.

SCOPE OF WORK
GRADE 8
STRAND: MATTER

TOPIC: MIXTURES & SOLUTIONS

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Plan and conduct an investigation to separate components of a mixture using filtration.	Filter paper has tiny pores and acts like a sieve letting smaller particles (filtrate) through and holding back larger ones (residue).	Plan, conduct and record an investigation to separate components of a mixture using filtration.	Mixtures of sand and water, sulphur and water, black pepper and water, chalk and water, filter funnel, filter paper, retort stand and clamp, beakers, stirrer, *Science for Junior High* Second Edition	Rubric for assessing investigations.
Use apparatus and materials to demonstrate filtration of a mixture.	Mixture is to be kept below the top of the filter paper during filtration to avoid contamination of the filtrate.	Correctly set up a filtration apparatus and make a mixture to be filtered for investigation above.	Mixtures of sulphur and water, black pepper and water, chalk and water, filter funnel, filter paper, retort stand and clamp, beakers, stirrer	Correct assembly of apparatus, correctly drawn and labeled diagram of apparatus.
Formulate a hypothesis on the effectiveness of filtration as a method of purification.	All particles or molecules smaller than the pore size of the paper can pass through (other salts and microbes).	Formulate a hypothesis on the effectiveness of filtration as a method of purification.		Plausible hypothesis given as a statement.
Use apparatus and materials to demonstrate the separation of a mixture by decantation.	Oil forms a layer on water. It is possible to carefully pour off the oil or let the water out.	Use a separating funnel or burette to let out water and retain oil.	Oil, water, dye, separating funnel or burette, *Science for Junior High* Second Edition	Correct and safe use of apparatus and materials.
Use apparatus and materials to show separation of a mixture using magnets.	A magnet attracts a magnetic material out of a mixture containing it.	Use apparatus and materials to show separation of a mixture using magnets.	Sulphur powder, iron filings, bar or horseshoe magnet. *Science For Junior High* Second Edition	Correct and safe use of apparatus and materials.
Plan and conduct an investigation to separate components of a mixture using evaporation.	The solvent having a lower boiling point than the solute, boils off leaving the solute.	Plan and conduct an investigation to separate components of a mixture using evaporation.	Salt, water, evaporating dish, beaker, heat source, tripod stand, hot water bath, *Science For Junior High* Second Edition	Rubric for assessing investigations.

SCOPE OF WORK
GRADE 8
STRAND: MATTER

TOPIC: MIXTURES & SOLUTIONS

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Use apparatus and materials to show separation of a mixture by evaporation.	Evaporation of water (water begins to evaporate at 212°F).	Correctly assemble the evaporation apparatus and correctly handle apparatus and materials.	Salt, water, evaporating dish, beaker, heat source, tripod stand, hot water bath, *Science for Junior High* Second Edition	Correct and safe use of apparatus and materials.
Use apparatus and materials to show separation of a mixture by chromatography.	Dyes differ in their relative weight and therefore move different distances during separation. The lighter ones move furthest away from the original spot.	Use apparatus and materials to show separation of a mixture by chromatography.	Chlorophyll extract, black ink, food colouring, filter paper, capillary tube, Petri dish, solvent – alcohol, *Science for Junior High* Second Edition	Correct and safe use of apparatus and materials.
Construct a bar graph to show the relative distances of the pigments separated by chromatography.	As for previous learner outcome.	Construct a bar graph to show the relative distances of the pigments separated by chromatography.	Square or graph paper, ruler, pencil	Graph showing distances of component dyes.
Plan and conduct an investigation to separate components of a mixture using distillation.	A solution containing components with different boiling points, may be separated into its components through distillation when each component attains its boiling point, it evaporates then condenses into a container.	Plan and conduct an investigation to separate components of a mixture using distillation.	Alcohol, water distillation apparatus, graduated cylinders, beakers, thermometer, alcohol base or water base mixtures, *Science For Junior High* Second Edition, *New Integrated Science For The Caribbean* Book 2	Rubric for assessing investigations.
Use apparatus and materials to show separation of a mixture by distillation.		Correctly assemble the apparatus and handle apparatus and materials.	As in previous learner outcome – a part of the same investigation.	Correct and safe use of materials and apparatus.
Take accurate measurements of the temperature at which liquid begins to evaporate during distillation.		Measures temperatures, observe boiling points.	As in previous learner outcome – a part of the same investigation.	Accuracy of measurements and recording of temperatures with correct units.

SCOPE OF WORK
GRADE 8
STRAND: MATTER

TOPIC: MIXTURES & SOLUTIONS

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Use knowledge of distillation to design model equipment for water purification or for beverage making.		Design model equipment for water purification or for beverage making.	Distillation apparatus or similar equipment included in design.	Plausible design with appropriate materials suggested.
Based on the end products from a given method of separation of mixtures, conclude what the substances were in the mixture that was used in the investigation.		Problem solving – conclude what mixture was used in this investigation based on the components retrieved and the method of separation used.	A red coloured powder dye, water and rice using filtration and distillation and evaporation End products from chromatography – yellow and blue Filtration – pollen and water	(logical steps in problem solving) plausible conclusion
Formulate a hypothesis suggesting the best method for separating a given mixture.	Filtration – different size particles, magnets – magnet material included, evaporation – solid residue required and solvent lost, distillation – all components of different boiling points (liquids) are collected separately, chromatography – separates dyes.	Formulate a hypothesis suggesting the best method for separating a given mixture.	components for a mixture listed previously (do not use a mixture that has more than one solute or suspended substance)	Plausible hypothesis formed and clearly written.
Discover less conventional methods that are used for separating mixtures in the food preparation and construction industries.	Using sieves, centrifugation, hand sorting, electromagnetism, pouring off less dense substances, drainage, pressing (using a mechanical press).	Observe photographs or interview persons who work in local industries to find out about other methods of separating mixtures.	Photographs	Simple written description of another method of separating a mixture.
Use methods of separation to extract coconut oil.	Oils can be pressed from beans and nuts like coconuts using a mechanical press.	Use a press to extract oil from a coconut.	Oily coconuts, an oil extracting press	Performance and report of the separation exercise.

SCOPE OF WORK
GRADE 8
STRAND: MATTER

TOPIC: MIXTURES & SOLUTIONS

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Observe sublimation of iodine crystals.	Sublimation – change from a solid to gaseous state without a liquid phase because the melting and boiling points are very close.	Observe sublimation of iodine crystals.	Iodine crystals, boiling or test tubes, test tube holders, Bunsen burner	Description of observation.
Suggest reasons why water and a number of other chemicals do not undergo sublimation under laboratory conditions.	Sublimation – change from a solid to gaseous state without a liquid phase because the melting and boiling points are very close.	Brainstorm and record suggested reasons.	A list of substances that can sublime under normal conditions, *Science for Junior High* Second Edition	Plausible reasons given.

SCOPE OF WORK
GRADE 8
STRAND: ENERGY AND FORCES

TOPIC: FORCES **DURATION: 6 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Identify SI units for mass.	The S.I. unit for mass is the kg. Mass is the amount of matter in a substance. The pull of gravity on mass is a force called weight. (**Mass and weight are not the same)** That mass in kg x 10 gives us the weight or force due to the earth's pull on the substance. e.g. a 2 kg bag of flour has a force of 2 x 10 = 20N	Convert the S.I. unit of mass to the S.I. unit of force. Name a place where the mass of a person may not affect their weight.	Worksheet	Correct conversions and units.
Demonstrate forces as push or pull.	Any force applied can be categorized as a push or a pull.	Use a variety of demonstrations e.g. tearing paper, moving book, tug-o-war.	Various articles to be manipulated	Demonstration of forces and identification of each as a push or pull.
Classify forces as push or pull.	There exists a variety of forces. Definitions for: friction, gravity, magnetism, air pressure, electrostatic and magnetic forces.	Classify each given force as push or pull.	Articles to demonstrate the various forms of forces	Correct classification.
Use S.I. units related to forces correctly.	The unit is written as N or Newton.	Tabulate information with correct S.I. unit for weight.	Worksheet	Correct form of writing the unit.
Observe and identify forces as they affect motion of objects.	As friction increases, motion decreases; as gravity increases, motion increases; as air pressure increases, movement decreases,; as water pressure increases, movement decreases.	In small groups conduct investigations to show the effect of forces on motion of objects. Observe and describe how each force affects the motion of an object.	Smooth, rough surface; magnets; 600 ml beaker, drinking straw	Written observations with matching effects of forces.

SCOPE OF WORK
GRADE 8
STRAND: ENERGY AND FORCES

TOPIC: FORCES

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Demonstrate Newton's three laws of motion.	Definitions of Newton's three laws of motion with examples of each. First Law – an object continues at rest or moves in uniform motion unless acted on by a force. Second Law – an object continues in the direction of the force and at a speed proportional to the force. Third Law – for every action there is an equal and opposite reaction.	Demonstrate Newton's laws of motion. Making a bottle rocket.	*General Science* (Silver Burdett)	Demonstration and written description of observations.
Make an oral presentation with visual aids to relate types of forces to examples and their usefulness.	Useful forces in the home, work place etc. Examples friction between breaks and wheel helps a vehicle to stop its motion, sharpening a knife, wind pressure for windmills to produce electricity, gravity keeps things on earth, water pressure used in reservoirs.	Possible examples: skating, turning a dynamo, scratching a match, sandpaper.		Rubric for assessing oral presentations.
Make a model of an instrument that measures force.	Force can be measured as resistance offered. The greater the force applied, the greater the length of extension (coil or rubber).	Make a simple spring balance and use it to take sample measurements.	$^{3}/_{4}$ PVC pipe, ½ wooden spindle, rubber band	Rubric for assessing models.
Use apparatus to demonstrate pressure.	Pressure is the force exerted on a unit area of a surface. Pressure used in everyday life. Pressure = Force / Area It is more painful to be stepped on by a woman's stiletto heel than a broad square heel	Dropping pencil into water point first and then, pencil flat on side. Compare water pouring through top bottom and middle holes of a plastic bottle or jar with cover on and with cover off. Crushing can experiment.	*Physics for the Caribbean*	Rubric for assessing investigations.

SCOPE OF WORK
GRADE 8
STRAND: ENERGY AND FORCES

TOPIC: FORCES

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Use formula to calculate energy converted when work is done.	Energy converted = work done (Work = Force applied x Distance moved)	Solve various problems to find Work done.	Worksheet *Science For Junior High* 2nd Edition	Correct processing data; correct answers and units.
Change the subject of the work formula to calculate Force and Distance.	(Work = Force applied x Distance moved) Force applied = Work done / Distance moved Distanced moved = Work done / Force applied	Solve various problems. Calculate an individual's energy output after walking a distance.	As above	Correct processing data; correct answers and units.
Explain information on energy and forces given in a table.	Results of experiments are tabulated for ease of reference.	Provide written explanations of data on energy and forces provided in a matrix.	Worksheet with information tables	Clearly stated correct explanations written.
Read and interpret graphs showing energy and forces.	Results of experiments can be expressed in various graph forms for ease of reference and analysis.	Provide written explanations of data on energy and forces provided on graphs.	Various graphs: bar, line, pie.	Clearly stated correct explanations written.

SCOPE OF WORK
GRADE 8
STRAND: ENERGY AND FORCES

TOPIC: MACHINES **DURATION: 6 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Describe the role of a machine.	A machine is a device that makes work easier. This may be done by multiplying the effort or changing the direction of the force.	Lift a 2 kg weight, use a fixed pulley to lift it, then use a movable pulley to lift it.	Weights, fixed and movable pulleys	Simple comparison of the observed ease of moving the 2 kg weight in each of the three scenarios.
Write a pneumonic device to distinguish between the three classes of levers.	EFL 1^{ST} , ELF 2^{ND} , LEF 3^{RD}	Write a pneumonic device to distinguish between the three classes of levers.		Pneumonic device.
Manipulate models of levers to show three classes.	1^{st}, 2^{nd}, 3^{rd}, class levers	Make sketches to represent the three classes.	Stick/ half-metre ruler, eraser (fulcrum)	Demonstration of each of three classes of levers.
Observe differences between the three classes of levers.	Classes differ depending on the position of the effort, load and fulcrum EFL 1^{ST} , ELF 2^{ND} , LEF 3^{RD}.	Record the name of the lever and the position of F, L, E in each case.	A variety of levers Diagrams showing the position of (FLE) in first, second and third class levers	Clearly stated differences in reference to diagrams (worksheet).
Classify examples of levers from given photographs / diagrams.	Crow bar – 1^{st} class; wheel barrow – 2^{nd} class; hammer – 3^{rd} class.	Classifying each lever as 1^{st}, 2^{nd}, or 3^{rd} class.	Charts and photographs nutcracker, knife, sea saw, scissors, tweezers, tongs	Number of levers correctly identified.
Recognize the relationship between the lengths of the effort arm and resistance arms to the Mechanical Advantage.	Mechanical advantage is a measure of how much a machine multiplies the effort (distance or force) to make the task easier.	Calculate M.A. using different lengths of effort arm and load arm M.A of lever = Length of effort arm Length of load arm	Various levers with different length effort arms and resistance arms.	Based on calculations, clearly stated relationship between the lengths of the effort arm and resistance arm to the Mechanical Advantage.
Use a fixed and movable pulley to determine the relative advantage of one to the other.	A fixed pulley has a M.A. of 1, while a moving pulley has a M.A. of 2 Definitions of fixed and movable pulleys.	Manipulate fixed and movable pulleys attached to spring balance and pulling up equal loads. Record and compare reading on spring balance in each case.	Fixed and movable pulleys *General Science* (Silver Burdett) *Science For Junior High* 2^{nd} Edition	Correct and safe use of apparatus Clearly written comparison of advantages.

SCOPE OF WORK
GRADE 8
STRAND: ENERGY AND FORCES

TOPIC: MACHINES

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Design and conduct an investigation into using less force to effect movement of a larger load.	Because machines can multiply force, they enable us to use a small force called effort to overcome a larger force (load), and thus move that load.	Writing up plan. Use force measurer in 1. lifting load onto a table 2. dragging load up inclined plane on to the table. Compare the force used and energy converted in both cases.	*First Physics Course*	Rubric for assessing investigations.
Recognize that a screw is a spiral inclined plane.	The side view of a screw shows rows of inclined planes.	Observe the screw from the side and make inclined step-like sketch. Cut a right angle triangle piece of paper, colour the hypotenuse, wrap the paper around a pencil of cylindrical object.	Screw, pencil, plastic right angle triangle (geometry set), coloured markers *General Science* (Silver Burdett)	Clear description of the relationship between an inclined plane and a screw.
Determine which simple machine will be most effective for given jobs.	More than one machine may be able to do a particular job, but only one will be most effective.	Brainstorming as a class. Manipulating and/or comparing simple machines with relevance to job e.g. moving a bucket up a ramp or via a pulley to a third floor on a construction site; ripping a piece of paper by using a pencil point or the (broadside) end of a ruler.	Variety of simple machines.	Type of machine correctly identified and reason(s) given.
Write a poem or song to differentiate between simple and complex machines including examples.	A machine is a device which makes work easier. It can change speed, direction or amount of force. A simple machine is any of the six devices on which other machines are based e.g. lever, pulley, screw, inclined plane, wedge, wheel and axle. A complex machine is a machine made up of two or more simple machines e.g. bicycle, and engines.	Write a poem or song to differentiate between simple and complex machines including examples.	Textbooks and resource books	Rubric for assessing oral presentations.

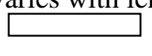
SCOPE OF WORK
GRADE 8
STRAND: ENERGY AND FORCES

TOPIC: SOUND **DURATION: 4 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Use bell jar and alarm clock to show that sound needs matter for its transmission.	Sound cannot travel in vacuum because there is no matter to vibrate. Sound needs matter to vibrate and travel. Without this sound cannot be heard.	Demonstration – as air is pumped from bell jar, sound of alarm gets weaker and is not heard while the clock is still vibrating (ringing). Write an experimental report.	Bell jar, alarm clock with bells on top, vacuum pump	Experimental report.
Use tuning fork, string and cup telephone, and other relevant materials and apparatus to demonstrate that vibrations produce sound.	Sound is a form of energy that results from the vibration of particles. It is energy you can hear. Most sound waves are longitudinal.	Manipulating tuning fork, string-cup-phone, and observing and recording results. Blow across candy wrapper – produce sound.	String-cup-phone, tuning fork, trough with water.	Use apparatus or materials to make audible sound.
Plan and conduct an experiment to show that sound is caused by vibrations.	Vibrations in tuning fork cause sound.	Plan and conduct experiment. Use a thin piece of wire and wrap around a prong of a tuning fork (near the end) leaving a 3 cm. piece extending upward. Strike fork with hammer.	Thin wire approximately 7 cm, tuning fork and tuning hammer.	Rubrics for assessing investigations.
Plan an investigation to determine which material allows sound to pass through fastest.	Sound is transmitted as sound waves through matter in any state. Sound travels fastest through solids and slowest through air because of the distance of particles from each other in each state. Sound travels at 330m/s in air at STP.	Plan and conduct experiment in small groups.	Various materials Bench/desk top, large glass water tank or bucket. Source of sound stop watch.	Rubrics for assessing investigations.
Relate the difference in sounds to difference in characteristics.	The three characteristics of sound are quality, loudness, and pitch. Two sounds can have the same loudness and frequency but still sound different because of quality.	Worksheet Identify and compare sounds.	*General Science* – Silver Burdett Recorded sounds	Sounds classified as loud or soft; high or low pitched; same note different quality – played on different musical instruments.

SCOPE OF WORK
GRADE 8
STRAND: ENERGY AND FORCES

TOPIC: SOUND

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Based on length of air tube predict which wind instrument will have the highest pitch.	The longer the tube of air, the lower the pitch. This is the reason why trumpets have a higher pitch than trombones.	Investigate sounds made by various wind instruments. Fill three test tubes with water to different levels and leave a fourth one empty. Blow into each to see which gives a sound with the highest pitch.	Wind instruments Test tubes with water	Accuracy of prediction compared with results of investigation.
Recognize and control variables when testing for sound pitch.	Pitch varies with length and thickness. E.g.  Same length of strings different thinness. The thinner string has the higher pitch. Pitch varies with length and thickness.	Construct model guitar. Investigate pitch in long and short, thick and thin strings on model guitar.	Guitar strings of various thickness or lengths, metal wires, nails, wood	Rubric for assessing models (two of three variables kept constant: materials, length, thickness).
Recognize that sounds vary in loudness.	The amplitude of the sound wave causes loudness. Loudness is measured in decibels. There is a lower threshold and upper threshold for sound below which humans cannot hear and above which causes pain.	Class discussion.	Variety of materials:- some hard, some soft Tables with loudness of common sounds and the thresholds for human hearing	The threshold for human hearing correctly stated.
Research the latest information on the effects of loud noises to the human ears.	Loud noise tends to damage cells concerned with hearing. Damage ear drum.	Research information.	Internet	Rubric for conducting research.
Research the latest uses of sound in modern technology.	The use of ultra sound in viewing images of solid masses in the body (e.g. foetus and growths in the body).	Research information on ultra sound.	Text, internet	Rubric for conducting research.

SCOPE OF WORK
GRADE 8
STRAND: ECOLOGY

TOPIC: ENDANGERED SPECIES **DURATION: 5 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Identify local endangered animal species.	An endangered species population has been reduced to the point where it is in danger of extinction. Examples of endangered animal species in The Bahamas are Hawksbill turtles, Loggerhead turtles, Bahama hutias, iguanas, white crown pigeons, West Indian Flamingos, West Indian Whistling – Ducks, Bahamian Boa Constrictors.	Observe photographs and describe each animal.	*Science For Junior High* 2nd Edition by Nevillett Pearce Bahamas National Trust publications	Match names and photographs.
Identify local endangered plant species.	Rare orchids are examples of endangered plant species.	Observe photographs and describe each plant.	Bahamas National Trust publications	Correct identification of local endangered plant species.
Use data to predict whether given species will become endangered.		Use a table that includes the population of various popular local species (plant or animal) during the past 20 years. Predict whether any species will become endangered.	Bahamas National Trust and Department of Marine Resources publications. A table	Plausible prediction with reasons.
Make a presentation on two local endangered species.		In small groups, select and conduct research on two local endangered species.	Bahamas National Trust publications	Rubric for assessing oral/visual presentations.

SCOPE OF WORK
GRADE 8
STRAND: ECOLOGY

TOPIC: ENDANGERED SPECIES

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Make a presentation on the need for conservation measures for one of the endangered species.	Conservation Methods 1. Protection by law e.g. crawfish closed season April 1 to July 31. 2. Establishment of national parks and marine reserves to protect endangered species. 3. Prevent pollution of the air, water and land.	Conduct research on the status of one endangered species. Prepare a presentation on the need for conservation measures for the endangered species researched.	Bahamas National Trust publications *Science For Junior High* 2nd Edition by Nevillett Pearce	Rubrics for assessing oral/visual presentations.
Use a skit to demonstrate the life of an endangered species.	Habitat, life history, food habits, challenges (predators if any).	Role playing.	Bahamas National Trust publications	Rubrics for assessing oral/visual presentations.
Describe the effect of urbanization growth on small populations of species.	As a result of urbanization growth, the habitat of small populations of species will be destroyed. This would lead to a decrease in their population.	Class discussion: pine forest, swamps, sandy shorelines (beaches) using local examples.		Effects of urbanization clearly described.
Describe the role of over-harvesting/ over-fishing in increasing the number of endangered species.	Rate of harvesting is greater than the survival and maturation of juveniles to reproductive adults, the population decreases. Over-harvesting/ over – fishing leads to an increase in the number of endangered species.	Game – bag containing a specified number (20) of clothespins. Every five minutes a certain number (5) of pins are added (new adults), every minute a specific number (3) of pins are removed representing fishing/harvesting.	*Science For Junior High* 2nd Edition by Nevillett Pearce	The role of over-harvesting/ over-fishing in increasing the number of endangered species clearly described.

SCOPE OF WORK
GRADE 8
STRAND: ECOLOGY

TOPIC: ENDANGERED SPECIES

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Predict the change in population of a local food that is in high demand over the next ten years.	If there is no control of harvesting and replenishing high demand foods, the population of these foods will decrease appreciably in the next ten years. Hence these organisms that are used for food would become scarce. Examples are conch, grouper, pineapples	Small group discussions. Predict the change in population of a local food that is in high demand over the next ten years.	Data on populations	Plausible prediction with reasons.
Predict the change in population of an endangered and protected species over the next ten years.	The population of the endangered and protected species will increase appreciably during the next ten years.	Small group discussions. Predict the change in population of an endangered and protected species over the next ten years.	Data on populations	Plausible prediction with reasons.
Calculate the rate of decrease in population of a species that is over-fished or over-harvested.	Calculate rate.	Use data on the population decrease of a species that is over-fished over a period and calculate the rate of decrease in population.	Data on population decrease of a species that is over-fished over a given number (10) of years.	Correct process used in calculations.
Calculate the average rate of increase in population of a species that is protected.	Calculate rate.	Use data on the population increase of a species that is protected over a period and to calculate the rate of increase in population per year.	Data on population increase of a species that is protected over a given number (10) of years.	Correct process used in calculations.
Design an assimilated investigation to show the effect of over-fishing on an endangered local species.	Add fixed number of items to container (e.g. 5 every 10 minutes). Use fishing gear to extract as many items while fishing for 10 seconds every minute.	Design an assimilated investigation to show the effect of over-fishing on an endangered local species. Research	“hook, line”, container, bottle covers or magnet, paper clips, or pieces of paper, stick, glue	Rubric for assessing investigations and creativity.

SCOPE OF WORK
GRADE 8
STRAND: ECOLOGY

TOPIC: ENDANGERED SPECIES

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Refrain from eating protected species except during the legal season.	The closed season for the lobster is April 1 to July 31 in The Bahamas; the closed season for grouper (December to February) is announced annually.	Refrain from eating protected species except during the legal season.		Long-term behavior.
Advocate peers, relatives or the community to practice conservation measures to protect small population species.	The success of conservation efforts depends on the support of people.	Host a forum or prepare a comic strip drama or prepare a pamphlet/brochure flyer soliciting the support of peers, relatives or the community to practice conservation measures to protect small population species.		Medium used and the promotion advocacy. Rubric for assessing oral/visual presentations.
Find out two species that have become extinct in the past ten years.	When all organisms of a species have died, the species is termed extinct.	Conduct research to find out two species that have become extinct in the past ten years. Write an infomercial about them.	Internet	Rubric for assessing research and oral presentation.
Find out about two species that have become endangered in North, Central or South America in the past five years.		Conduct research to find out two species that have become endangered in the past ten years. Write an infomercial about them.	Internet	Rubric for assessing research and oral presentation.
Justify the need for biodiversity to be kept.	Biodiversity is the term used to describe a wide variety of species occupying a certain habitat. Every organism has its own intrinsic value.	Discussion – should any organisms be made extinct? Does every organism have a value?		Justification given for the need for biodiversity. Number of points made, convincing argument.

SCOPE OF WORK
GRADE 8
STRAND: ECOLOGY

TOPIC: CARBON **DURATION: 10 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Use a crucible or tongs to roast seeds.	Organic matter when roasted turns black indicating the presence of carbon.	Students bring seeds, e.g. peas. They will measure the mass of about five seeds, roast them in a crucible and observe the change that occurred.	Peas, peanuts (raw, shelled) crucible, tongs, Bunsen burner.	Rubric for assessing correct and safe use of equipment and materials. Accuracy in measuring mass.
Explain the differences between a blue and yellow/red flame.	Blue flame: Very hot, forms no soot, can be noisy, has three zones, steady flame. Carbon is completely burnt. Yellow flame: Not hot, forms soot, quiet, four zones, unsteady flame. Unburnt carbon glows yellow.	Use Bunsen burner to show differences between blue and yellow flames.	*Science For Junior High* 2nd Edition by Nevillett Pearce	Description of the difference between blue and yellow/red flames.
Observe soot.	Soot is a form of carbon formed.	Students will use a yellow flame to heat water in a beaker and observe the soot on the beaker.	Bunsen burner, tripod, wire gauze, beaker, water	Record observations.
Design a filter to remove unburnt carbon (soot).		Design a filter to remove soot.	Internet	Rubric for assessing designs/models.
Find out three points of interest about graphite and five on diamond.	Points listed may be related to physical properties and uses of graphite and diamond. Colour, hardness, source (where found) time to form.	Conduct research to find out three points of interest about graphite and five on diamond.	Chemistry resource books, Internet	Number and accuracy of points of interest for each of the two forms of carbon.
Evaluate the importance of bacteria in the carbon cycle.	When organisms die the carbon compounds in their remains are broken down by decomposers e.g. bacteria. Carbon dioxide is released to the atmosphere. Hence, carbon dioxide is recycled in the ecosystem.	Group discussion - What would be the effect on the Carbon Cycle if all bacteria were killed? Evaluate the importance of bacteria in the carbon cycle.	Carbon cycle poster or diagrams	Paragraph evaluating the importance of bacteria to the Carbon Cycle.

SCOPE OF WORK
GRADE 8
STRAND: ECOLOGY

TOPIC: CARBON CYCLE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Advocate limiting the amount of trees that are removed from an area and conservation of green spaces.	Trees provide oxygen and remove carbon dioxide from the atmosphere. Removal of too many trees causes an increase in carbon dioxide in the atmosphere.	Prepare brochure/flyer. Host a meeting, write a song/rap for a target group.		Selection and use of medium to solicit the support of the target group. Long-term behavior.
Identify one factor that would interrupt the carbon cycle and state the long-term effects.	Deforestation – Definition	Identify one factor that would affect the carbon cycle and state the long-term effects.	*New Integrated Science for the Caribbean*, Second Edition by Lucy Durgadeen, Steve West & Eugenie Williams, Bk. 1	Valid factor identified and its long term effects stated.
Formulate a hypothesis on creating an oxygen – carbon dioxide balance in nature.	If the rate of removal of oxygen by respiration and its rate of replacement by photosynthesis is about the same. Similarly, if the rate of removal of carbon dioxide by photosynthesis and its rate of replacement by respiration is about the same.	Formulate a hypothesis on creating an oxygen – carbon dioxide balance in nature.	*Science For Junior High* 2nd Edition by Nevillett Pearce Carbon Cycle poster	Plausible hypothesis with reasons given.
Explain whether trees are more useful as oxygen producers or as carbon-dioxide absorbers.	During the day trees take in carbon dioxide for photosynthesis faster than they make it in respiration. In the night they give out carbon dioxide faster during respiration. They produce oxygen as a result of photosynthesis. Trees are useful for both reasons.	Group discussion. Write a paragraph explaining whether trees are more useful as oxygen producers or as carbon-dioxide absorbers.	*Balanced Science* 1 by Jones, Jones and Marchington 1	Written explanation.
Prepare recycled paper.	Used paper may be shredded, treated and re-processed.	Follow instructions to prepare recycled paper.	Internet	Rubric for assessing a product.

SCOPE OF WORK
GRADE 8
STRAND: ECOLOGY

TOPIC: CARBON CYCLE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Use apparatus and materials to prepare carbon dioxide.	Laboratory preparation of carbon dioxide. Carbon dioxide is prepared in the laboratory from the reaction between dilute hydrochloric acid and marble chips (a form of calcium carbonate).	Teacher will guide students in setting up the apparatus for the preparation of carbon dioxide.	Marble chips, dilute hydrochloric acid, water, round bottomed flask, thistle funnel, delivery tube, beehive shelf, gas jar, pneumatic trough	Rubric for assessing correct and safe use of equipment and materials.
Write an experimental report on an investigation to prepare carbon dioxide.	Laboratory preparation of carbon dioxide. Carbon dioxide is prepared in the laboratory from the reaction between dilute hydrochloric acid and marble chips (a form of calcium carbonate).	In groups, perform an experiment to prepare carbon dioxide.	*Science For Junior High* 2nd Edition by Nevillett Pearce	Lab report.
Use apparatus to test for carbon dioxide in air.	Tests for carbon dioxide 1. Carbon dioxide turns limewater milky (formation of calcium carbonate) 2. Carbon dioxide puts out a lighted splint. (carbon dioxide does not support combustion)	Perform test for carbon dioxide using limewater and/or a lighted splint.	*Science For Junior High* 2nd Edition by Nevillett Pearce	The test for carbon dioxide performed correctly. Rubric for assessing investigations.

SCOPE OF WORK
GRADE 8
STRAND: ECOLOGY

TOPIC: CARBON CYCLE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Draw conclusions on the presence of carbon dioxide based on the test for carbon dioxide.	Lime water become milky in the presence of carbon dioxide.	Small groups of students will prepare samples of carbon dioxide in test tubes by reacting various metal carbonates and hydrogencarbonates with dilute hydrochloric acid and dilute nitric acid. They will pour the gas in limewater in a test tube and draw conclusions based on their observations.	Limewater	Correct observation made that the limewater turned milky.
Write an experimental report on an investigation to demonstrate the presence of carbon dioxide.			*Science For Junior High* 2nd Edition by Nevillett Pearce	Lab report.
Make a presentation on the Carbon Cycle.	The carbon cycle is the pathway along which carbon travels in nature. Carbon dioxide in the air is the source of most of the carbon in living things.	Work in small groups and prepare a chart of the carbon cycle.	Diagram of the Carbon Cycle *Science For Junior High* 2nd Edition by Nevillett Pearce *New Integrated Science for the Caribbean* Book 2, Second Edition by Lucy Durgadeen, Steve West & Eugenie Williams, Bk. 1	Rubric for assessing visual presentations.
Make a model of the carbon cycle.		Work in small groups and make a model of the carbon cycle.		Rubric for assessing models.
Assess the economic and ecological factors in the selection of a main source of energy.	Coal is cheaper but produces soot (carbon) and carbon dioxide. Propane produces carbon dioxide, more expensive – less soot. Electricity cleaner but more expensive, carbon dioxide at the plant/production level.	Group discussion.	Internet	Group report with reasons. Number, accuracy, relevancy and sequencing of points.

SCOPE OF WORK
GRADE 8
STRAND: ECOLOGY

TOPIC: CARBON CYCLE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Explain the relationship between the emission of carbon dioxide and global warming.	Carbon dioxide is produced by the combustion of fossil fuels. The build up of carbon dioxide in the atmosphere in recent decades is causing global warming. The carbon dioxide behaves like the glass of a greenhouse. It lets the Sun's rays through to the earth's surface but stops heat from escaping. This causes the trapping of heat which results in global warming.	Field trip to a greenhouse or observe photographs of greenhouse.	*Balanced Science* 1 by Jones, Jones and Marchington 1	Written, clearly explained relationship between the emission of carbon dioxide and global warming.
Present points in a debate on the effects of carbon dioxide emissions on the greenhouse effect.	As above	A debate.	*Balanced Science* 1 by Jones, Jones and Marchington 1	Rubric for assessing oral presentations.
Design and conduct an investigation to determine the level of awareness of global warming in the community.	Familiarity with the term; identify causative agent; contributing factors; action persons should take to reduce rate; effects of global warming.	Conduct a survey using questionnaires and interviews.	Questionnaires (10 items) multiple choice	Rubric for assessing investigations.
Design and conduct an investigation to show the extent to which people are utilizing one safe practice to reduce carbon dioxide level in the atmosphere.	Stop burning trash. Regular servicing motor vehicles; use cars less frequently, plant trees; reduce use of electricity.	Conduct a survey using questionnaires and interviews.	Questionnaires (10 items) multiple choice	Rubric for assessing investigations.
Advocate peers, relatives or the community to practice energy conservation measures.	As above	Advocate for energy-saving measures to a target group through brochures, meetings, soap box etc.		Effective medium used to convey the message to the target group. Long-term behaviour.

SCOPE OF WORK
GRADE 8
STRAND: ECOLOGY

TOPIC: CARBON CYCLE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Advocate peers, relatives or the community to use renewable energy (solar).	As above	Advocate for energy-saving measures to a target group through brochures, meetings, soap box campaign etc.		Effective medium used to convey the message to the target group. Long-term behaviour.
Formulate a hypothesis on the effect of a mandatory decrease in the number of vehicles would have on the health of people on a densely populated island.	Vehicles release carbon dioxide into the atmosphere from burning fuel.	Formulate a hypothesis on the effect mandatory decrease in the number of vehicles would have on the health of people on a densely populated island.		Plausible hypothesis with reasons.

SCOPE OF WORK
GRADE 8
STRAND: ECOLOGY

TOPIC: CARBON DIOXIDE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Observe physical properties of carbon dioxide.	Properties of carbon dioxide 1. Colourless gas 2. Odourless gas 3. Denser than air 4. Slightly soluble in water	Observe physical properties of carbon dioxide during the experiment when it is prepared.		Physical properties of carbon dioxide correctly observed.
Observe chemical properties of carbon dioxide.	1. It does not support combustion. 2. It turns limewater milky. 3. It turns damp blue litmus paper pink as carbonic acid is a weak acid.	Perform tests and reactions to show chemical properties of carbon dioxide.	Burning splint Limewater Blue litmus paper.	Chemical properties of carbon dioxide correctly observed.
Relate common uses for carbon dioxide to its properties.	Uses of carbon dioxide 1. It is dissolved in water under pressure to make "fizzy" drinks. 2. In fire extinguishers. Dry ice. Carbon dioxide is easily changed to a solid called dry ice. It sublimes and is useful for cooling things.	List properties and match corresponding uses to each property.	*Science For Junior High* 2nd Edition by Nevillett Pearce	Uses correctly related to properties.
Design a fire extinguisher.	A container with a substance which easily puts out fire. Container must be easily accessed and content easily discharged.	Design a fire extinguisher.	Internet search	Rubric for assessing a product.

SCOPE OF WORK
GRADE 8
STRAND: ECOLOGY

TOPIC: AIR **DURATION: 2 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Use apparatus and materials to demonstrate air has weight.	Molecules of air give air its mass. The weight of air is due to the force of gravity acting on its mass.	Use apparatus and materials to show that air has weight.	Balloons, sticks, string, clamp and stand. *Science For Junior High* 2nd Edition by Nevillett Pearce	Rubric for assessing correct and safe use of apparatus along with conclusion. Rubric for assessing investigations.
Use apparatus and materials to demonstrate air occupies space.	Air occupies space – has volume.	Show that air occupies space. Blow air into inverted gas jar filled with water, air replaces water. OR: compare inflated and "empty" balloons.	Conical flask, rubber bung, thistle funnel, delivery tube, gas jar *Science For Junior High* 2nd Edition by Nevillett Pearce	Rubric for assessing correct and safe use of apparatus along with conclusion. Rubric for assessing investigations.
Use apparatus and materials to demonstrate air has mass.	Air has mass.	Show that air has mass.	Balloon, triple beam balance.	Rubric for assessing correct and safe use of apparatus along with conclusion. Rubric for assessing investigations.
Write experimental reports on investigations to demonstrate the properties of air.	Properties of air 1. Air is real 2. Air occupies space 3. Air has mass and weight 4. Air exerts pressure	Write a laboratory report.		Lab report.
Observe the physical properties of air.	Colourless, odourless, mass, weight, density	Observe physical properties of air.	*Science For Junior High* 2nd Edition by Nevillett Pearce	Correct observations made.
Construct pie and bar graphs to compare the percentage composition of gases in air.	**Composition of air** Nitrogen 78% Oxygen 21% Carbon dioxide 0.03-0.3% Noble gases 0.9-1.0% Water vapour varying quantities **Math skill** Pie charts and bar graphs.	Use a table showing the percentage composition by volume of the various gases in air. Draw a pie chart and a bar graph.	*Science For Junior High* 2nd Edition by Nevillett Pearce *New Integrated Science for the Caribbean* Book 2, Second Edition by Lucy Durgadeen, Steve West & Eugenie Williams, Bk. 1	Pie chart and bar graph correctly drawn.

SCOPE OF WORK
GRADE 8
STRAND: ECOLOGY

TOPIC: AIR

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Recognize the relationship between height above sea level and density of air.	Density of air decreases as altitude increases. Force of gravity is greatest near earth's surface therefore more air molecules are found there. As altitude increases, gravity decreases therefore less air molecules are present.	Class discussion. Recognize relationship.	Physics resource books	The relationship correctly and clearly stated.
Make a presentation to describe air.		In small groups make a presentation on the properties of air.	*Science For Junior High* 2nd Edition by Nevillett Pearce	Rubric for assessing oral presentations.

SCOPE OF WORK
GRADE 8
STRAND: ECOLOGY

TOPIC: OXYGEN **DURATION: 5 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Measure the weight and volume of substances used to prepare oxygen.		Use a balance and measuring cylinder to measure mass and volume respectively.	Balance and measuring cylinder	Mass and volume of substances measured to an accuracy of 0.1 g or 0.1 cm^3.
Use apparatus and materials to prepare oxygen.	Laboratory preparation of oxygen – potassium permanganate and manganese dioxide. Oxygen is prepared in the laboratory by the catalytic breakdown (decomposition) of hydrogen peroxide.	In groups, set up demonstration experiment. Teacher performs demonstration experiment.	*Science For Junior High* 2nd Edition by Nevillett Pearce Hydrogen peroxide, potassium permanganate, manganese(IV) oxide source of heat, gas jar, cover, pneumatic trough, delivery tube, water	Apparatus set up.
Demonstrate air-tight conditions.	Air contains oxygen in a significant proportion which would affect combustion. Vaseline applied around the place where the delivery tube fits into hole in rubber stopper and where the rubber stopper meets the neck of the flask, prevents gas from entering or escaping.	Seal possible places where air may enter. Select a small bottle and use a cork or rubber stopper to stopper it. Completely submerge it in an upright position in a large container containing water and observe if water will not enter the bottle.	Flat-bottom/conical flask, rubber stopper, petroleum gel (Vaseline).	Air-tight conditions demonstrated.
Explain the need for air-tight conditions in the preparation of oxygen.	Airtight conditions are precautions taken during an experiment to prevent air from passing through a container.	Group discussion. Explain the need for air-tight conditions in the experimental report.		Correct reasons given for air-tight conditions.
Use materials to test for oxygen.	Oxygen relights a glowing splint. It supports combustion.	Test for oxygen.	Splint, matches *Science For Junior High* 2nd Edition by Nevillett Pearce	Rubric for assessing correct and safe use of apparatus and materials.

SCOPE OF WORK
GRADE 8
STRAND: ECOLOGY

TOPIC: OXYGEN

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Observe the positive test for oxygen.	Glowing splint burns brightly indicating the gas is oxygen.	Observe and record the positive test for oxygen.	Splints	Written observations.
Write an experimental report on an investigation to demonstrate the presence of oxygen.		Write a laboratory report.		Experimental report.
Observe physical properties of oxygen.	Physical properties of oxygen 1. Colourless gas 2. Odourless gas 3. Slightly soluble in water. 4. Density of oxygen is slightly greater than density of air.	Observe properties of oxygen using sample collected.	Worksheet	Worksheet – details of observations.
Observe chemical properties of oxygen.	**Chemical properties of oxygen** Oxygen is a very reactive element and reacts with most elements forming oxides. Oxygen supports combustion. Oxygen will allow many substances to burn in it forming oxides.	Demonstration – heating various elements in oxygen.	*Science For Junior High* 2nd Edition by Nevillett Pearce Worksheet Sulphur, carbon (charcoal), magnesium, iron, sodium in oxygen using a gas jar and deflagrating spoon.	Worksheet – details of observations.
Design a gadget that might safely produce oxygen.	Reactants chamber, passage to collecting container, air-tight conditions.	Design a gadget.		Rubric for assessing models (design with main components, suggested dimensions and scale, materials).

SCOPE OF WORK
GRADE 8
STRAND: ECOLOGY

TOPIC: OXYGEN

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Relate common uses for oxygen to its properties.	Uses of oxygen 1. As a respiratory aid (combustion of food to produce energy). • in deep sea diving • in high altitude flying and climbing • in hospitals 2. Facilitates the burning of rocket fuels. 3. Welding and cutting metals	Draw a table with three columns. In the first column list properties of oxygen and in the second column state uses of oxygen third – state reason(s).	Worksheet	Worksheet – Correct matching to show the relationship between properties of oxygen and its uses.
Classify substances as combustible or non-combustible.	A combustible substance is one that burns in air or oxygen.	Classify substances given, e.g. wood, paper, plastic, iron, glass as combustible or non-combustible. Add 10 substances and classify.	Worksheet	Worksheet – Correct classification of substances.
Classify substances as oxides.	An oxide is a compounds of an element with oxygen. List oxides: magnesium oxide, copper (cuprous/cupric) oxide, sulphur dioxide, sulphur trioxide, calcium oxide, iron (ferrous/ferric) oxide.	Use information from previous activities (chemical properties, classification of compounds as combustible) to identify common oxides.	Chemistry resource books. Worksheet	Worksheet – Correct identification of oxides.

SCOPE OF WORK
GRADE 8
STRAND: ECOLOGY

TOPIC: SOIL **DURATION: 5 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Use apparatus to identify animals present in soil.	The soil is a habitat for many animals. Animals that live in the soil break down the plant and animal remains to produce nutrients which increase soil fertility.	Hold lamp over soil sample. Animals move away from light and into container. Transfer the soil to a sieve and shake it until the soil passes through the sieve. Identify the animals that remain in the sieve.	*Science For Junior High* 2nd Edition by Nevillett Pearce	Animals in soil identified by name or description.
Use sieves to separate different size soil particles.	Soil consists of particles of different sizes.	Experiment: Separate different size soil particles using sieves of different pore sizes using larger pores first. Use sieves with a range of mesh sizes.	Sieves and soil sample	Sieves used to separate at least three different size soil particles.
Use a ruler to measure the width of small stones/pebbles found in soil.		Measure width of pebbles/stones/ rock particles using a ruler. Record measurement to 0.05 cm. Comment on the activity.	Small pebbles/ small stones	Use of ruler, accuracy of measurement, unit included.
Classify soils based on particle size.	Soil is the upper layer of the earth's crust in which plants grow. Soil is composed of different sized particles. Soil particles: They are made up of sand (large particles), clay (small particles) and silt (medium particles).	Classify the soil according to the particle size of three samples previously sifted.	*Science For Junior High* 2nd Edition by Nevillett Pearce *New Integrated Science for the Caribbean* Book 2, Second Edition by Lucy Durgadeen, Steve West & Eugenie Williams, Bk. 3 Soil samples table with particle size and description of classes of soil.	Appropriate classification of soil samples.

SCOPE OF WORK
GRADE 8
STRAND: ECOLOGY

TOPIC: SOIL

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Design and conduct investigations to compare soil porosity.	The porosity of soil depends on the size of the soil particles. Soil with larger particles will have larger air spaces and allow water to pass through more quickly than soil with small particles.	Design and conduct investigations to compare soil porosity. Note the time when water first drips from each soil into the measuring cylinder.	*Science for Junior High Workbook* by Nevillett Pearce Three soil samples (different particle size), water, measuring cylinder, filter funnels, filter paper, stop watches/timer.	Rubric for assessing investigations.
Design and conduct investigations to compare drainage in different soils.	When water is added to a soil sample, the water passes through the air spaces. Soil with large air spaces will be more permeable than soil with small air spaces. Hence, more water will drain from soil with larger spaces than soils with small spaces.	Design and conduct investigations to compare drainage in different soils. After water has finished dripping from each soil, record the amount of water in each measuring cylinder.	*Science For Junior High* 2nd Edition by Nevillett Pearce Soil samples, water measuring cylinders, filter funnel, filter paper	Rubric for assessing investigations.
Recognize and control variables in experiments comparing drainage rates in soils.	Mass of soil and volume of water are fixed variables. They are kept constant.	Recognize and control variables in experiments comparing drainage rates in soils.		Variables controlled in experiment correctly indicated.
Measure volume of water and soil for experiments.		Use measuring cylinders to measure equal volumes of the soils. Use a measuring cylinder to measure equal volumes of water.	Measuring cylinders	Volume of water and soil measured accurately.
Use a stop watch to measure soil drainage.		Measure and record time taken for the water to begin to drain from each soil sample.	As above	Soil drainage rates measured and noted.
Measure time for water to drain from soil samples.		Measure time for water to stop draining from soil samples.	Soil sample, water & stop watch.	Time measured correctly.

SCOPE OF WORK
GRADE 8
STRAND: ECOLOGY

TOPIC: SOIL

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Calculate the drainage rate of soil samples.	Math skill.	Calculate drainage rate stating the unit, e.g. cm^3 of water /s.	*Science For Junior High* 2nd Edition by Nevillett Pearce	Correct process in calculation.
Draw a conclusion on the suitability of a soil for farming based on its drainage rate.	Soils with high drainage rates, e.g. sandy soils are not suitable for agriculture because leaching occurs as water passes through quickly carrying valuable nutrients with it. Clay soils retain water – poor drainage, easily become water-logged/swampy.	Draw a conclusion on the suitability of soils investigated, for farming based on its drainage rate determined from the results of experiments performed.	*Science For Junior High* 2nd Edition by Nevillett Pearce	Plausible conclusion drawn from the results of experiments.
Compare porosity of soil with the rate of drainage and leaching.	Porosity of soil As the porosity increases, the drainage and leaching rate also increases.	Write a statement to compare porosity of soils investigated, with the rate of drainage and leaching.		Written comparison correctly and clearly made.
Observe air displaced from a soil sample.	When Water moves into soil pores (spaces), it replaces air which is pushed out. This air rises as bubbles.	Place 100 ml soil in a 250 ml measuring cylinder. Slowly add 150 ml water. Observe air bubbles in the water. Record final volume of water in the measuring cylinder.	Measuring cylinder, soil beakers, *New Integrated Science for the Caribbean*, Second Edition by Lucy Durgadeen, Steve West & Eugenie Williams, Bk. 3	Air bubbles observed.
Calculate the percentage composition of air in a soil sample.	Volume of air = volume of soil + volume of water – final volume Percentage = vol air/vol soil x 100	Calculate the percentage composition of air in the soil sample.	Data from above.	Correct process in calculation.
Design and conduct an investigation to determine the percentage composition of water in a soil sample.	Heating to 100 °C causes water to evaporate from soil sample.	Design and conduct investigations to determine the percentage composition of water in a soil sample.	*New Integrated Science for the Caribbean*, Second Edition by Lucy Durgadeen, Steve West & Eugenie Williams, Bk. 3	Rubric for assessing investigation.

SCOPE OF WORK
GRADE 8
STRAND: ECOLOGY

TOPIC: SOIL

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Calculate the percentage composition of water in a soil sample.	Difference in weight of soil sample before heating and after cooling in dry environment = weight of water.	Use results from experiment to calculate the percentage composition of water in a soil sample. Weigh soil sample. Heat soil sample, cool in dry conditions. Weigh sample. Weight of water/weight of soil x 100.	*New Integrated Science for the Caribbean* Book 2, Second Edition by Lucy Durgadeen, Steve West & Eugenie Williams, Bk. 3	Calculation correctly performed.
Design and conduct investigations to compare pH in soils.	Soils can be classified as acidic, basic or neutral. The pH of a soil affects the plants which grow in it. The pH of a soil impacts agriculture.	Design and conduct investigations to compare pH in soils.	*New Integrated Science for the Caribbean* Book 2, Second Edition by Lucy Durgadeen, Steve West & Eugenie Williams, Bk. 3 Soil samples, water, beakers & universal indicator.	Rubric for assessing investigations.
Measure the pH of a soil sample.	The pH of Bahamian soil is generally slightly alkaline (limestone content).	Half fill a test tube with the soil. Add water and shake well. Test the liquid with Universal Indicator paper. Record the colour developed and determine the pH by comparing the colour with the the corresponding colour on the colour chart.	As above	Correct technique used to measure pH of soil sample.
Classify soils based on pH values.	As above.	Classify soil samples based on pH values in a table containing soils and their pH values.	Table with pH values.	Soil samples classified correctly based on their pH values.

SCOPE OF WORK
GRADE 8
STRAND: ECOLOGY

TOPIC: SOIL

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Make a model showing a soil profile from the parent rock upward.	A soil profile is the arrangement of soil layers from top to bottom The parent rock is at the bottom with large rocks, smaller ones, soil in successive layers upwards according to size. The order from top is humus, small clay particles, large clay particles, silt, sand, gravel.	Make a model of a soil profile. A project	*New Integrated Science for the Caribbean* Book 2, Second Edition by Lucy Durgadeen, Steve West & Eugenie Williams, Bk. 3 Different soil samples, water, measuring cylinder.	Rubric for assessing models.
Design and conduct an investigation to show sedimentation.	Sedimentation is the process by which matter, e.g. soil settles at the bottom of a liquid, e.g. water. The soil components separate according to their densities. The components with highest densities settle at the bottom and those with the lowest densities settle at the top.	Design and conduct an experiment to show sedimentation. Use a clear, transparent (glass) container/measuring cylinder. Place soil with mixed particle sizes to about 8 cm high. Add water to an additional 8 cm high. Share well. Allow particles to settle.	*New Integrated Science for the Caribbean* Book 2, Second Edition by Lucy Durgadeen, Steve West & Eugenie Williams, Bk. 3	Rubric for assessing models.
Observe the appearance of soil samples.		Observe the appearance of soil samples.	Various soil samples.	Colour of each soil sample observed correctly.
Classify soils based on colour.	Types of soils Clay soil – white, reddish/brown Sandy soil- white, yellow/brown Loam soil – contains humus which adds the black colour to soil. Colour depends on mineral content e.g. pink, black.	Observe the appearance of various types of soils. Classify soil samples and describe the soil(s) in each class.	Various soil samples.	Classification and criteria for classification match.

SCOPE OF WORK
GRADE 8
STRAND: ECOLOGY

TOPIC: SOIL

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Make an inference on the fertility of soil based on its colour.	Black coloured soils, e.g. loam soils are more fertile than light coloured soils e.g. sandy and clay soils. Black coloured soils contain humus which is partially or completely decayed plant and animal matter. Humus increases the fertility of the soil.	Class discussion of the presence of humus and natural fertilizers in soil. Make inferences on the fertility of the soil samples based on their colour.	Soil samples	Correct inferences drawn (with valid reasons).
Design and conduct investigations to compare the humus composition in soils.	In experiments performed to determine the composition of soil, humus floats since it is less dense than water.	Design and conduct investigations to compare the humus composition in soils.	*New Integrated Science for the Caribbean* Book 2, Second Edition by Lucy Durgadeen, Steve West & Eugenie Williams, Bk. 3 Measuring cylinder, soil water	Rubric for assessing investigations.
Use apparatus to determine the humus content of soil.		Use apparatus to determine the humus content of soils used in the previous experiment.	*Science For Junior High* 2nd Edition by Nevillett Pearce Beam balance & crucibles	Appropriate apparatus selected and used correctly and safely.

SCOPE OF WORK
GRADE 8
STRAND: ECOLOGY

TOPIC: SOIL

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Measure weight of soil and crucible for experiments.		Use a balance to measure mass of empty crucible and then the mass of the soil and crucible. Record the results.	Beam balance & crucibles	Mass of soil and crucible measured accurately using triple beam balance.
Calculate the percentage composition of humus in a soil sample.	Math skill Percentages	Calculate percentage using results from experiment. Teacher may also give students a problem to calculate the percentage composition of humus.		Correct process usedin calculation.
Formulate a hypothesis on converting limestone rock into fertile soil.	Limestone (calcium carbonate) is parent rock in The Bahamas is essential to white infertile soil.	Formulate a hypothesis on converting limestone rock into fertile soil.		Plausible hypothesis clearly stated.
Design a portable unit for preparing compost.	Unwanted organic matter – (kitchen waste, garden cuttings, sea weed, mixed layers with soil to decompose by bacteria in soil.	Design a portable unit for preparing compost.	Farmers, gardener, Agriculture teacher, Agriculture resource books, Internet	Rubric for assessing models (product).
Compare the value of using organic fertilizers with inorganic fertilizers.	Fertilizers are chemical substances that release minerals to the soil to become fertile. **Types of fertilizers** Organic natural fertilizers: Manure and compost. Release nutrients/minerals slowly, tend to cause slightly acidic conditions. Artificial inorganic fertilizers: These are substances made in factories that contain the three elements, nitrogen, phosphorus and potassium that are most essential for plant growth. Examples: Ammonium nitrate, potassium phosphate and potassium sulphate. Release minerals relatively quickly.	Small group discussion.	*Science For Junior High* 2nd Edition by Nevillett Pearce	Number of points used in comparison.

SCOPE OF WORK
GRADE 8
STRAND: HUMAN BODY

TOPIC: PARTS OF THE DIGESTIVE SYSTEM **DURATION: 3 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Make an oral presentation on the purpose of mechanical digestion.	Food must be crushed into smaller pieces and churned into a liquid in order to flow through the alimentary canal easily.	Oral presentation.	LCD projector,	Rubric for assessing oral presentations.
Identify different parts of the Digestive System.	mouth, salivary glands, tongue, teeth, esophagus, stomach, liver, pancreas, gallbladder, small intestine, large intestine (colon), rectum, anus	Colour the parts of the digestive system. Name individual parts or organs.	Charts, diagrams, models, handouts	Observations made, correct labeling.
Make a model of the digestive system.	mouth, salivary glands, tongue, teeth, esophagus, stomach, liver, pancreas, gallbladder, small intestine, large intestine (colon), rectum, anus	Make a (life-sized) model of the human digestive system using various materials.	Cotton, cardboard, paper, glue, scissors, cardstock, construction paper, handouts, sheet, large roll of paper, leaf (pancreas), grocery bag (stomach)	Rubric for assessing models.
Use a microscope to observe villi.	Relative size, shape, colour	Identify villus/villi. Draw villi and cross section of intestinal walls.	Charts, diagrams, models, handouts, microscope, prepared slides	Use of apparatus, outline diagram of villi.
Make a model of villi.	Epithelial cells, blood vessels, Relative sizes and shapes of components	Model construction	Cotton, cardboard, paper, glue, scissors, cardstock, construction paper, handouts, sheet, large roll of paper	Rubric for assessing models.
Observe features of pig “tripe” / intestine.	“Tripe” is the common name referring to the long, narrow, white intestine of sheep, cows, pigs. The inner wall lining is rough with “bumps”.	Observe outward appearance and use hand lens to observe surface of inner lining. With the aid of diagrams describe the features of “tripe”.	sheep, cows, pigs stomach lining (tripe) and intestines	Written description and diagrams.

SCOPE OF WORK
GRADE 8
STRAND: HUMAN BODY

TOPIC: DIGESTIVE PROCESS **DURATION: 7 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Use a string to compare the length of the small intestine to the large intestine.	Small intestine is roughly 6 meters long, the large 1.5 meters. The diameter (not the length) differentiates the small and large intestines.	Measure string to length of small intestine. Measure a different colour string/yarn to the length of the large intestines. Compare lengths of the intestines	Strings (2 colours), ruler/tape measure	Accuracy of measurements.
Describe what happens to food in the different parts of the alimentary canal.	Mouth, stomach, duodenum, ileum, large intestine (colon) and rectum	List mechanical changes and chemical changes foods undergo. Simulate mechanical changes of food.	Balloons, transparent plastic bags, food, water, elastic bands	Communication of information. Rubric for assessing oral/visual presentations.
Identify where digestion begins and ends for each class of nutrient.	Carbohydrates – cooked starch begins in mouth, ends in ileum. Proteins - begin in stomach ends in ileum. Fats – begin in duodenum, ends in ileum. Vitamins minerals and water are readily taken up into the bloodstream and do not have to be digested.	On a diagram of the alimentary canal, colour the organs in which digestion begins and ends for each nutrient group. Use different colours to represent each nutrient group.	Markers, highlighters, colour pencils, handout digestive system	Organs correctly identified.
Explain the relationship between enzymes and the rate of digestion.	Enzymes speed up the rate of chemical digestion significantly. Enzymes are biological catalysts.	Use starchy foods to investigate the rate at which enzymes act on substrates.	Salivary amylase, bread, crackers, potatoes, stopwatch	Recognition of relationships. Rubric for assessing investigations.
Identify a bolus in a diagram.	Bolus is the mass/ball of food that has been chewed and swallowed.	Identify bolus in a diagram. Move a paper ball along a tube or flexible cylinder. Simulate muscular motions.		Identification and label a bolus.
Predict what would happen if food was not properly chewed.	Food is softened and made smaller in size during the process of mastication (chewing).	Practice chewing various food items properly. Describe effects of large masses of food on esophageal tissue.	Food items, article	Plausible predictions with reasons.

SCOPE OF WORK
GRADE 8
STRAND: HUMAN BODY

TOPIC: DIGESTIVE PROCESS

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Based on the foods digested by a digestive juice, identify the types of enzymes present in it.	Digestive juices aid the process of chemical digestion (e.g. bile, pancreatic juice, trypsin) Saliva – starch (amylase/ carbohydrase) Gastric juice: protein (protease) Pancreatic juice: starch (amylase/ carbohydrase), protein (protease), fats (lipases) Intestinal juice: starch (amylase/ carbohydrase), protein (protease), fats (lipases)	Complete a worksheet with organs, digestive juice, enzymes and action.	Worksheet	Worksheet – Enzymes correctly identified.
Recognize and explain the relationship between the structure of the small intestine and its function in absorption.	Relative size (length and width), shape and structural makeup (folding of inner wall and villi). Villi are found in the walls of the small intestine. They are fingerlike projections with large surface area. Increased surface area and time food spends passing through the intestine so increasing chances of absorption.	View the villi using a microscope.	Microscopes, prepared slides	The structure of ileum to its function clearly explained.
Identify and adopt practices to maintain a healthy digestive system.	Eat a balanced diet that includes all nutrients much water and fiber, which promote regular bowel movements; eat on time, avoid late night meals.	Class discussion. Identify and adopt practices to maintain a healthy digestive system.		Long-term behaviour.

SCOPE OF WORK
GRADE 8
STRAND: HUMAN BODY

TOPIC: DIGESTIVE PROCESS

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Predict the effect of a blockage (growth of tissue) in the small intestine.	Food travels the alimentary canal as peristaltic contractions. Obstructions prevent the normal flow of food and fluid. There is a back-up of food causing pain and sensation of being "full". Reduced defeacation. adhesions, hernias or tumors	List signs of intestinal obstruction		Plausible predictions with reasons.
Predict the effect on daily diet for a person whose gall bladder was removed.	Gall bladder stores bile which aids in the digestion of fatty foods. Diet should have minimal fatty component. Bile emulsifies (breaks up) fat into small "droplets" so increasing the surface area for enzymes to work. Bile is made in the liver and stored in the gall bladder.	Class discussion on the functions of bile and the gall bladder. Compiles a list of foods that people without gall-bladders should avoid (due to inadequate amounts of bile to process them at mealtime).	Chart of Digestive System	Plausible predictions with reasons.
Compare the functions of the liver and pancreas.	Function, role in digestion, features: **Digestion** Liver – bile salts, emulsify fats - stores converts glucose to glycogen - breaks down excess amino acids Pancreas – pancreatic juice – protease, lipase, amylase **Endocrine** Liver – controls amount of sugar in blood Pancreas – makes hormones (chemicals) to monitor sugar	List function of the liver and pancreas. Compare and contrast the two organs. Indicate the role of each in the digestion process.	Textbooks	Number of points made. Comparisons made.

SCOPE OF WORK
GRADE 8
STRAND: TECHNOLOGY

TOPIC: LIGHTHOUSES **DURATION: 8 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Observe a lighthouse.	Tall, cylindrical shaped, wide at base and narrower towards the top, three sections: main (service), optic (light) and dome (cover)	Observe photographs or visit a lighthouse.	*Anatomy of a Light house* **www.seathelights.com**	Oral or written description highlighting obvious features and details.
Identify the locations of existing lighthouses on a map of The Bahamas.	Hole in the wall, Great Sturrup, Hopetown, San Salvador, Cay Lobos	Mark and label the locations of existing lighthouses on a map of The Bahamas.	Map of The Bahamas, coloured pencils or markers	Correct location and number of lighthouses identified.
Recognize the relationship between the location of lighthouses and the presence of reefs.	The Bahamas consists of several hundred islands, cays, and rocks many of which are submerged (reefs). Ships become wrecked on reefs at night. The lights warn ships of the presence of reefs.	In small groups, write one verse of a poem/rap or a jingle describing the role of the light (house).		Rubric for assessing oral presentations (emphasize the relationship between the locations of lighthouses and reefs to the potential dangers to shipping).
Draw a general conclusion about the brightness of a light.	Lights must be seen over great distances and in bad weather. Some lights are 500 and others 1,000 watts.	Class or small group discussion or included on a worksheet. Use maps to estimate the distance each light must cover.	Map showing locations of lighthouses, reefs and shipping lanes.	Conclusion given on brightness of lights as a generalization based on the distance to be covered.
Describe simply the type of lights used on lighthouses and why they are effective.	Incandescent kerosene lamp with a revolving lens which magnified the brightness of the light. Electrically powered lights, electronically remote-controlled and solar powered lights have replaced kerosene over the years.	Investigate the effect of lenses (different kinds) on a beam of light (flashlight or similar source).	Light source for producing an fairly narrow beam, concave, convex and plain lenses, prism	Description of the effect of different lenses on (magnifying the brightness of) a light beam.
Make a model lighthouse.		In small groups, make a model lighthouse.	Internet	Rubric for assessing models.
Research the basic scientific principle for flashing lights.	As lens rotates around the light produces “flashing”. Frequency of flashes identifies the lighthouse.	Research the basic scientific principle for flashing lights.	Internet	Written description.

SCOPE OF WORK
GRADE 8
STRAND: TECHNOLOGY

TOPIC: TELEGRAPH, TELEPHONE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Name one factor that might have limited the effectiveness of lighthouses.	Weather conditions; most were operated "manually" (depended on a person)	Small group discussion; brainstorming and recording possible factors.		Plausibility of factors suggested.
Suggest a means of modernizing lighthouses in The Bahamas. Change in sSS	Use of electronic or solar powered lights etc.	Small group discussion including information from prior research, map work and building model.	Information from previous assignments.	Plausible suggestions made.
Research the basic scientific principle for the telegraph.	Telegraphs – message is sent as electric currents through a wire to the device that makes dots and dashes to match the message.			Correct information stated simply.
Research the basic scientific principle for telephone.	The sound from words is changed into electrical signals by the electromagnet in the "mouthpiece". Electrical signals travel through wires and an exchange to the "ear piece" appropriate of the telephone where the electrical signals are changed to corresponding sounds (words) by the electromagnet in the loudspeaker.	Conduct research to find out the basic scientific principle(s) for telephone. Use of optical fibres (small pulses of light) instead of electrical wires.	*The Young Oxford Library Science Electricity and Magnetism* Internet	Correct information stated simply.
Observe components of a telephone (electromagnet).	Loudspeaker in earpiece, microphone in mouthpiece, connecting electrical wires.	In groups or as a class, observe components of a telephone.	Diagrams or condemned artifact *Oxford Library Science* Internet	The main components identified and simply described.
Make a model telephone.		In pairs or small groups, make a model telephone.	Disposable cups, string	Inclusion of "mouthpiece", connection and "earpiece". Bonus for some functionality. Rubric for assessing models.

SCOPE OF WORK
GRADE 8
STRAND: TECHNOLOGY

TOPIC: FAX MACHINES

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Write a simple story to describe the operation of the telephone.		Write a simple story (narrative, conversational, cartoon) to describe the operation of the telephone.		Story – correct facts simply stated to show comprehension of operation, easily read.
Formulate a hypothesis on the scientific principle used to invent the fax machine.	The fax machine is used to send a copy of documents to another fax machine without the document actually being sent.	Formulate a hypothesis on the scientific principle used to invent the fax machine.		Plausible hypothesis clearly stated.
Research the basic scientific principle for fax machines.	Sending fax machine scans document converting the black markings (letters/lines) and white spaces into electrical signals to be sent to receiving fax machine which changes electrical signals via heat to black markings with white spaces making an identical copy – facsimile.	Conduct research to find out the basic scientific principle(s) for the fax machine.	*The Young Oxford Library Science Electricity and Magnetism* Internet	Correct information briefly and clearly stated showing comprehension. (Heating elements convert markings to electricity then back to identical markings.)
Observe components of a fax machine.	Heating elements, scanner, paper entry point, paper exit point	Observe components of a fax machine.	Diagrams, discarded artifact	Main components identified and simply described.
Measure the length of the laboratory/classroom.		In pairs or small groups, measure the length of the laboratory/ classroom.	Metre ruler, tape, string	Accuracy of measurement written with correct unit.
Predict the time taken for sound from a radio to travel the length of the room.	Sound travels in air at an approximate speed of 330 m/s.	Predict the time taken for sound from a radio to travel the length of the room.		Plausible prediction.

SCOPE OF WORK
GRADE 8
STRAND: TECHNOLOGY

TOPIC: RADIO, TELEVISION

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Research the basic scientific principle for the radio.	Sounds (words/music) go into a microphone which changes them to the appropriate electrical signals which, in turn, are combined with other (carrier) waves. These waves are sent to a tower which "beams" them out as radio waves to the aerial of a radio (receiver). The loudspeaker in the radio changes the radio waves back into the sound waves.	Conduct research the basic scientific principle for radio.	*The Young Oxford Library Science Electricity and Magnetism* Internet	Correct information briefly and clearly stated showing comprehension.
Write simple stories to describe the operation of the television.	A television camera records the pictures while a microphone records the sounds. The sound and light signals are changed into electrical signals. These signals are sent to the television set (receiver) which converts the electrical signals back to light and sound to give the appropriate picture and sound.	Write a simple story (narrative, conversational or cartoon to describe the operation of the television.	*The Young Oxford Library Science Electricity and Electronics* Internet	Story – correct facts simply stated to show comprehension of operation, easily read.
Research the basic scientific principle for the computer.	Messages transformed into signals in one device to be sent then interpreted by another device.	Research the basic scientific principle for the computer.	Computer teacher Introduction to computers textbooks, Internet	Simple and clear written description of the computer facilitating means of communicating.
Observe components of a computer.	Input (keyboard, microphone, webcam), storage, CPU, Output (monitor, earphones, printer) devices	Observe photographs or components of discarded computers. Discussion on methods of communication via computers.	*Physics for You* Internet	Identification and classification of major components of and associated with computers.
Research the basic scientific principle for the mobile phone.	Microwaves transmitted to nearby special pole then to receiving pole nearest receiving phone.	Research the basic scientific principle for the mobile phone.	*The Young Oxford Library Science Electricity and Electronics*	Simple and clear written description.

SCOPE OF WORK
GRADE 8
STRAND: TECHNOLOGY

TOPIC: MOBILE PHONES, WORLD WIDE WEB

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Compare the communication features of a landline (traditional) with a mobile phone.	Traditional phones allow audio communication, mobile phones have many features including: Internet access etc.	Small group discussion; brainstorming and recording possible differences and similarities.		Number of features recorded and correct comparisons.
Follow safety tips in the use of mobile phones.	Do no use mobile telephones in open spaces during thunderstorms, while taking baths, at gas stations or while being re-charged.	Adhere to safety tips while using a mobile phone and encourage others to do so.	Information leaflets that accompany new phones, Internet	Practices
Research the basic scientific principle of the worldwide web.	The Worldwide web and the internet are not one and the same. The internet is a global system of interconnected computer networks. The web is a collection of interconnected documents and other resources linked by hyperlinks and URL's. The web is an application running on the internet.	Research the basic scientific principle of the worldwide web. Make a group presentation.	Computer teacher Introduction to computers textbooks, Internet	Group presentation Rubric for assessing oral/visual presentations.
Classify communication instruments based on their scientific principle.	Some devices convert signals to electricity, light radio or microwaves for transmission.	Identify a means of classification and use it to classify the instruments studied.		A plausible means of classifying the communications devices.
Recognize the relationship between the use of satellites and efficiency of communication.	Satellites allow radio waves that travel in straight lines to be reflected to distant parts of the earth that would not be accessible by straight lines.	Brainstorm the role of satellites in communications. Observe diagrams showing a satellite receiving and routing signals to earth. Describe the role of satellites in communications highlighting the advantages of and progress caused by satellites.	*The Young Oxford Library Science Electricity and Magnetism* Internet	The relationship between the use of satellites and the efficiency of communication clearly shown.
Compare the relative efficiency of three devices studied.	Any three of telegraph, radio, telephone, fax machine, mobile phone	Compare the relative efficiency of three devices studied.	Information from previous lessons and assignments.	Number of features compared and relative efficiency stated with reasons given.

SCOPE OF WORK
GRADE 9
STAND: LIVING THINGS

TOPIC: CLASSIFICATION OF PLANTS **DURATION: 5 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Observe features of five phyla of plants.	Algae, Mosses and Liverworts, Ferns, Conifers and Flowering plants make up the five phyla of plants.	Observe features of five phyla of plants. Describe similarities and differences.	*Biology For Life* Worksheet	Worksheet – Description of observations.
Use external features of plants to classify them into five phyla.	Algae, mosses and liverworts do not have well formed stems, leaves and roots, ferns have proper stems and roots, reproduce by spores, conifers are non-flowering plants that reproduce by cones. Flowering plants reproduce by seeds and include monocotyledons and dicotyledons.	Create a portfolio on the five phyla of plants; include pictures of an example of plant from each phylum. Use local examples. Portfolio with observations and comments on diversity of plants in and between phyla.	*Biology For Life* Science for Jr. High	Comments on diversity of plants in and between phyla.
Classify flowering plants based on their height and stem features.	Trees are tall with branches at the end of a length of trunk, thick woody trunks. Shrubs are shorter, woody stems, branches begin fairly low on stem. Herbs (herbaceous plants) are short, green, flexible stems with branches continuous.	Construct a classification table. Classify pictures of plants in the table.	Pictures of different plants Life Study	Assess classification table. Appropriate table; correct classification.
Observe external features of herbaceous plants (herbs).	Herbaceous plants are plants with non-woody stems e.g. sunflower, Shepherd's Needle, Sailor Cap, thistle	Observe external features of herbaceous plants (herbs).	Pictures of herbaceous plants	Number and quality (details) of observations included in written description.
Observe external features of shrubs.	Woody, bushy plants of relatively low height usually less than (15-20 ft) tall and have several stems e.g. hibiscus,bougainvillea, oleander, yellow elder	Observe external features of shrubs.	Pictures of shrubs	Number and quality (details) of observations included in written description.

SCOPE OF WORK
GRADE 9
STAND: LIVING THINGS

TOPIC: CLASSIFICATION OF PLANTS

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Observe external features of trees.	A woody plant that has many secondary branches supported clear off the ground on a single main stem or trunk with clear apical dominance. Examples: pine, sapodilla, almond, Poinciana	Observe external features of trees.	Pictures of trees	Correct classification.
Observe features of a deciduous plant.	Trees that lose their leaves at the same time during a period of the year. Examples: almond, Poinciana	Observe features of a deciduous plant.	Pictures of deciduous trees	Correct classification.
Classify flowering plants based on the time taken to complete a life cycle.	Plants are classified according to if they complete their life cycle within a year (annuals) sunflowers, or twice a year (bi-annuals) or every two years (biennials) pigeon peas, or lives for more than two years (perennials) avocado.	Classify flowering plants based on the time taken to complete a life cycle.	Pictures of common plants	Correct classification.
Classify plants based on their habitat.	Low plants are found near coastlines.	Observe plants that are found in coastal, swampy and inland habitats. Relate their features to habitat.	Pictures of common plants	Written description of plants observed. Correct classification.
Compare and contrast methods of pollination in flowering plants.	Pollination is the process whereby pollen grains are transferred from the anther to the stigma of the plant. The flower can be self-pollinated or cross-pollinated by insects or the wind.	Make diagrams to show self-pollination and write captions. Make diagrams to show cross-pollination and write captions. Compare and contrast methods of pollination in flowering plants.	*Science For Junior High* 2nd Edition by Nevillett Pearce	Worksheet – Correct comparisons and contrasting points.
Make an oral presentation (with visual aids) to demonstrate classification of plants into major groups.		Participate in a group oral presentation on the classification of plants.	Pictures and other visual aids	Rubric for assessing oral presentations.

SCOPE OF WORK
GRADE 9
STAND: LIVING THINGS

TOPIC: CLASSIFICATION OF PLANTS

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Collect, process and interpret data from a survey conducted on plant population to show classification.		In groups, conduct a survey of plants in a given area. Classify and count the types of plants found. Create a mini portfolio to include names and diagrams/photos of herbs, shrubs, trees, annuals, biennials, perennials, evergreens and deciduous plants. Use local examples.	Pictures of different types of trees for identification purpose	Rubric for assessing classification and recording data.
Construct a bar graph to show the populations of the four most common flowering plants in a given area.		Construct a bar graph to show the populations of the four most common flowering plants in the area studied.	Bar graph, Internet	Rubric for assessing bar graph (processind data).
Make predictions as to the changes in plant populations in areas that show high selection (based on classifications used) by humans.	Humans select for flowering, ornamental and food bearing plants. Humans select against native non-flowering plants, forest for buildings.	Discussion on types of plants humans select for and against. Make predictions as to the changes in plant populations in areas that show high selection (based on classifications used) by humans. E.g. Poinciana trees, pine trees	Photographs of areas where man has either removed particular types of plants or planted more of a particular type of plants.	Plausible predictions made with supportive reasons given.

SCOPE OF WORK
GRADE 9
STAND: LIVING THINGS

TOPIC: GUM ELEMI **DURATION: 1 lesson**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Observe external characteristic features of Gum Elemi trees.	Height to 10 metres, reddish brown smooth trunk which shows peeling. Leaves are lime green, pinnate.	Observe and record all features seen from either photograph, video or natural plant.	Plant or visual aids	Number and quality of observations made.
Formulate a hypothesis as to the effect of growing Gum Elemi in sandy soil on the plant.	Sandy soils found near seashore. Gum Elemi found in broad leaf coppice – usually away from seashore.	Look at photos of sandy ecosystems and broadleaf coppice. Formulate hypothesis and state reasons.	Photos of sandy ecosystems and broadleaf coppice.	Hypothesis stated with plausible reasoning.
Use visual aids to describe the economic importance of Gum Elemi.	As plants – used for hedges, seeds – food for birds, leaves/trunk – bush medicine (anti-rash), trunk – hardwood for buildings & furniture.	Make an annotated diagram/poster/graphic display showing uses of Gum Elemi plant.	Resource literature Bahamas National Trust	Rubric for assessing visual aids (valid points showing economic importance).
Research additional uses/benefits of Gum Elemi.		Conduct personal research	Bahamas National Trust, history books, Internet	Rubric for assessing research.
Make an item using Gum Elemi.		Make an item (ornament, model, or bush medicine) using Gum Elemi.	Local sculptor, model boat builder	Rubric for assessing models (creativity, usefulness).
Use the Gum Elemi as a shade plant or hedge.	Use as hedge or shade plant	Observe photos of hedges and landscaping using Gum Elemi	BNT, Agricultural Science publications	Written paragraph showing personal commitment to use of Gum Elemi.
Formulate a proposal to increase the number of Gum Elemi trees grown throughout The Bahamas.		In groups brainstorm reasons to support the proposal. Formulate target group and most effective means to communicate with the group. Develop the proposal.	Information from previous lessons, resource materials from Dept. of Agriculture, BNT	Proposal – clearly stated, logical, supportive reasons, convincing, suited to target group.

SCOPE OF WORK
GRADE 9
STAND: LIVING THINGS

TOPIC: MAIZE **DURATION: 5 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Measure the height of a mature maize plant.	A mature maize plant typically grows, locally, to 2 metres. However, it may grow to 5 metres in some countries.	Measure the height of a maize plant.	Tape measure (metric) or metre ruler	Accuracy of measurement and with correct unit recorded.
Use features of maize plant to classify it.	Fruit – spermatophyte Flowers – angiosperms Leaves, root, germination – monocotyledon	Observe maize and pre-soaked grains.	Hand lens, maize grains, photos or diagrams of maize plant	Correct classification by deductive reasoning (worksheet/notebook).
Predict the number of maize plants that might develop from ears on one plant.	Every fully grown grain has the potential to develop into a new plant.	Guess a number. Count the number of grains on an ear and the number of ears on the plant. Predict the number of potential plants.	Maize ears (mature), plant or photos of plants with ears.	Plausible prediction.
Make a model showing the internal structure of a maize grain.	Each maize grain is a fruit. Vocabulary: covering, endosperm, cotyledon, radicle, plumule	Dissect a pre-soaked maize grain and examine with hand lens and pin. Use diagram of L. S. maize and dissection to make model.	Pre-soaked maize grains, hand lenses, dissecting pins, Petri dishes, diagrams L. S. maize grain, plasticene	Rubric for assessing models.
Use visual aids to describe the life cycle of maize.	Radicle germinates then plumule, radicle stops and fibrous roots grow, leaves grow from their cover, 3 – 4 months tassle or male inflorescence appears at top and female inflorescence or ears form in axillary nodes. Wind cause pollination. Ears mature. Grains are planted and germinate.	In groups, research period for germination, time to maturity and to complete life cycle. Describe stages of germination, show at least two stages in growth to maturity. Show mature plant with inflorescences. Represent pollination. Show mature ears. Show dispersal of grains, planting and germination.	Poster paper, grains, textbooks (Biology, Agricultural Science), posters, markers	Rubric for assessing visual aids/ presentations (life cycle).
Recognize variables in the process of germination for maize.	Age of grains, temperature, moisture	Set investigation of germination of maize grains with one variable changed and others remain constant.	Clear sanitary cups, hand towel, maize grains with different temperatures and the same, levels of moisture and age grains	Identified the variables that were kept constant and the one that was varied in the report of the investigation.

SCOPE OF WORK
GRADE 9
STAND: LIVING THINGS

TOPIC: MAIZE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Plan and conduct an investigation to determine the best temperature for maize germination.	As above	As above	As above	Rubric for assessing investigations.
Formulate a hypothesis on whether seasons effect growth and/or productivity of ears of maize.	Seasons being wet or dry, long days or short days (hours of daylight) or spring, summer, autumn and winter.	Formulate a hypothesis and state reasons for hypothesis.	Information from previous lessons.	Plausible hypothesis with reasoning.
Make an item from some part of the maize plant.	Cobs – figurines, grains – jewelry, leaves – *plait*, husk – animal feed, stems – fencing, grains food/liquid recipe	Make use of a part of the maize plant.	Agricultural Science books, Food and Nutrition textbooks.	Product – creativity, usefulness, appearance (rubric for assessing models).

SCOPE OF WORK
GRADE 9
STAND: LIVING THINGS

TOPIC: SPINY LOBSTER **DURATION: 5 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Identify animals belonging to the "lobster" family.	American and European clawed lobsters are related to the spiny lobster which has no claws.	Identify animals belonging to the "lobster" family.	Pictures of lobsters	Number of organisms correctly identified.
Use external features to identify the Spiny Lobster.	The spiny lobster, *Panulirus argus* has a tubular shaped body encased in a hard exoskeleton, which is variable in colour from greenish purple to reddish brown.	Use external features to identify the Spiny Lobster. List the external features observed.	Diagram/ chart of the spiny lobster, pictures of other kinds of lobsters The Spiny Lobster/ Crawfish Fact Sheet: Prepared by the Dept. of Marine Resources © 2007.	Accurate description of external features.
Observe the characteristic markings of the spiny lobster.	The tail has four conspicuous yellow spots and does not have large pinching claws. It has long whip-like antennae and the frontal part of the shell (carapace) is covered with forward-projecting spines. Two sharp horns project over the eyes.	Observe the characteristic markings of the spiny lobster. Make same markings on an outline diagram of a spiny lobster.	Diagram/ chart of the spiny lobster The Spiny Lobster/ Crawfish Fact Sheet: Prepared by the Dept. of Marine Resources © 2007.	Accuracy of markings on diagram.
Measure the length of the tail, cephalothorax and antennae of a model lobster in cm.		Measure the length of the tail, cephalothorax and antennae of a lobster in cm.	Ruler, measuring tape, hand lens, model of adult lobster.	Accuracy of measurements.
Measure the weight of an adult lobster in kilogrammes.		Measure the weight of an adult lobster in kilogrammes.	Balance, hand lens, model of adult lobster	Accuracy of measurements.
Use measurements to draw the outline of the lobster1/4 of its size.		Draw the outline of the lobster1/4 of its size.	Table with accurate measurements of lobster	Diagram drawn correctly to scale.

SCOPE OF WORK
GRADE 9
STAND: LIVING THINGS

TOPIC: SPINY LOBSTER

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Observe diagrams of the life history of the Spiny Lobster.	After the lobster is hatched it spends 6-12 months floating in the sea and is called "plankton". After 6-12 months the baby lobster undergoes metamorphosis and changes shape. The young lobster then moves and settles in shallow areas and become coloured and is now one year old. Lobsters reach maturity between 3 and 5 years old. At this age a lobster is about 20.5-25.5 cm (8-10) inches long from head to tail.	Observe diagrams of the life history of the Spiny Lobster. Complete a worksheet about the life history of the Spiny Lobster.	Diagrams of the life history of the spiny lobster *The Life Story of The Spiny Lobster* by Katherine Orr *Leroy the Lobster* – Katherine Orr	Worksheet on life history.
Observe differences in gender of the Spiny Lobster.	Female lobsters have two extra claws at the tip of each last leg and an extra set of swimming legs underneath the tail. Male lobsters have a padded opening at the base of each last leg.	Observe differences in gender of the Spiny Lobster. Complete annotated diagrams showing differences in the genders.	Male and female adult lobsters or diagrams of male and female adult lobsters	Annotated diagrams showing gender differences based on observations.
Use features of the lobster to determine whether it is a juvenile.	Juvenile lobsters are less than three years old and the back is less than 9cm (3.5 inches) long.	Use features of the lobster to determine whether it is a juvenile.	*The Life Story of The Spiny Lobster* by Katherine Orr Pictures of juvenile lobster	Correctly identify photographs of juvenile lobsters.
Use features of the lobster to determine whether it is ready to spawn.	The female lobster that is ready to spawn has dark brown eggs near the tail. Additionally, "a tar spot" of the males harden sperm on the abdomen indicates that she is ready to lay eggs.	Use features of the lobster to determine whether it is ready to spawn.	*The Life Story Of The Spiny Lobster* by Katherine Orr The Spiny Lobster/ Crawfish Fact Sheet: Prepared by the Dept. of Marine Resources © 2007.	Correctly identify photographs of lobsters that are ready to spawn.

SCOPE OF WORK
GRADE 9
STAND: LIVING THINGS

TOPIC: SPINY LOBSTER

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Make an oral presentation with visual aids to describe the habitat of the lobster.	Coral reefs, mangroves, sea grass plains and open ocean are all necessary habitats for the survival of the lobster.	Make an oral presentation with visual aids to describe the habitat of the lobster.	*The Life Story Of The Spiny Lobster* by Katherine Orr The Spiny Lobster/ Crawfish Fact Sheet: Prepared by the Dept. of Marine Resources © 2007. *Marine Life of the Caribbean*	Rubric for assessing oral presentations.
Recognize the relationship between the colours of the external features of the lobster to its environment.	E.g. blood turns blue in the presence of oxygen, red when you cook them.	Recognize the relationship between the colours of the external features of the lobster to its environment.	Pictures of lobsters in natural habitats.	The relationship described in terms of camouflage.
Make a model (visual) of a food web including the spiny lobster.	Lobsters are known to feed on sea urchins, worms, crustaceans, and fish and some types of sea vegetation. They are preyed upon by humans, snappers, groupers, sharks, rays and octopus.	Make a model (visual) of a food web including the spiny lobster.	Pictures, notes on life cycle, reproduction and behavior of the spiny lobster.	Rubric for assessing models.
Recognize the relationship between rate of reproduction, predation rate and survival of lobsters.	Overharvesting the spiny lobster will result in a decline in numbers because they will be captured faster than they are allowed to reproduce.	Class discussion. Write a description of the relationship between rate of reproduction, predation rate and survival of lobsters. In groups, dramatize the relationships.	Notes on life cycle, reproduction and behavior of the spiny lobster	Rubric for assessing drama.
Recognize the relationship between the closed season and the spawning of lobster.	Lobsters mate and spawn during the warmer months of the year. The closed season allows lobsters to reproduce uninterrupted resulting in an increase in numbers.	Class discussion. Write a description of the relationship between the closed season and the spawning of lobster.	Notes on life cycle, reproduction and behavior of the spiny lobster	Relationship clearly described.

SCOPE OF WORK
GRADE 9
STAND: LIVING THINGS

TOPIC: SPINY LOBSTER

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Make predictions on the number of offspring produced and the number that mature to survival from one lobster.	Of the many eggs that are released by each female many do not survive long enough to grow into adults due to predation during the larval and juvenile stages, interruption of natural habitat, pollution, environmental and climatic changes.	Group discussion. Make predictions on the number of offspring produced and the number that mature to survival from one lobster.	The Spiny Lobster/ Crawfish Fact Sheet: Prepared by the Dept. of Marine Resources © 2007.	Predicted number of offspring produced is very large, predicted number that survive to maturity is much less – predation and overfishing included in reasons.
Make predictions as to the lobster population or habitats in 25 years should there be no restrictions on fishing and should restrictions be enforced.	Should there be no restrictions on catching the spiny lobster; the populations in 25 years will decrease due to overfishing because the grouper will be caught faster than it can reproduce to sustain the population. If laws are enforced there will be an increase in numbers.	Group discussions. Make predictions as to the lobster population or habitats in 25 years should there be no restrictions on fishing and should restrictions be enforced.		Plausible predictions made as to the relative decrease in lobster populations, should there be no restrictions and the relative increase in lobster populations, should restrictions be enforced.
Calculate the average number of lobsters or weight of lobsters caught per month.		Calculate the average number of lobsters or weight of lobsters caught per month.	Statistics from the department of marine resource Calculator Worksheet	Calculation.
Make graphs to show the number of lobsters caught per month over a one-year period.		Make graphs to show the number of lobsters caught per month over a one-year period.	Statistics from the department of marine resource	Rubric for assessing graphs.
Make graphs to show the catch of lobster over a five-year period.		Make graphs to show the catch of lobster over a five-year period.	Statistics from the department of marine resource	Rubric for assessing graphs.
Use statistics from studies of lobster populations to draw conclusions on the effect of fishing on populations.		Use statistics from studies of lobster populations to draw conclusions on the effect of fishing on populations.	Statistics from the department of marine resource	Valid conclusion based on statistics with reasons.

SCOPE OF WORK
GRADE 9
STAND: LIVING THINGS

TOPIC: SPINY LOBSTER

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Recognize the relationship between demand for lobster meals and the rate of fishing for lobster.	The demand for grouper meals will result in an increase in the rate of catching grouper.	Class discussion. Recognize the relationship between demand for lobster meals and the rate of fishing for lobster. Written description of the relationship.		Number of points made to show a correlation between increase demand for lobster and increase in fishing for lobster.
Participate in a debate on the importance of observing the size limitation and closed season for catching the lobster OR the economic importance of the lobster outweighs the need to protect it.	Closed seasons allow the lobsters time to mature and mate. Thus ensuring the survival of the species.	Participate in a debate on the importance of observing the size limitation and closed season for catching the lobster OR the economic importance of the lobster outweighs the need to protect it.	Statistics/ information from BREEF, or Department of marine resources	Rubric for assessing oral presentations.
Recognize the relationship between the demand for lobster and its price.	The higher the demand for the spiny lobster, the more expensive it becomes.	Class discussion. Recognize the relationship between the demand for lobster and its price.		Number of points made to show a correlation between increase demand for lobster and increase in price for lobster.
Find out what happens to lobsters between catch and marketing abroad.	Lobsters are frozen, processed, packaged and frozen for export.	Find out what happens to lobsters between catch and marketing abroad. Write two paragraphs explaining the steps in the process.	Fishermen from Spanish Wells or Abaco.	Description of the process with key points included.
Evaluate whether changes in weather patterns and other natural influences impact the lobster population to the same extent as fishing.	Spiny lobsters mate and spawn in warm water. The water temperature also affects how fast a lobster grows and how soon it becomes a mature adult. Therefore changes in weather patterns will result in a drastic decline in the lobster population.	Class discussion. Evaluate whether changes in weather patterns and other natural influences impact the lobster population to the same extent as fishing.	Statistics/ information from BREEF, or Department of marine resources The Spiny Lobster/ Crawfish Fact Sheet: Prepared by the Dept. of Marine Resources © 2007.	Clearly stated belief position. Points that support and some that contradict the position.

SCOPE OF WORK
GRADE 9
STAND: MATTER

TOPIC: COMPOUNDS **DURATION: 7 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Predict the compound to be formed from given reactants.	Two or more elements chemically combine to form a compound.	Predict the names of compounds formed from the combination of given elements.	*Science For Junior High* Second Edition by Nevillett Pearce	Plausible predictions.
Use apparatus and materials to prepare a compound.	Iron heated with sulphur forms iron sulphide.	Investigation: to form iron sulphide.	Iron filings, sulphur powder, test tube, heating source, retort stand and clamp, *Science For Junior High* Second Edition by Nevillett Pearce	Rubric for assessing correct and safe use of apparatus and materials.
Use models, videos, or drawings to illustrate molecules, compounds and their differences.	A molecule is the smallest unit of a compound.	Construct molecules then connect these molecules together to form a compound.	Molecular kit, plasticine & toothpicks, paper and coloured pencils	Rubric for assessing models.
Recognize the potential union between positively and negatively charged atoms/ions to form compounds.	Ions act to obtain the stable duplet/ octet configuration (two/eight electrons) in the outermost orbit. Ions of elements in Groups 5, 6 & 7 (-3, -2, -1) gain, 3, 2 or 1 electron respectively. Those ions of elements in Groups 1, 2, or 3 (+1, +2, +3) gain 1, 2, or 3 electrons respectively.	Make drawings to show negative and positive ions bonding. $Na^+ + Cl^- \rightarrow NaCl$	*A New Certificate Chemistry Chapter*: Chemical Union and Structure. Internet: skoool.ie::senior cycle	Rubric for assessing visual aids.
Classify molecular bonding as ionic or covalent.	A bond is a chemical union between two or more atoms of various elements where electrons can be gained or lost (ionic) or shared (covalent) to make the stable octet).	Practice forming simple ionic and covalent bonds between the first 20 elements.	*A New Certificate Chemistry Chapter*: Chemical Union and Structure. Internet: skoool.ie::senior cycle	Correctly classify ionic and covalent bonding.
Predict chemical formulae for products formed by simple reactions.	-ide denotes presence of only two elements, -ate denotes presence of oxygen, use metal at beginning and non-metal radical afterwards e.g. $Mg + O_2 \rightarrow MgO$. $K + I \rightarrow KI$	Groups write reactants for simple reactions, exchange with other groups for the latter to predict the chemical formulae.	*A New Certificate Chemistry Chapter*: Chemical Union and Structure. Internet: skoool.ie::senior cycle	Plausible formulae predicted.

SCOPE OF WORK
GRADE 9
STAND: MATTER

TOPIC: ACIDITY **DURATION: 7 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Plan and conduct an investigation to test the acidity of a substance.	Acids turn blue litmus paper red, bases turn red litmus paper blue.	Test a variety of substances using universal indicator, blue litmus and a colour coded pH scale.	Blue litmus paper, universal indicator, a variety of acidic substances, colour coded pH scale, test tube, test tube holder	Rubric for assessing investigations.
Identify acids.	An acid is a substance that donates a hydrogen ion. They: turn blue litmus paper red; taste sour; pH of 1 – 6; neutralize a base, are corrosive; formed from non-metal oxides.	Test a variety of liquids with universal indicator or blue litmus paper.	Blue litmus paper or universal indicator, common liquids, vinegar, citrus juice, hydrochloric acid, *Science For Junior High* Second Edition, Internet: skoool.ie::senior cycle, school.discoveryeducation.com	Correctly classify liquids tested as acids or not.
Differentiate between very weak acids, weak acids, strong acids, and very strong acids.	Acids are classified according to their (strength) pH. pH is a relative measure of hydrogen ion concentration. More concentrated acids are more corrosive. The "stronger" the acid, the lower the pH (1), the weaker the acid the higher the pH (6).	Observe the effects of acids of different strengths being dropped onto a surface (demonstration).	Sulphuric Acid 50% soln, Acetic Acid 50% soln	Written comparison stating differences observed.
Find out the names of three acids found in substances used in the home.	Vinegar, ascorbic acid, citric acid nitric acid are common acids that can be found in most homes.	Observe labels of a variety of cleaning products and food items to determine the presence of an acid.	Cleaning supplies and food items.	Names of acid observed and where found noted.
Identify bases.	A base is a substance that donates a hydroxyl ion. They: turn red litmus paper blue; taste bitter; pH of 8 – 14; neutralize an acid, feel soapy; formed from metal oxides.	Test a variety of liquids with universal indicator or red litmus paper.	Red litmus paper or universal indicator, common liquids, aloe, dish washing detergent, household ammonia, potassium/sodium hydroxide (lye), test tubes	Correctly classify liquids tested as base or not.
Differentiate between very weak bases, weak bases, strong bases, and very strong bases.	Bases are classified according to their (strength) pH value. Stronger bases are more *corrosive* and have high pH values (14).Weak bases have low pH values (8).	Observe the effects of bases of different strengths being dropped onto a surface (demonstration).	Sodium Hydroxide 50% soln, Ammonium Hydroxide 50% soln.	Written comparison highlighting differences observed.

SCOPE OF WORK
GRADE 9
STAND: MATTER

TOPIC: ACIDITY

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Find out the names of three bases found in substances used in the home.	"Joy" liquid detergent, milk of magnesia, epson salts, bicarbonate of soda, and ammonia are common bases that can be found in most homes.	Observe labels of a variety of cleaning products and food items to determine the presence of a base.	Cleaning supplies and food items	Names of bases observed and noted.
Use a colour-coded pH scales to show degrees of acidity, alkalinity or neutrality of a substance.	Universal indicator paper shows the degree of acidity and alkalinity through different colour changes.	Use universal indicator paper and a colour coded pH scale to measure the degree of acidity, alkalinity or neutrality of substances.	Universal litmus paper, colour coded pH scale, various household substances, test tubes, test tube holders	Numerical values and colour on pH scale recorded for substances tested.
Draw a conclusion about the acidity or alkalinity of common household substances.	Acids turn blue litmus paper red, bases turn red litmus paper blue.	Review the recorded observations for the investigation and formulate conclusions.	Red & blue litmus paper, a variety of household substances	Accurate conclusionsbased on observations.
Research uses for acids and alkalis in industry.	Weak organic acids for preventing bacterial growth, fertilizers, explosives, and dyestuffs; strong bases for soaps and cleaning agents, bases as antacids – neutralization , anti-freeze, paper-pulp, rayon, artificial silk, in fertilizers for acidic soils.	Research uses for sulphuric, nitric and hydrochloric acid as well as for sodium, potassium and calcium hydroxide.	Articles from magazines and Chemistry resource books, Internet	Rubric for assessing research.
Formulate a hypothesis on the products formed from a reaction involving an acid and base.	An acid reacts with a base to form a salt and water. Copper oxide and hydrochloric acid → copper chloride and water; sodium hydroxide and hydrochloric acid →sodium chloride and water. $Cu^{2+}O^{2-} + H_2^+ + 2Cl^- \rightarrow CuCl + H_2O$	Worksheet showing ions in reactants, Drill practice. Formulate a hypothesis on the products formed from a reaction involving an acid and base.	Cue cards with chemical formula for reactant acid and base	Correctly identify salts.

SCOPE OF WORK
GRADE 9
STAND: MATTER

TOPIC: ACIDITY

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Plan and conduct an investigation to demonstrate neutralization of an acid with a base.	Sodium hydroxide and hydrochloric acid →sodium chloride and water.	Plan and conduct (demonstration) an investigation to demonstrate neutralization of hydrochloric acid with sodium hydroxide.	Hydrochloric acid and sodium hydroxide, litmus paper, universal indicator paper, dropping pipette, graduated cylinder, beakers	Rubric for assessing investigations.
Make suggestions how a simple reaction like neutralization could be used in medicine and other industries.	Bases used as antacid, basic fertilizers for acidic soils and acidic fertilizers for basic soils.	Brainstorming. Worksheet. Make suggestions about how a simple reaction like neutralization could be used in medicine and other industries.	Chemistry resource books, worksheet	Plausibility of suggestions made.
Use knowledge of acids and bases to make a product.	Weak acids remove oxide and tarnish from metals, preserve fruits and vegetables. A base can be used for cleaning floors and testing for carbon dioxide.	Make a solution or a tarnish remover for shining silverware, brass or copper items. Use a base to test for carbon dioxide. Acetic acid for pickling foods.	Acetic acid, citric acid, calcium hydroxide, ammonium hydroxide, samples of fruits and vegetables, water, tarnished brass objects, beakers, measuring cylinders, goggles	Rubric for assessing products.
Demonstrate knowledge of the safe usage of acids, bases, and other household chemicals and mixtures.	Use gloves and goggles when handling acids and bases; add acid to water and not vice versa; use a glass rod to add acid to water; avoid inhaling fumes directly from stocks of acids and bases. Label bottles, keep away from heat.	Demonstrate knowledge of the safe usage of acids, bases, and other household chemicals and mixtures.	Goggles, gloves, beakers, water, bench strength acids and bases	Safe practices and techniques demonsatrated.
Demonstrate knowledge of the proper disposal of acids, bases, household chemicals and other unsafe chemicals.	Neutralize acids and bases before flushing down the sink with copious amounts of water, placing unsafe chemicals in hazardous waste containers.	Demonstrate knowledge of the proper disposal of acids, bases, household chemicals and mixtures. Placing unsafe chemicals in hazardous waste containers.	Bench acids and bases, water, beakers, household chemicals, and hazardous waste containers	Safe disposal of acids, bases, household chemicals.

SCOPE OF WORK
GRADE 9
STAND: FORCES & ENERGY

TOPIC: HEAT **DURATION: 8 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Use apparatus and materials to demonstrate methods of heat transfer.	Definition of heat Conduction only occurs in solids. Convection occurs in liquids and gases.	Using metal rod with layer of wax and thumb tacks consecutively lining one end while heating from the other end. Observing convection in liquids using small flame.	Metal rod, wax, thumb tacks, clamp and stand, beaker with water, heat source, smoke box, material to make smoke, coductometer, potassium permanganate/dye, radiometer *A First Physics Course* [*Integrated Science for Caribbean Schools.* (Dalgety, et al)]	Rubric for assessing investigations.
Demonstrate and explain differences between the three methods of heat transmission.	There are three methods of heat transfer: 1. **Conduction** –heat moves as a result of particles gaining heat, vibrate, hit other particles and pass the heat (energy) on by direct contact without the particles changing their position. 2. **Convection** – particles gain energy and move out of position (upward) allowing cooler particles to take their place. This sets up a convection current. 3. **Radiation** – does not require a medium. Energy travels as waves. Can travel through vacuum as particles are not needed. Becomes heat energy only when it strikes particles in solids, liquids or gases. The darker the surface the better the absorption. Shiny and light surfaces reflect most of their heat.	Observe and record differences in rate of heat transfer in solids (metals), liquids (water), gases and radiant energy.	Clamp and stand, aluminum foil, cardboard, black paper, sunshine, thermometer. *Integrated Science for Caribbean Schools.* (Dalgety, et al)	Rubric for assessing investigations.

SCOPE OF WORK
GRADE 9
STAND: FORCES & ENERGY

TOPIC: HEAT

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Use a thermometer to measure temperature.	Temperatures measured in degrees Celsius and Fahrenheit. Mercury and alcohol thermometer Temperature is a measure of how hot or cold something is. Temperature is a measure of the average kinetic energy in a substance. Structure of a thermometer. Comparison of mercury and alcohol thermometers.	Use a thermometer to measure temperatures in Celsius and in Fahrenheit. Make a labelled diagram of a thermometer.	Laboratory thermometers	Accuracy of measurements; correct units used.
Make predictions on which materials will be heat conductors and heat insulators.	Metals are good heat conductors. Non-metals are good heat insulators	Observe materials usually used for holding hot pots, making pot handles, clothes, iron handles, iron surface, pots.	Assortment of materials	Plausible predictions.
Observe and identify good conductors of heat and good heat insulators.	**Conductivity** varies in different substances. It is better in metals than non-metals even though it varies from one type of metal to another. **Insulators** are poor heat conductors	Investigate which materials are best heat conductors and heat insulators from among an assortment of metals and non-metals.	Conduct-o-meters, with metallic and non-metallic rods. *A First Physics Course [Integrated Science for Caribbean Schools.* (Dalgety, et al)]	Correct classification of materials observed.
Classify materials as good or bad conductors of heat	Good insulators can be classified as bad conductors	Classify given list of materials as good or bad conductors of heat.	Conduct-o-meters, with metallic and non-metallic rods	Classify correctly. Correct classification of materials observed.
Observe differences in heat transfer in solids (metals), liquids (water) and gases.	Solid – heat moves from particle without particles moving Liquid and gases – convectional currents	Observe thumb tacks fall from metal rod as heat melts wax. Observe convectional current in water being heated, in smoke being heated.	Metal rod, wax, thumb tacks, clamp and stand, beaker with water, heat source, smoke box, material to make smoke. *A First Physics Course* [*Integrated Science for Caribbean Schools*. (Dalgety, et al)]	Oral description of (details) observations.

SCOPE OF WORK
GRADE 9
STAND: FORCES & ENERGY

TOPIC: HEAT

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Formulate a hypothesis on types of materials that are conductors or insulators of heat.	All metals are heat conductors. Non-metals are poor conductors so they make good insulators.	Check as wide a variety of metals and non-metals as possible for time taken for heat to pass through.	A variety of materials , metals and non-metals	Plausible hypothesis clearly stated.
Use apparatus and materials to demonstrate the effect of heat on solids, liquids and gases.	Heat causes matter to expand as their molecules gain heat energy and move outward.	Manipulate apparatus to demonstrate what happens to solids (metals) and liquids when heat is applied.	Bi-metallic strip, ball and ring, coloured water, conical flask, rubber stopper, glass tubing, trough, clamp and stand, Bunsen burner	Rubric for assessing investigation.
Construct bar graph to show relative heat conductivity of various metals.	Heat conductivity of metals can be compared in a conduct-o-meter.	Construct bar graph based on name of metal and time taken for wax to begin melting.	Square paper	Rubric.
Recognize variables that are controlled when using the conduct-o-meter.	For accuracy, reliability and validity of experiment, variables must be recognized and controlled, e.g. same length, same thickness.	Control variables such as same length of metal rods, same amount of and type of wax as different conduct-o-meters are heated.	Varying conduct-o-meter – one with metals of similar length and thickness, another with length controlled and thickness varying; another with thickness controlled and length varying	Valid variables identified.
Record times at which heat completed its travel through various metals in a conducto-o-meter.	Various metals take various times to conduct heat.	Conduct investigation. Observe when wax in the metal melts and record time in seconds.	Conduct-o-meter, heat source	Record of results and rank shown.
Construct a graph comparing conductivity of metals.	Information expressing results can be expressed in bar graphs.	Construct graphs.	Graph sheets	Accuracy of graphs.
Design and state the materials for a cooking pot that cooks food fast.	Choice of heat conductor must include easy availability on world market, and cost.	Drawing; state material, and give reason	Textbook, Internet	Plausible design and metal with high conductivity and low cost.

SCOPE OF WORK
GRADE 9
STAND: FORCES & ENERGY

TOPIC: HEAT

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Select materials best suited for removing hot pots or pans.	Padded cloths act as good insulators for removing hot pots or pans.	Check various soft materials to see which would take a long time to conduct heat.	Various soft materials	Appropriate materials selected; valid explanation given.
Identify flames for cooking vs. flames for light.	A blue flame gives more heat than a yellow flame. A bright yellow flame gives more light than a blue flame.	Comparing light from a blue flame with light from a yellow flame. Compare the amount of heat given to similar volumes of water in 10 seconds.	Bunsen burner, beaker, water	Correct choice of flame and reasons.
Explain why a blue flame is better for cooking than a yellow /red flame.	Cooking with a big yellow flame means that you are wasting gas or fuel since they carry less heat Yellow flames are good for giving light. Blue flames give the best heat for cooking.	Boiling equal amounts of water with blue and yellow flame and recording time taken to boil.	Bunsen burner, beaker, water	Correct explanation clearly and simply stated/written.
Recognize that colour and temperature of a flame are dependent on available oxygen for combustion.	Varying the intake of oxygen through a lighted Bunsen burner can alter the type of flame and affect the amount of heat the flame produces.	Observe and record flame colour as oxygen inlet is varied.	Bunsen burner, flame	Description of observations; explanation for observed changes clearly and simply stated/written.
Design and make a simple solar oven or water heater.	The knowledge of science can be used to activate technology which is the application of scientific principles.	Design and construct a simple solar oven or water heater.	Raw materials for solar oven construction	Rubric for assessing models.

SCOPE OF WORK
GRADE 9
STAND: FORCES & ENERGY

TOPIC: LIGHT **DURATION: 12 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Describe a wave.	The movement of energy from particle to particle, on a large scale is seen as a wave. The components of a transverse wave – crest, trough, amplitude, wavelength, speed, frequency.	Make waves in a trough with water and measure length of waves. Make waves with slinky spring. Make diagrams of waves.	Pneumatic trough, slinky, string, ruler, water	Labelled diagram.
Classify energy based on its wavelength (electromagnetic spectrum).	The electromagnetic spectrum classifies various forms of energy according to wavelengths. The part of the spectrum where wavelengths are visible is called light.	Research the electromagnetic spectrum. Draw samples of wavelengths to represent various types of energy forms, e.g. light, sound, heat not using actual lengths, but comparative lengths.	Trough, water, slinky spring, *General Science* (Silver Burdett)	Accuracy of representative diagrams.
Observe components of white light.	White light is made up of seven colours which can be seen when it is passed through a prism, a drop of oil, or reflected form a CD's surface. The colour of the spectrum reflected from an object is the colour of the object seen.	Use flashlight and prism to observe light spectrum. Use coloured filters to demonstrate why objects appear coloured.	Prism, flash light, cardboard	Description of phenomena observed.
Classify materials as luminous or non-luminous.	Definition of luminous (produces light) and non-luminous materials with examples of each.	Classify list of given materials as (light producers) luminous or non-luminous.	*A First Physics Course Integrated Science for Caribbean Schools* Bk. 3 (Dalgety et al.)	Correct classification.
Classify materials based on their transparency to light.	Definitions and examples of transparent, translucent, and opaque objects. Shadows are formed as a result of opaque objects blocking light rays.	Use flash light with various materials and classify them according to their transparency.	Flash light, assortment of materials	Correct classification.
Use apparatus to demonstrate light travels in a straight line.	Light is a form of energy which travels in straight line waves. One straight wave is referred to as a ray. A collection of rays is called a beam.	Use apparatus, e.g. ray box , ball and light to show light travels in straight lines. Draw diagrams to represent light ray path.	Ray box, flash light, ball *A First Physics Course Integrated Science for Caribbean Schools* Bk. 3 (Dalgety et al)	Demonstration, oral description, drawing of ray diagrams.

SCOPE OF WORK
GRADE 9
STAND: FORCES & ENERGY

TOPIC: LIGHT

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Observe formation of shadows.	Because light travels in straight lines, whenever an opaque object is placed in the path of light a shadow is formed. A small light source gives one solid dark patch. A large light source gives two kinds of shadows, a dark inner patch called the umbra, and a lighter outer patch called the penumbra.	Use opaque objects and light source to form shadows. Use diagrams to aid description of how shadows are formed.	Opaque objects and light source (flash light) *A First Physics Course Integrated Science for Caribbean Schools* Bk. 3 (Dalgety et al)	Rubric for assessing visual/oral presentations.
Plan an investigation to show how an inverted image is formed on the retina.	Light travels from a light source to an object then bounces off the object to the eye helping to form an image of the object. This image is formed upside down on the retina. The brain interprets the image right side up.	Use a large hand lens to capture inverted images on screen. Plan an investigation to show how an inverted image is formed on the retina.	Hand lenses *A First Physics Course Integrated Science for Caribbean Schools* Bk. 3 (Dalgety et al)	Logical plan including apparatus and method.
Make a model of a pinhole camera.	The structure of the camera is similar to the eye since they are both used for forming images based on light rays.	Make models of pinhole cameras. Compare diagrams of a camera and eye.	*A First Physics Course*	Comparison of the eye to the camera, number of similarities identified.
Use apparatus to demonstrate reflection of light.	Light reflects (bounce off) non – luminous reflective surfaces. This light enters the eye, forming an image of the object.	Using mirrors or polished surfaces and light source (flash light) to demonstrate reflection.	Mirrors, flash lights *Integrated Science for Caribbean Schools* Bk. 3 (Dalgety et al) *A First Physics Course*	Rubric for assessing correct and safe use of apparatus.
Observe reflection of light.	Light rays bounce off shiny, flat surfaces – **reflection**.	As above	As above	Oral description of reflection of light based on observation.

SCOPE OF WORK
GRADE 9
STAND: FORCES & ENERGY

TOPIC: LIGHT

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Classify mirrors.	Plane mirrors have a flat surface, produce same size images. Concave mirrors are curved inward, images may be magnified. Convex mirrors are curved outward, images are reduced in size.	Observe surfaces and images formed by mirrors of different shapes. Classifying mirrors as plane, concave or convex according to their shape and image formed Find out one use for each type mirror.	Various shaped mirrors.	Mirrors correctly classified based on their shape and images formed.
Find out how reflection of light is used in one device.	The application of the knowledge of light reflection is used in technological devices such as over head projectors, microscope and periscope.	Make and manipulate periscope. Use overhead projector to represent how reflective surfaces work.	Overhead projector, periscope	Rubric for assessing a product/model. Simple explanation of how they work.
Use knowledge of light reflection / absorption in choosing colours for a room.	Dark colours absorb light and make room appear small. Light colours reflect light easily and make room appear larger.	Observe and compare light reflected objects of different colours.	Colour filters *Science for Junior High*	Suggest a colour to paint a room based on its size.
Use apparatus to demonstrate refraction of light.	Light rays change direction (bend) every time they enter a new medium. Bending of light shows a “shorter” pencil and “closer” coin.	Lean a pencil in a beaker of water to show refraction. Use different types of transparent solids including lenses to show refraction.	Beaker or trough with water, pencil or coin	Rubric for assessing correct and safe use of equipment and materials.
Observe refraction of light.	Light shone through various media change direction.	Observing refraction of light through various media.	Perspex block, glass rectangular block. Various transparent materials to show refraction.	Oral description of observed refraction of light.

SCOPE OF WORK
GRADE 9
STAND: FORCES & ENERGY

TOPIC: LIGHT

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Classify lenses.	Concave lenses have their surfaces curved inward. They are diverging lenses because they cause light to spread out. Images are smaller. Convex lenses have their surfaces curved outward. They are converging lenses because they cause light to converge to a point. Images are magnified.	Classify lenses as converging or diverging based on shape and images formed.	Various lenses, *Integrated Science for Caribbean Schools* Bk. 3 (Dalgety et al) *A First Physics Course*	Correct classification.
Find out how refraction of light is used in one instrument or gadget.	Role of lenses in microscopes, telescopes, spectacles	Examine a compound microscope. Identify the lenses. Describe the role of each lens.	Microscope	Description includes: convex lenses in eyepiece and objectives magnify the size of the object.
Use apparatus to demonstrate dispersion of light.	Light can be dispersed into its seven colours, as seen in: rainbow, prism, drop of oil, CD surface	Manipulating a prism to demonstrate light dispersion.	CD, oil drop, prism, flash light *General Science* (Silver Burdett)	Rubric for assessing correct and safe use of apparatus.
Observe dispersion of light.	The seven colours of light are separated by a prism and other simple means.	Observe the colours formed by dispersion	Prism, flash light	Oral description of observations related to dispersion.
Make an oral presentation on the properties of light.	Light has several properties, including: wave motion, straight line motion, speed, refraction, reflection, dispersion,	Writing presentation	*General Science* (Silver Burdett) *Integrated Science for Caribbean Schools* Bk. 3 (Dalgety et al)	Rubric for assessing oral presentations.

SCOPE OF WORK
GRADE 9
STAND: FORCES & ENERGY

TOPIC: ELECTRICITY **DURATION: 8 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Use apparatus/materials to show difference between static and current electricity.	Definition of current and static electricity A simple circuit can show current electricity. Materials rubbed together e.g. plastic and wool, two balloons, can show static electricity.	Demonstrate difference between static and moving electricity.	Electrical circuit, plastic rod, bits of paper, piece of cloth	Use of materials and apparatus to show static and current electricity. Rubric for assessing correct and safe use of equipment and materials.
Use knowledge of static electricity in choice of (a) clothing material, (b) shelter in the open during a storm.	Lightning is an example of static electricity. Certain fabrics/materials when rubbed together or after being in an electric dryer have static charges. Lightning strikes the tallest object as clouds discharge – avoid trees, poles).	Test a variety of materials for static electricity by rubbing them then holding over bits of paper/sugar/salt.	Glass, silk, nylon, cotton, plastic, wool, cotton, linen, rubber General Science (Silver Burdett)	Materials selected for clothing and reasons given. Shelter to be avoided during electrical storms and reasons.
Make predictions on which materials will be electrical conductors and electrical insulators.	Definition of electrical conductor and electrical insulator. Insulators are materials which do not conduct electricity. Conductors allow electric current to flow through them.	Compile a sample list of materials that are insulators or conductors.	Assortment of materials	Plausible predictions with reasons.
Formulate a hypothesis on types of materials that are conductors or insulators of electricity.	All metals, carbon, and water with dissolved minerals can conduct electricity. Most non-metals are insulators.	Formulate hypothesis based on the compiled list above.	As above.	Plausible hypothesis clearly stated.
Classify materials as good or bad conductors of electricity.	Examples of good conductors are aluminium, copper, silver, carbon. These materials offer low resistance to the movement of electricity. Generally, metals are good conductors.	Classify an assortment of materials as good or bad electrical conductors.	Electrical circuit, ammeter, assortment of good or bad electrical conductors.	Correct classification.
Suggest a reason why certain electrical conductors are not used in electrical wires.	Even though silver has the highest electrical conductivity, just above copper, silver and other metals such as gold are more expensive to produce and are found in smaller quantities.	Groups: brainstorm, conduct research. Write suggested reasons.	Textbooks , Internet	Plausible reasons including cost and availability.

SCOPE OF WORK
GRADE 9
STAND: FORCES & ENERGY

TOPIC: ELECTRICITY

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Use knowledge of electrical conductivity in choosing materials which could be used to increase or decrease current flow when necessary.	Materials (resistors) with lesser conductivity can be placed in circuits to reduce current flow, while higher conductivity materials (conductors) may help increase current flow in circuits.	Introduce variable conductor materials to the circuit and record increase or decrease current flow.	Assortment of conductors – different metals of different sizes.	Completions Accuracy of measurement, measurements clearly recorded.
Use symbols to show parts of electrical circuits.	The parts of a circuit can be represented by symbols. Symbols for cell, battery, wire, resistor, key, light bulb, ammeter, voltmeter to be identified.	Make diagrams of symbols for components of a circuit.	Worksheet with diagrams and/or photographs of components of circuits.	Parts of a circuit correctly matched to their symbols.
Use a mini voltmeter to measure voltage of batteries.	Voltmeters are connected around a device whose voltage is to be measured. They are placed in parallel.	Use mini voltmeter to measure voltage across a cell/battery of cells.	Circuit board, voltmeter	Correct connection, accuracy of measuring voltage in volts.
Use an ammeter to measure current flow in a circuit.	Definition of a circuit. Simple circuits connected and in drawings with symbols. Ammeters are placed in series within a circuit.	Connect a simple circuit. Use mini ammeter to measure current flow in it.	Circuit board, ammeter	Correct connection, accuracy of measuring current in amperes.
Recognize and control variables when setting up electrical circuits.	Similar size and type conductor wire.	Class discussion.	Cell/battery, insulated wire, lamp	Plausible suggestions made.
Classify electrical circuits as series or parallel.	A series circuit has only one path for current to flow. A parallel circuit has more than one path for current to flow.	Classify given electrical circuits as series or parallel based on available paths for current to flow	Worksheet *Integrated Science for Caribbean Schools* Bk. 3 (Dalgety et al)	Correct classification.

SCOPE OF WORK
GRADE 9
STAND: FORCES & ENERGY

TOPIC: ELECTRICITY

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Use circuit boards to explain the path of electricity in series circuit and in a parallel circuit.	A series circuit has only one path for current to flow. A parallel circuit has more than one path for current to flow. Each circuit has its special use. Both have properties which lead to their advantages and disadvantages.	Manipulate circuits changing arrangement, adding and removing lamps to make parallel and series circuits. Record observations. Trace current path for each circuit.	Circuit board with additional lamps	Drawings showing paths.
Formulate a hypothesis on whether a series or a parallel circuit is better for use in homes.	Based on the properties of series and parallel circuits, parallel circuits are better for use in homes.	Group discussion. Formulate hypothesis with reasons.	Physics resource books. Advantages and disadvantages of series and parallel circuits.	Hypothesis clearly stated with plausible reasons.
Plan and conduct an investigation to determine whether lamps in series or parallel are better for homes.	When one light connection is broken in a series connection, the others following it are also out. In parallel the other light stays on.	Make miniature house with simple wiring as exhibit, or electrical circuit with light bulbs connected in series and in parallel.	Materials for miniature house and electrical circuit	Rubric for assessing an investigation.
Make models of electrical circuits.	The three basic parts of a simple circuit are: 1. A power source – e.g. cell/ battery 2. A path for electrons to flow – conductor wire. 3. A device – e.g. a lamp	Make models of circuits.	*Integrated Science for Caribbean Schools* Bk. 3 (Dalgety et al)	Rubric for assessing models.
Differentiate between AC and DC.	DC - current from cells and batteries (is called direct current). AC - current from local generators and places like BEC (is called alternating current).	Identify direct current and alternating current from several examples given.	*Integrated Science for Caribbean Schools* Bk. 3 (Dalgety et al) General Science (Silver Burdett)	Difference clearly stated.
Suggest reasons why even though The Bahamas is surrounded by much water, it still cannot use hydro-electricity.	There are certain requirements in the geography of a land before the infrastructure for hydro electricity can be considered. This includes a fast moving flow of water.	Research hydro dams and create a simple one using water in a trough.	Internet	Rubric for assessing models and research.

SCOPE OF WORK
GRADE 9
STAND: ECOLOGY

TOPIC: INVASIVE SPECIES **DURATION: 4 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Identify local invasive species.	An invasive species is an organism occurring as a result of human activities, beyond its normal distribution and which threatens valued environmental, agricultural and personal resources by the damage it causes. **Examples:** Lionfish, Feral hogs, Brazilian pepper, Casuarina, Scaevola Sericea, Bermuda grass and Poinciana.	Identify examples of local invasive species (or photographs).	The BEST Commission, Nassau, Bahamas The Ministry of Agriculture, Nassau, Bahamas. *Science for Junior High* Workbook by Nevillett Pearce.	Local invasive species correctly identified.
Design and conduct an investigation to determine the occurrence of a particular invasive species in an area.	Bermuda grass and Poinciana trees are tolerated by humans because of their landscaping appeal.	Design and conduct a survey of the school campus or neighbourhood to determine the occurrence of Bermuda grass, Poinciana.		A plausible outline plan of the investigation/survey; survey conducted and statement made based on data.
Use data collected to derive the population of an invasive species in a given area.	Number of Poinciana trees in an area X Km^2	Use data from above to derive the population of an invasive species in an area.		Population of invasive species and area studied recorded in table.
Make inferences on how local invasive species arrived in the area.	Humans introduce them for agricultural production, aquaculture, landscaping and biological pest control. They are also introduced unintentionally through transportation of goods, trade and tourism in ballast water of ships.	Infer how local invasive species identified arrived in the area.	*Science for Junior High* Workbook by Nevillett Pearce.	Plausible inferences with reasons.

SCOPE OF WORK
GRADE 9
STAND: ECOLOGY

TOPIC: INVASIVE SPECIES

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Compare the positive and negative effects of Bermuda Grass, Casuarina and Poinciana trees.	**Bermuda grass** – grows slower therefore less maintenance needed. Grows anywhere; excludes weeds. However, it pushes out all other species and grows over anything and into crevices. Difficult to eradicate. **Casuarina** – fix sand dunes, hardwood hedge. However, does not allow other plants to grow around it. Roots damage foundations and pavements, become hollow inside. **Poinciana** – beautiful flowers but sheds flowers in rainy season (slippery), habitat for ants, roots cause damage to structures, become hollow inside.	Group discussion. Conduct research.	BNT publications	Rubric for assessing research.
Find out information about natural predators of an invasive species found locally.		Select an invasive species and find out information about its natural predators.	Bahamas National Trust Library, Internet	Rubric for assessing research.
Make a presentation on two local invasive species.		In small groups, make an oral presentation along with PowerPoint or charts as visuals.	Bahamas National Trust BREEF	Rubric for assessing oral presentations.

SCOPE OF WORK
GRADE 9
STAND: ECOLOGY

TOPIC: INVASIVE SPECIES

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Describe the relationship between the spread of invasive species and environmental and/or human factors.	Ways in which a local invasive species is spread 1. Intentional introduction of species for use in biological production systems, i.e. agriculture, forestry, fisheries and landscaping, as well as recreational and ornamental purposes and for biological control of pests; 2. Intentional introduction of species as a commodity for uses where there is a known risk of escape or release to the wild, i.e. zoos, aquaculture, mariculture, aquariums, horticulture, pet trade, etc.; and 3. Unintentional introduction of species through pathways involving transport, trade, travel or tourism.	Describe the relationship between the spread of invasive species and environmental and/or human factors.	Visit Website: www.best.bs	The relationship clearly described, number of points included.
Trace the path showing the spread of a local invasive species.		Select a local invasive species and interview; an old person in the community, a farmer, environmentalist or landscaper to trace the path of its spread.	Visit website: www.best.bs	Plausible path given for the spread of a local invasive species.

SCOPE OF WORK
GRADE 9
STAND: ECOLOGY

TOPIC: INVASIVE SPECIES

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Predict the change in population and/or predict the occurrence of a local invasive species over the next three years.		Find out information on population changes of a local invasive species during the past two years and predict the change in population over the next three years.	Bahamas National Trust	Plausible prediction with reasons.
Formulate a hypothesis as to whether additional invasive species will be introduced and/or the extent to which newly introduced invasive species will spread during the next three years.		Conduct interviews. Formulate a hypothesis as to whether additional invasive species will be introduced and/or the extent to which newly introduced invasive species will spread during the next three years.	Gardening societies, farmers, landscapers, customs officers	Plausible hypothesis formulated with reasons.
Advocate the need to refrain from bringing into the country unknown species that are not previously approved by the Ministry of Agriculture & Marine Resources.		Write a short article (for students) or a brochure/flyer (for adults) to make persons aware of the need to refrain from bringing into the country unknown species that are not previously approved by the Ministry of Agriculture & Marine Resources.		Points made, relevance of points, convincing argument. Long-term behavior.
Suggest methods to prevent the introduction of invasive species into the country/island.	Plant native species in your yard and community Remove any invasive plant species from your yard and community and replace them with native species. Do not buy invasive species from nurseries.	Small group discussion. Compile a list of suggested methods to prevent the introduction of invasive species into the country/island.	BREEF	Number and plausibility of suggested methods.
Formulate a hypothesis as to whether nature would eventually eliminate invasive species in an ecosystem.		Group discussion. Formulate a hypothesis as to whether nature would eventually eliminate invasive species in an ecosystem.		Plausible hypothesis formulated.

SCOPE OF WORK
GRADE 9
STAND: ECOLOGY

TOPIC: NITROGEN CYCLE **DURATION: 3 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Label a diagram of the Nitrogen Cycle.	The nitrogen cycle shows the forms of nitrogen that exists naturally and how nitrogen is changed from one form to another.	Label a variety of diagrams of the nitrogen cycle.	Three different diagrams of the Nitrogen Cycle *Science for Junior High* by Nevillett Pearce	Diagrams correctly labeled.
Dramatize the Nitrogen Cycle.	Nitrogen occurs as free nitrogen gas in the air. Lightning converts gaseous nitrogen to nitrogen oxides. Nitrites occur in the soil. Bacteria change nitrites to nitrates. Nitrates are absorbed by plants that convert the nitrogen to proteins. Plant proteins are eaten by animals and converted to animal proteins. Animals release urine which is converted in the soil to ammonium compounds. Bacteria cause plants and animals to decay releasing simple nitrogen compounds from proteins. Nodules on leguminous plants have bacteria that convert gaseous nitrogen to nitrates.	Use cards with the forms/compounds of nitrogen represented in the nitrogen cycle. Students dramatize the conversion of nitrogen from one form to another throughout the nitrogen cycle.	Cue cards and any other propos desired.	Rubrics for assessing oral presentation/dramatization.
Explain how Nitrogen is circulated in nature.	Bacteria are responsible for most conversions of nitrogen from one form to another. **Nitrifying** bacteria convert simple nitrogenous compounds to more complex ones. **Denitrifying** bacteria convert complex nitrogen compounds to simple ones. **Nitrogen-fixing** bacteria convert gaseous nitrogen directly to nitrates.	As above – describe the role of each type of bacteria.	*New Integrated Science for the Caribbean*, Second Edition by Lucy Durgadeen, Steve West & Eugenie Williams, Bk. 2	The role of the three types of bacteria clearly stated and compared.

SCOPE OF WORK
GRADE 9
STAND: ECOLOGY

TOPIC: NITROGEN CYCLE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Make a model of the Nitrogen Cycle.		In small groups and available materials to make a model of the nitrogen cycle.		Rubric for assessing models.
Observe root nodules.	Leguminous plants (bear pods) have "bumps" called nodules on the roots. Nitrogen-fixing bacteria live in the root nodules.	Observe photographs of leguminous plants (e.g. pigeon peas, beans) Make a diagram of roots showing nodules.	Photographs of leguminous plants (e.g. pigeon peas, beans) and of roots showing nodules.	Diagrams of roots observed and position of root nodules.
Classify the types of bacteria that act in the Nitrogen Cycle.	As above	Identify a symbol to represent each type of bacteria. Indicate the appropriate symbols on the arrows showing conversion of nitrogen compounds on a diagram of the nitrogen cycle.	Diagram of the nitrogen cycle	Bacteria correctly classified.
Explain the extent to which it is beneficial to place plant cuttings or humus around plants as a source of nitrogen.	Denitrifying bacteria cause plant cuttings and humus to decompose. This forms ammonium compounds which are converted to nitrates by nitrifying bacteria.	Group discussion. Explanation formulated.	*Science for Junior High* by Nevillett Pearce	Oral explanation – logical explanation given.
Find out methods of enriching nitrogen-poor soils.	Add a nitrogenous fertilizer, e.g. ammonium nitrate to the soil. Cultivate nitrogen-fixing plants e.g. leguminous plant in the soil.	Find out methods of enriching nitrogen-poor soils.	Biology resource books, Internet.	Suitable methods suggested with plausible reasons.

SCOPE OF WORK
GRADE 9
STAND: ECOLOGY

TOPIC: NITROGEN CYCLE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Justify the need to cultivate legumes in home gardens.	Leguminous plants are nitrogen-fixing plants. Nitrogen fixing bacteria live in the soil and in the root nodules of leguminous plants. They are able to convert nitrogen gas into nitrogen compounds, e.g. nitrates which plants can use to make proteins in order to grow.	Small group discussion. Write a justification for the need to cultivate legumes in home gardens.	Biology resource books, Internet.	Number of points (advantages), logical reasoning, convincing argument.
Cultivate leguminous plants.		Cultivate leguminous plants, e.g. peas in school garden and in a home garden.	Home and school garden.	Common leguminous plants selected and cultivated. Long-term behaviour.
Formulate a hypothesis as to whether human factors would change nature's cycling of Nitrogen.		Class discussion. Formulate a hypothesis.	Internet.	Plausible hypothesis formulated with reasons.

SCOPE OF WORK
GRADE 9
STAND: ECOLOGY

TOPIC: SOLID WASTE **DURATION: 6 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Observe and identify common items/materials that form litter.	Litter is refuse, especially paper, discarded other than in proper receptacles and evident strewn about. Common materials that form litter: Paper, cardboard boxes, plastic bags, beverage cans, food containers.	Groups brainstorm and identify items that a student could possibly throw into the trash can on a typical school day. Compile a second list of items from the first list, that are found as litter.	*New Integrated Science for the Caribbean*, Second Edition by Lucy Durgadeen, Steve West & Eugenie Williams, Bk. 1	Number of items correctly identified.
Classify solid waste as biodegradable or non-biodegradable.	Biodegradable solid waste can be broken down by bacteria, e.g. food Non-biodegradable solid waste, e.g. most plastics cannot be broken down by bacteria.	Classify example of solid waste as biodegradable and non-biodegradable.	Worksheet *New Integrated Science for the Caribbean*, Second Edition by Lucy Durgadeen, Steve West & Eugenie Williams, Bk. 3	Waste classified correctly (worksheet).
Draw conclusions on the length of time for common land pollutants to break down.	Plastics are non-biodegradable. They are not decomposed or broken down by bacteria. They remain in the environment for a very long time. Food substances are biodegradable and they are broken down by bacteria. They remain in the environment for a short time.	Identify some common land pollutants and draw conclusions on the length of time each takes to break down.	*New Integrated Science for the Caribbean*, Second Edition by Lucy Durgadeen, Steve West & Eugenie Williams, Bk. 3	Plausible conclusion drawn.
Classify/sort solid waste for disposal.	Ideally, each household should sort various types of solid waste, e.g. cans, paper, bottles, green waste, white waste and hazardous waste and put them in separate containers for separate collections.	Group discussion. Perform simulated classification and sorting of solid waste accumulated in home for the arrival of the garbage truck.	Index cards representing examples of common solid waste accumulated in home.	Solid waste classified and sorted correctly.

SCOPE OF WORK
GRADE 9
STAND: ECOLOGY

TOPIC: SOLID WASTE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Make brochures to promote sorting household solid waste.		Make brochures and display them on bulletin boards in classrooms and on the corridors.	Computer, bulletin boards.	Rubric for assessing visual aids/ brochures.
Design a sorter for household solid waste.		Design a sorter.	Internet.	Rubric for assessing models.
Design and conduct an investigation to determine the most common land pollutant in the area.	Pollution is the presence of unpleasant or harmful substances within the environment. These substances are called pollutants.	Plan an investigation, conduct a survey of the school campus or a neighbouring area to determine the most common land pollutant.	Tally counter, form for listing and tallying types and number of pollutants	Rubric for assessing investigations.
Use a bar graph to show the types and number of items forming land pollutants.	Examples of land pollutants: Plastic items, empty cans, derelict cars, discarded household appliances, tyres, disposable diapers. Math skill: Bar graphs	Use a data table to show types of land pollutants and their amounts (above) to draw a bar graph.	Land pollutants identified above	Rubric for assessing graphs.
Calculate the percentage of the most common pollutant in litter collected and examined in an area.	Math skill: Percentages	As above	As above	Correct process in calculating percentage.

SCOPE OF WORK
GRADE 9
STAND: ECOLOGY

TOPIC: SOLID WASTE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Make an inference as to the circumstances under which most littering occurs.	Circumstances under which most littering occurs 1. Refuse containers are not provided. 2. Refuse is not disposed of on a regular basis. 3. Recycling procedures are not practiced. 4. Persons are not educated about the harmful effects of littering on the environment.	Based on the types and locations of litter (above) make inferences as to the circumstances under which most littering occurs.	Information from survey above	Plausible inferences made.
Write a news article or cartoon provoking action against littering.		Write a news article or cartoon provoking action against littering.		Rubric for assessing written article or cartoon (oral presentation).
Relate population size/change to the amount of solid waste produced.	As the population increases the amount of solid waste produced also increases.	Group discussion. Write a statement to show relationship between population size and the amount of solid waste produced.		Number of points (showing relationship) logical reasoning, convincing argument.
Relate socio-economic groups with different composition of solid waste produced.	The composition of solid waste produced is influenced by the income of the group. Persons in a bigger income bracket are likely to produce a wider range of solid waste items on a daily basis.	Group discussion.		(Group report) - Number of points (relationships) logical reasoning, convincing argument.

SCOPE OF WORK
GRADE 9
STAND: ECOLOGY

TOPIC: SOLID WASTE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Make a poster showing the method of solid waste disposal for the island.		Make a poster Field trip to the Solid Waste Disposal Site.	Construction paper.	Rubric for assessing posters (visual aids).
Predict whether landfills will adequately service waste produced for the next 20 years.	Firstly, waste should be recycled and reused in order to reduce the amount of waste left for disposal. Landfills will adequately service waste produced for the next 20 years if they are constructed and maintained properly.	Field trip to the Solid Waste Disposal Site (as above).	*New Integrated Science for the Caribbean*, Second Edition by Lucy Durgadeen, Steve West & Eugenie Williams, Bk. 1	Clearly stated prediction with valid reasons.
Make a model of a landfill.		Make a model of a landfill.	Diagrams from Department of Environmental Health Services, Internet	Rubric for assessing models.
Formulate a hypothesis as to whether education would change people's bad practices in disposing of solid waste.	If people are educated as to the environmental problems caused by the improper disposal of solid waste they may change their bad practices.	Group discussion. Formulate a hypothesis.		Plausible hypothesis formulated with reasons stated.

SCOPE OF WORK
GRADE 9
STAND: ECOLOGY

TOPIC: SOLID WASTE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Recognize and control variables when taking a survey to compare behaviours to solid waste disposal.	A controlled variable is a variable held constant in order to assess the relationship between two other variables, the independent and dependent variable. The independent variable is the variable changed by the experimenter. The dependent variable is the variable changed by the experiment.	Recognize and control variables e.g. school, grade level, age group when taking surveys.	Internet.	Correct variables controlled during survey.
Conduct a survey to determine the extent to which the theme "Reduce, Reuse, Recycle" is implemented.	Environmentally aware consumers are producing less waste by practicing the "3Rs" These practices will tend to decrease pollution and conserve raw materials.	Conduct a survey using questionnaires or interviews.	Questionnaires.	Rubric for assessing investigations.
Make a product based on one of Reduce, Reuse, Recycle waste.		Make a product based on one of Reduce, Reuse, Recycle waste	Examples of waste materials used at home.	Rubric for assessing model/product.
Apply the three R's Reduce, Reuse, Recycle in dealing with solid waste.	Buy products that are less toxic and contain less packaging. Use reusable containers. Maintain and repair products. Participate in recycling programmes. Buy products from recycled materials.	Apply the three R's at home and at school.		Long-term behavior.

SCOPE OF WORK
GRADE 9
STAND: ECOLOGY

TOPIC: SOLID WASTE

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Research methods of solid waste management in small island states.	Waste management is the collection, transport, processing, recycling or disposal of waste material. Methods 1. Disposing of waste in a landfill. 2. Incineration or combustion of waste material. 3. Recycling.	In groups, research methods of solid waste management in small island states.	Department of Environmental Health Services Internet.	Rubric for assessing research.
Evaluate the methods of solid waste disposal used in small island states and justify which method is most efficient and effective.		In groups identify and evaluate methods of solid waste disposal used in The Bahamas and at least one other small island state.	Department of Environmental Health Services Internet.	Critical analysis (advantages and disadvantages, short and long-term effects, economic impact); number of points that show one method to be efficient and effective.

SCOPE OF WORK
GRADE 9
STAND: HUMAN BODY

TOPIC: PUBERTY **DURATION: 1 lesson**

LEARNER OUTCOMES	CONTENT	ACTIVITY	RESOURCES	METHOD OF ASSESSMENT
Describe the signs of puberty.	Puberty is the stage at which a human becomes sexually mature. The age at which this happens varies between genders and within each gender. Puberty is controlled by hormones (oestrogen and testosterone).	Class discussion List and describe signs associated with puberty/adolescence.		Outward signs that accompany adolescence.
Calculate the number of fertile years for women.	The reproductive or fertile period, for women, is the period between puberty and menopause. Menopause is the stage when no more ova are produced and no further menstrual periods occur. This stage lasts for different periods. "Hot flashes", insomnia, mood swings, weight gain are some signs of menopause.	Calculate the number of years in the fertile period for women, given the ages of puberty and menopause. Class discussion on signs and symptoms of menopause.		Correct calculations for reproductive years. Signs and/or symptoms related to menopause given.
Justify the term "secondary sexual characteristics".	Growth of body hair, development of breasts and onset of "period" in females, broadening of shoulders/chest in males and hips in females are second in importance to the release of mature gametes.	In groups identify secondary sexual characteristics. Brainstorm reasons for the terminology.	*Human & Social Biology for the Tropics*.	Number of points made and logical argument.
Formulate a hypothesis as to factors that might influence the onset of puberty.	Diet, hormone imbalance, growth rate.	Group brainstorming and discussion. Formulate a hypothesis as to factors that might influence the onset of puberty.		Clearly stated hypothesis with plausible reasons.

SCOPE OF WORK
GRADE 9
STAND: HUMAN BODY

TOPIC: REPRODUCTIVE SYSTEMS **DURATION: 2 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITY	RESOURCES	METHOD OF ASSESSMENT
Identify the structures of the male reproductive system.	Testis (testicle), scrotum, epididymis , vas deferens, seminal vesicle, prostate, urethra, penis, bladder, cowpers gland	Observe structures of the male reproductive system on diagrams or models. Label diagrams of the male reproductive system.	Posters, model and diagrams of the male reproductive system.	Structures of male reproductive system clearly labeled.
Relate each male structure to its function(s).	Functions of structures named above.	Matching games (structure and function), puzzle, team oral quiz, Add notes on functions to diagrams above.	As above	Annotated diagram (function written next to label of each structure).
Identify the structures of the female reproductive system.	Ovary, fallopian tube (oviduct) vagina, uterus, cervix, vagina	Label structures of male/female reproductive system. Organize paper cutouts of system structures into composite illustrations.	Diagrams, charts, models, construction paper, scissors, glue, handouts	Correct labeling for reproductive systems.
Relate each female structure to its function(s).		Matching games (structure and function), puzzle, team oral quiz, Add notes on functions to diagrams above.	Diagrams of the female reproductive system.	Annotated diagram (function written next to label of each structure).

SCOPE OF WORK
GRADE 9
STAND: HUMAN BODY

TOPIC: PREGNANCY **DURATION: 1 lesson**

LEARNER OUTCOMES	CONTENT	ACTIVITY	RESOURCES	METHOD OF ASSESSMENT
Describe the sequence of events in human fertilization.	Life span of sperm 2 – 3 days, life span of ovum 1 day. Erection, ejaculation, number of sperms, seminal fluid, pathway of sperms. Fertilization in oviduct/fallopian tubes, zygote.	Observe photographs, posters and models. Write the sequence of events in human fertilization.	Resource books	Written description in sequential notes.
Compare fertilization to produce one embryo with that for twins.	Sperm and ovum unite to form one cell – zygote develops into a foetus (baby). The zygote splits in half – each half develops into a foetus producing identical twins. Two ova released, each fertilized by one sperm – two zygotes develop forming two fetuses, non-identical twins.	Observe diagrams		Differences clearly explained.
Explain the importance of the placenta.	Forms attachment to the uterine lining – anchor, allows substances (food, oxygen, carbon dioxide and urea) to pass between mother and foetus. Drugs and medication are carried across the placenta and into bloodstream of fetus.	Group brainstorming, class discussion Experiment: Use osmosis to show how materials travel across semi-permeable membrane.	Worksheet Beakers, cellophane, elastic bands	Correct labeling of diagram, indication of the direction in which (named) substances move. Oral description.
Make a model of a foetus in the uterus.	Birth position, womb, cervix, vagina, amniotic sac, fetus, placenta	Construct a model of a fetus.	Clay, clear plastic bags, water, rubber bands, plastic funnels, balloons, newspapers, toothpicks	Rubric for assessing models.
Compare the features of a foetus in the three trimesters.	Development of limbs, proportion of head and trunk, definition of digits, development of eyes, ears, heart.	Observe photographs or posters Complete a table comparing features at 3, 6 and 9 months or 1, 3, 6 months or 2, 5 and 8 months.	Diagrams showing major developments in the foetus each month during pregnancy. *Human and Social Biology for the Tropics.*	Correct information compared in a table.

SCOPE OF WORK
GRADE 9
STAND: HUMAN BODY

TOPIC: PREGNANCY

LEARNER OUTCOMES	CONTENT	ACTIVITY	RESOURCES	METHOD OF ASSESSMENT
Describe the sequence of events in parturition/birth.	Progesterone level decreases, foetus turns, uterine wall contracts, cervix dilates, amnion breaks, baby emerges, placenta emerges, umbilical cord is cut.	Observe photographs Read an account of parturition/birth Group discussion. Complete steps given on worksheet.	Photographs of child birth *Human & Social Biology*	Description and sequencing of stages in child birth (worksheet).
Explain the importance of amniotic fluid.	Amniotic fluid provides protection for fetus during development, indicates the onset of labour as well as sterilizes and lubricates the birth canal.	Suggest the effects of inadequate amniotic fluid on the fetus. Use various items to demonstrate how amniotic fluid protects the fetus.	Eggs (uncooked in shell), sealable containers, water, water balloons	Clarity of explanation and demonstration of the protective role of the amniotic fluid.
Predict the effect of the mother's dietary practices on the fetus.	Too little: protein, minerals (especially iron, calcium, phosphorus), vitamins, water. Too much carbohydrates (especially sugar), fats, salt	Review dietary deficiency diseases (Grade 7) Group discussion – what are the special needs during pregnancy? Predict the effect of the mother's dietary practices (specified) on the fetus.		Prediction based on information given with plausible reasons.

SCOPE OF WORK
GRADE 9
STAND: HUMAN BODY

TOPIC: THE MENSTRUAL CYCLE **DURATION: 3 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITY	RESOURCES	METHOD OF ASSESSMENT
Explain the sequence of events that accompany the development and release of an ovum during the menstrual cycle.	Ovum in one ovary develops, is released (ovulation), dies. Next cycle an ovum from the other ovary develops etc.	On a 28-day cycle show the stages of the ovum's development.		Correct sequence of the ovum's development during the cycle.
Describe the sequence of events that accompany the changes in the uterine lining during the menstrual cycle.	Uterine lining is shed at the beginning of cycle, a new lining develops and thickens (thickest around ovulation),. Lining is shed at the beginning of new cycle.	On a 28-day cycle show the stages of the development and shedding of the uterine lining.		Description includes: stages of the development and shedding of the uterine lining during the cycle.
Describe the change in hormone levels that occur during the menstrual cycle.	Oestrogen level increases from menstruation to ovulation. Decreases after ovulation. Progesterone increases similar to oestorogen but some days later. Should fertilization occur, the level of progesterone remains high.	On a 28-day cycle show the change in level of oestrogen and progesterone.		Description includes: increasing, maximum and decreasing levels of hormones shown during the cycle.
Justify the term menstrual cycle.	The sequence of events for the: ova, uterine lining and hormone levels are repetitive over a given period of time. Hence they are cyclical.	Group discussion. Review reasons for nutrient cycles being termed cycles. Record reasons why "cycle" is a part of the term menstrual cycle.	Diagrams of carbon, nitrogen and water cycles, 28 day menstrual cycle (above)	Number and relevance of reasons why "cycle" is a part of the term menstrual cycle.
Deduce the menstrual cycle stage based on hormone levels.	Pre-ovulation, ovulation, post ovulation, menstruation	Observe diagrams showing the level of progesterone and/or oestrogen. Identify the stage of the menstrual cycle the diagram represents.	Diagrams	Plausible inferences made/ conclusions drawn.

SCOPE OF WORK
GRADE 9
STAND: HUMAN BODY

TOPIC: THE MENSTRUAL CYCLE **DURATION: 3 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITY	RESOURCES	METHOD OF ASSESSMENT
Conclude whether conception is possible at given stages of the menstrual cycle.	Pre-ovulation, ovulation, post ovulation, menstruation	Observe diagrams showing the developmental level of the ovum. Based on the diagrams conclude whether conception could take place at the stage in the cycle shown by the diagram. Suggest necessary conditions for successful conception.	Diagrams	Correct inferences made or conclusions drawn.
Predict the date of menstruation for a given cycle.	Day one of the menses/period is day 1 of the menstrual cycle. The cycle ends the day prior to the next period. Day 1 of the cycle is not necessarily Day 1 of the month.	Examples given for 28 and 30 day menstrual cycles. Day 1 is given for different days of the month (calendar). On a calendar, mark plausible dates of onset of the menstrual cycle for three months.	Calendars, markers/colour pencils, charts,	Plausible predicted dates indicated on calendars.
Identify and justify practices that preserve regular/healthy menstrual cycle.	Exercise, diet, regular checkups, stress elimination	Create a brochure advising peers to practice methods to ensure a healthy period.	Healthcare professional, Chart paper, markers, colour pencils	Rubric for assessing visual aids.

SCOPE OF WORK
GRADE 9
STAND: HUMAN BODY

TOPIC: CONTRACEPTIVES **DURATION: 2 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITY	RESOURCES	METHOD OF ASSESSMENT
Explain the term contraceptive.	A device, substance or action that prevents pregnancy.	Brainstorm definition.		Oral definition
Classify contraceptives as barrier, hormonal, surgical, and natural.	Condom, patch, sponge, pill, injection diaphragm and cap, spermicide, rhythm, vasectomy, tubal ligation, coil or intra-uterine device, ring	Classify contraceptives under appropriate group headings.	Contraceptives or pictures of each.	Correct classification.
Evaluate advantages and disadvantages of using named contraceptives.	Condom, patch, sponge, pill, injection diaphragm and cap, spermicide, rhythm, vasectomy, tubal ligation, coil or intra-uterine device, vaginal ring	Class discussion. Complete a table listing advantages and disadvantages of using/ not using contraceptives. Rank methods of contraceptives in order of effectiveness (expected).	Pamphlets	Number of points made, accuracy of information in table.
Suggest reasons for differences in contraceptive use among various people.	Age, gender, race, economic level, level of education	Class discussion Conduct survey to find out people's opinion as to differences.	Survey instrument - questionnaire	Rubric for assessing conducting a survey.
Hypothesise about economic/social implications of using/refraining from using contraceptives.	Cost, trends	List advantages and disadvantages of using/ not using contraceptives. View documentary.	VCR, video, television	Plausible hypothesis with reasons.
Identify and justify practices adopted to prevent unwanted pregnancies.	Abstinence methods of contraception	Create cartoon/comic strip urging others to practice methods that ensure their protection from unwanted pregnancies.	Healthcare professional Chart paper, markers, colour pencils	(Number and validity of reasons given, logical and convincing argument made, visual appeal of cartoon/comic strip) Rubric for assessing visual aids.

SCOPE OF WORK
GRADE 9
STAND: HUMAN BODY

TOPIC: SEXUALLY TRANSMITTED INFECTIONS **DURATION: 3 lessons**

LEARNER OUTCOMES	CONTENT	ACTIVITY	RESOURCES	METHOD OF ASSESSMENT
Distinguish between a STI and other infections.	Sexually Transmitted Infections are transmitted by sexual contact	Brainstorm differences and definition.		Oral definition.
Describe the signs and symptoms of Gonorrhoea.	Itching and burning when urinating, untreated eventually: sterility, heart disease, blindness and death.	Class discussion In groups make an oral presentation with visual aids.	*Human and Social Biology for the Tropics*	Rubric for assessing oral and visual presentations.
Describe the signs and symptoms of syphilis.	Sore on genitals, untreated – body rash, eventually – insanity and death.	Class discussion In groups make an oral presentation with visual aids.	*Human and Social Biology for the Tropics*	Rubric for assessing oral and visual presentations.
Describe the signs and symptoms of herpes (genital).	Itching and rash that turns to blisters then sores on the genitals	Class discussion In groups make an oral presentation with visual aids.	*Human and Social Biology for the Tropics*	Rubric for assessing oral and visual presentations.
Describe the signs and symptoms of HIV/AIDS.	Advanced stages – dry skin, blotches on skin, signs of secondary disease/illness	Class discussion In groups make an oral presentation with visual aids.	Materials for the AIDS Secretariat	Rubric for assessing oral and visual presentations.
Classify STIs based on their causative agents.	Bacteria – gonorrhoea, syphilis treated with penicillin Viruses – no cure	Classify causative organisms as bacteria or viruses.	*Human and Social Biology for the Tropics*	Classification with reasons.
Construct bar graph of the STI statistics recorded within the past decade.	Gonorrhoea, syphilis, herpes, HIV/AIDS total number of cases for each disease in the past 10 years.	Class discussion. Construct a graph.	Statistics from the Ministry of Health. Rulers, graph paper,	Rubric for assessing graphs.
Suggest reasons for changes in the number of STI cases over the years.	Use of protection, abstinence, time period, level of education	Group discussion/individual "soap box" 2 – 3 minutes.		Valid and plausible reasons given.
Identify and justify practices adopted to prevent contracting an STI.	Abstinence, condoms	Write a letter to a friend urging him/her to practice methods that ensure their protection from STIs	Materials from Health Education Division of Ministry of Health. Healthcare professional	Number and validity of reasons given, logical and convincing argument made.

SCOPE OF WORK
GRADE 9
STRAND: TECHNOLOGY

DURATION: 4 lessons

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Recognize the relationship between height of ceiling and roof to temperature of room.	Hot air rises by convection. As the height of the ceiling and roof increases, the hot air rises further from the floor, making rooms cooler.	Design an investigation using model houses to determine whether the height of ceilings/roofs has an effect on the temperature in the rooms of houses.	Textbooks – transmission of heat by convection in air.	Plan includes different height ceiling and roofs.
Observe pictures of houses with different height roofs.		Observe pictures of houses with different height roofs. Compare the relative expected temperatures in the houses.	Photographs of houses/buildings with different height roofs.	Comparison with correct, logical reasoning.
Observe pictures of houses with different height ceilings.		Observe pictures of houses with different height ceilings. Compare the relative expected temperatures in the houses.	Photographs of houses/buildings with different height ceilings.	Comparison with correct, logical reasoning.
Classify types of light bulbs according to the relative amount of energy used.	Incandescent light bulbs use much energy. The larger the amount of power i.e. number of Watts, the greater the energy used. Fluorescent bulbs use less energy. Low-energy bulbs reduce the brightness and use less energy.	Darken a room and observe the difference in brightness with different bulbs used in a lamp.	40W, 60W, 100W incandescent bulbs, fluorescent bulb and low-energy bulb.	Correct classification process and classification of bulbs.
Recognize the relationship between the brightness of lights and amount of energy used.	The power of a light bulb, in Watts, is a measure of how many Joules of energy are converted to heat and light each second e.g. 100W bulb uses 100J of energy every second to produce a bright light.	Record the amount of energy used per second to produce light in each of the bulbs observed. Indicate next to each bulb a code for its relative brightness observed. Write a sentence describing the relationship between brightness of lights and the energy used.	As above	Clearly stated relationship between the brightness of lights and energy used.

SCOPE OF WORK
GRADE 9
STRAND: TECHNOLOGY

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Observe pictures of houses with solar panels.	Solar panels vary in size. They are installed horizontally to maximize collection of sunlight. Panels are often placed on roofs.	Describe solar panels on houses and their position.	Photographs of houses with solar panels.	Detailed/accurate observations included in description.
Formulate a hypothesis on The impact of solar energy on the Bahamas both environmentally and economically.	Solar energy is a form of renewable energy. There is relatively low cloud cover in The Bahamas, maximizing the amount of solar energy available. Solar energy, itself is free. There is no harmful by-product of solar energy.	Group brainstorming advantages and disadvantages of gasoline produced energy for homes and solar energy as a source of energy for homes.	Textbook: renewable and non-renewable forms of energy.	A valid hypothesis with supporting reasons given.
Recognize and compare the thickness, texture, colour and material when comparing walls for buildings.	Thicker external walls provide strength to building. Concrete walls heat faster and hold heat longer than wooden walls. Darker coloured (painted) external walls gain heat faster and retain heat longer.	Design an investigation to determine whether thickness, texture, colour and material used for exterior walls of houses have an effect on the temperature of the rooms.	Textbook – transmission of heat by radiation.	Rubric for assessing a plan for an investigation.
Design a simple investigation to determine the best type of windows for constructing buildings in tropical climates.	Heat and hurricanes are tropical factors for consideration in selecting windows for buildings. Plexi glass, tinted windows, glass, shatter-proof glass.	Plan an investigation to determine the best type of windows for constructing buildings in tropical climates.		Rubric for assessing a plan for an investigation.
Research latest materials used in windows, hurricane shutters, roofs.		Conduct research on the latest materials used in windows, hurricane shutters, roofs.	Brochures from Building Supply Companies, Internet.	Rubric for conducting research.

SCOPE OF WORK
GRADE 9
STRAND: TECHNOLOGY

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Assess photos of a few houses to rate their efficiency in reducing electrical usage to cool the building.	Low roof, low ceiling, few windows, no-cross ventilation, concrete walls painted dark colours, dark colour roof and incandescent bulbs increase the use of electricity so increasing the electricity usage and fees.	Observe photographs or models of houses, develop rubrics to rate the houses on the efficiency in reducing electrical usage to cool the building. Complete a matrix rating features of the houses.	Photographs of houses that differ in design and materials used in construction.	Information provided in matrix and ratings.
Observe water saving plumbing gadgets.	Gadgets that can be affixed to taps, shower head and toilet tanks to reduce the water flow, reduce wastage of water and consequently reduce cost of water.	Observe water saving plumbing gadgets. Observe demonstration use of kit. Calculate the difference in water usage for a home in one week.	Kits with gadgets to reduce water flow.	Correct calculations and conclusion stated based on data.
Measure dimensions for constructing a model house.				Accuracy of measurements.
Construct a model house including technology.	Select materials to represent materials studied – roofing, ceiling, walls, windows, colour.	Construct a model house including technology studied.		Rubric for assessing models; representation/inclusion of technology.
Formulate a hypothesis on the effect of one aspect of technology to the efficiency or usefulness of the house.	Factors to be considered – ventilation, heat/temperature of rooms, hurricane-proof, reduced usage of electricity, eco-friendly.	Select on aspect of technology applied to the construction of houses studied, to review. Formulate a hypothesis on the effect of it to the efficiency or usefulness of the house.		Valid hypothesis and logical reasons stated.

SCOPE OF WORK
GRADE 9
STRAND: TECHNOLOGY

LEARNER OUTCOMES	CONTENT	ACTIVITIES	RESOURCES	METHOD OF ASSESSMENT
Design a simple investigation to determine the best available materials for constructing buildings for humid climates.		Interview the purchaser for supplies for the store. Interview a building contractor. Research via the Internet. Plan an investigation to determine the best available materials for constructing buildings for humid climates.	Building supplies store, Internet	Plan is simple, logical and covers most categories of building materials.
Make informed, responsible and wise decisions for materials and designs to be used in constructing buildings in tropical conditions.		Interview the purchaser for supplies for the store. Interview a building contractor. Research via the Internet. Record findings.	Building supplies store, Internet	Rubric for assessing investigations/research.

APPENDIX I
RUBRIC FOR ASSESSMENT

What is Rubric?

Rubric – a set of guidelines for assessment which states the characteristics and/or dimensions being assessed with clear performance criteria and a rating scale. – *Policy on Assessment and Evaluation published by the Scarborough Board of Education, 1977.*

A scoring rubric consists of:
- A fixed scale
- A list of characteristics/criteria describing performance for each of the points on a scale.
- Clear performance targets for students.

How to design a Rubric
- Select a result/results based on a learner outcome that will be assessed.
- Describe a superior performance.
- Describe a low-level performance.
- Set different level performances between the high and low level performances described.
- Explain the scoring criteria to students.
- Use examples to assist students in using the rubric as a means of demonstrating their understanding.

Examples of Rubric are included in this document to assist teachers in effectively using alternative methods of assessment. However, the use of Rubric for assessment is not limited to the categories shown. Teachers are encouraged to develop similar Rubric to assess learner outcomes or student activities that are not included. Additionally, teachers are expected to develop score sheets based on the criteria. An example is shown.

RUBRIC SCORE SHEET FOR ASSESSING VISUAL AIDS

Students' Names or Groups	Visual appeal	Use of space	Comprehension of assignment	Content – information	English	Effectiveness in making a point	Creativity	TOTAL	Percentage

GENERAL RUBRIC FOR VISUAL AIDS
(posters, pamphlets/brochures, fliers, PowerPoint presentations)

Criteria	Exemplary **4**	Proficient **3**	Satisfactory **2**	Incomplete/ Below standard **1**	Unsatisfactory **U**
Visual appeal	Very attractive colour scheme, bold, easily-read writing, very attractive and appropriate graphics.	Attractive colour scheme, legible writing, attractive and appropriate graphics.	More than one colour font, legible writing, a graphic used.	One colour font, legible writing.	One colour font, font is not easily read.
Use of space	Visual display effectively covers at least 90% of the space available.	Visual display effectively covers approximately 75% of the space available.	Visual display covers approximately 67% of the space available.	Visual display covers 50 – 66% of the space available.	Visual display covers less than 50% of the space available.
Comprehension of assignment	Display shows an excellent understanding of the intent and focus of the assignment.	Display shows an good understanding of the intent and focus of the assignment.	Display shows some understanding of the assignment.	Display is related to the topic but does not satisfy the focus of the assignment.	Apparent misunderstanding of the assignment.
Content – information	Includes the necessary information, avoids unnecessary information, information is correct and current.	Includes the necessary information, information is correct, also includes unnecessary information.	Information included is correct. However, only some of that needed is included along with some unnecessary information.	Less than 50% of the required information is included.	Insufficient information, some information included is incorrect.
English	Vocabulary ideally suited for target group, correct grammar and spelling.	Vocabulary appropriate for target group, correct grammar and spelling.	Correct grammar and spelling.	Grammatical or spelling errors.	Grammatical and spelling errors.
Effectiveness in making a point	Display is very effective in marketing its message.	Display makes a point strongly.	Display makes a point (covers its theme).	Information does not show connection.	No evidence of structure or sequence.
Creativity	A very high level of creativity shown in visual appearance as well as in the message.	A good standard of creativity shown in visual appearance as well as in the message.	Some creativity shown in visual appearance as well as in the message.	Creativity shown in visual appearance or in the message.	Little or no evidence of creativity.
Grade	A 86 – 100	B 71 – 85	C 56 – 70	D 41 – 55	F 40 and lower

GENERAL RUBRIC FOR ORAL PRESENTATIONS

(rap, song, poem, speech)

Criteria	Exemplary **4**	Proficient **3**	Satisfactory **2**	Incomplete/ Below standard **1**	Unsatisfactory **U**
Preparedness	Completely prepared and has obviously rehearsed.	Seems well-prepared but could have spent more time rehearsing.	Somewhat prepared, but seems not to have rehearsed.	Did not seem prepared to present.	Appeared to have made no effort to prepare.
Sound appeal	Very attractive beat or rhythm, outstanding variations of voice intonation and volume.	Attractive beat or rhythm, good variations of voice intonation and volume.	Consistent beat or rhythm, variations of voice intonation or volume.	Consistent beat o rhythm, no variations in voice intonation and volume.	Lyrics with no accompanying sounds.
Time/length	Duration is for the required time.	Duration is longer or shorter than time allotted by 0 – 20% of duration.	Duration is longer or shorter than time allotted by 21 – 30% of duration.	Duration is longer or shorter than time allotted by 31 – 40% of duration.	Duration is longer or shorter than time allotted by 41 – 67% of duration.
Enthusiasm	Facial expressions and body language evoke a strong interest and enthusiasm from the audience.	Facial expression and body language sometimes evoke a strong interest and enthusiasm from the audience.	Facial expressions and body language used to spark interest and enthusiasm from the audience but seems faked.	Very little use of facial expression and body language. Did no evoke interest or enthusiasm fron the audience.	Little enthusiasm shown by the presenter(s).
Content – information	Includes the necessary information, avoids unnecessary information, information is correct and current.	Includes the necessary information, information is correct, also includes unnecessary information.	Information included is correct. However, only some of that needed is included along with some unnecessary information.	Less than 50% of the required information is included.	Insufficient information, some information included is incorrect.
English	Speaks clearly and distinctly throughout the presentation, does not mispronounce words.	Speaks clearly and distinctly throughout the presentation, mispronounced one and two words.	Speaks clearly and distinctly for most of the presentation, mispronounces key vocabulary or makes one or two grammatical errors.	Mumbles at one or two points, more than two grammatical errors.	Mumbles most of the presentation, mispronunciation and grammatical errors.
Effectiveness in making a point	Song etc. is very effective in marketing its message.	Song etc. makes a point strongly.	Song etc. makes a point related to the topic.	Information in song etc. is disjointed.	Lyrics without a theme.
Creativity	A very high level of creativity shown in sound appeal as well as in the message.	A good standard of creativity shown in sound appeal as well as in the message.	Some creativity shown in sound appeal as well as in the message.	Creativity shown in sound appeal or in the message.	Little or no evidence of creativity.
Grade	A 86 – 100	B 71 – 85	C 56 – 70	D 41 – 55	F 40 and lower

GENERAL RUBRIC FOR RESEARCH PROJECTS
(surveys, research information)

Criteria	Exemplary **4**	Proficient **3**	Satisfactory **2**	Incomplete/ Below standard **1**	Unsatisfactory **U**
Information sources	Used a variety of relevant sources (three or more different types) several of each type of source. Cites all sources.	Used many sources of two types. Cites all sources.	Used many sources of one type (e.g. textbooks, Internet, journals, magazines, questionnaires)	Two or three sources used.	One source used and referenced.
Sources had data to support claims	All sources (but one) had data to support claims.	Most sources had data to support claims.	Some sources had data to support claims.	One source had data to support claims.	No source had data to support claims.
Extracted relevant information	All information extracted is relevant to topic. No irrelevant information included.	All information extracted is relevant to topic. However, no information on one aspect. No irrelevant information included.	Some relevant and some irrelevant information extracted.	Little relevant information extracted.	Little information extracted – mainly irrelevant.
Paraphrased information	Information paraphrased and well-written.	Most information is paraphrased and well-written.	Some information is paraphrased; copied portions are not indicated.	Most information is copied from sources.	All information is copied from sources.
Organized information	Information is very clearly and sequentially organized. Logically stated position with supporting data. Include alternative points of view.	Information is clearly and sequentially organized. Logically stated position with supporting data.	Information is clearly and sequentially organized.	Information is sequentially organized.	Information is written haphazardly.
Synthesized	Project clearly and articulately shows: problem, hypothesis, method of research, literature reviewed, findings, analysis of findings, position.	Project shows: problem, hypothesis, method of research, literature reviewed, findings, analysis of findings, position.	Project shows: problem, hypothesis, method of research, literature reviewed, findings, analysis of findings, position (one missing).	Project shows: problem, hypothesis, method of research, findings.	Project has notes on aspects of the project.
Grade	A 86 – 100	B 71 – 85	C 56 – 70	D 41 – 55	F 40 and lower

GENERAL RUBRIC FOR INVESTIGATIONS
(experiments, experimental report)

Criteria	Exemplary **4**	Proficient **3**	Satisfactory **2**	Incomplete/ Below standard **1**	Unsatisfactory **U**
Hypothesis	Clearly stated correct purpose and explanation of purpose.	Clearly stated correct purpose.	States a purpose that is correct.	States a purpose that is incorrect.	States a purpose that is incorrect and irrelevant.
Sequence	Aim, Apparatus, Materials, Procedure, Observations, Results, Conclusion.	One missing or out of sequence.	Two missing or out of sequence.	One missing and two out of sequence.	More than two missing or out of sequence.
Procedure/Method	Clear step-by-step description of experimental procedures; labeled diagrams used.	Step-by-step description written description with one step missing, labeled diagrams included.	Two steps missing or diagrams not labeled.	An account written which includes most steps but not clearly and sequentially recorded.	A few steps are recorded.
Observations	All observations made and recorded in a clear format.	All obvious observations made and recorded in a clear format.	One obvious observation missing, clear format for recording.	Two observations missing or format for recording is not clear.	More than two observations missing.
Results	All data clearly recorded with units to the highest level of accuracy.	One reading missing; data clearly recorded with units to the highest level of accuracy.	Readings not to highest level of accuracy but all recorded with units in a clear format.	Readings not to highest level of accuracy and not recorded clearly.	A few readings recorded with no units.
Conclusion	Conclusion is logically drawn from data and stated as a relationship – in general terms.	Logical conclusion drawn, general reference to data, stated as a summary conclusion.	Logical conclusion but not connected to data. Written as a series of statements.	Obvious conclusion drawn, not connected to data, hypothesis or aim.	Results stated as a conclusion.
Handles apparatus and materials	Handles apparatus correctly, handles materials appropriately and safely, no help needed.	Handles apparatus correctly, handles materials appropriately and safely, one or two reminders given.	Handles apparatus correctly, handles materials appropriately, one or two reminders given.	Handles apparatus or materials correctly, two or three reminders given.	Uses apparatus and materials with much assistance given.
Error	Identifies all main sources of error and explains effect on results.	Identifies all but one main sources of error and explains effect on results.	Identifies sources of error.	Suggests possibility of error but identifies no sources.	Does not address Possibility of error.
Grade	A 86 – 100	B 71 – 85	C 56 – 70	D 41 – 55	F 40 and lower

Reference: www.accessexcellence.org

GENERAL RUBRIC FOR FIELD WORK
(field trips)

Criteria	Exemplary **4**	Proficient **3**	Satisfactory **2**	Incomplete/ Below standard **1**	Unsatisfactory **U**
Organization/ systematic investigation	Read and comprehend instructions first. Gather equipment. Organize group. Work systematically.	Read and comprehend instructions first. Gather equipment. Organize group.	Read instructions first. Gather equipment. Group works together.	Read instructions. Gather equipment. Group works.	Does not participate or individuals perform tasks haphazardly.
Following instructions	Follows all instructions. Makes adaptations if necessary.	Follows all instructions except one.	Follows most instructions.	Follows some instructions.	Fails to follow most instructions.
Use of equipment	Uses equipment safely and correctly without additional assistance.	Uses equipment safely and correctly with some assistance (reminders).	Uses equipment safely but with much assistance needed.	Uses equipment correctly but unsafely.	Does not use all equipment correctly and no special effort for safety in usage.
Collection of data	Required number of readings taken – additional done to verify anomalies. Readings all taken at required time/place etc.	Required number of readings taken. Readings all taken at required time/place etc.	Most of the required number of readings taken Readings all taken at required time/place etc.	Some of the number of readings taken. Readings for some intervals missing.	Few readings taken. Readings are not for regular intervals.
Observations	All possible observations made and described in detail.	Most observations made in detail and the others as obvious observations.	Some observations made in detail.	Most observations made as general or obvious observations.	Few obvious observations made.
Teamwork	Performs all assigned duties efficiently. Supports other group members. Readily provides additional assistance as is needed.	Performs all assigned duties efficiently. Supports other group members.	Performs all assigned duties.	Performs most assigned duties. Works independently.	Performs few duties. Does not support other group members. Refuses to perform additional tasks.
Safety	Adheres to all rules of conduct. Reminds others to keep the rules.	Adheres to all rules of conduct.	Adheres to most rules of conduct.	Causes another student to break a rule.	Action(s) responsible for jeopardizing the safety of another participant.
Sensitivity to the environment	Demonstrates sensitivity to the environment at all times and reminds others to do so.	Demonstrates sensitivity to the environment at all times.	Demonstrates sensitivity to the environment most times.	Requires frequent reminders to not negatively impact the environment.	Actions cause a negative reaction or damage to the environment.
Grade	A 86 – 100	B 71 – 85	C 56 – 70	D 41 – 55	F 40 and lower

GENERAL RUBRIC FOR MODELS

Criteria	Exemplary **4**	Proficient **3**	Satisfactory **2**	Incomplete/ Below standard **1**	Unsatisfactory **U**
Grade	A 84 – 100	B 71 – 85	C 56 – 70	D 41 – 55	F 40 and lower

SCORING AN ORAL PRESENTATION

CRITERIA	SCORE
Preparedness	
Sound appeal	
Time/length	
Enthusiasm	
Content – information	
English	
Effectiveness in making a point	
Creativity	
TOTAL / PERCENTAGE / GRADE	

SCORING A VISUAL DISPLAY

CRITERIA	SCORE
Visual appeal	
Use of space	
Comprehension of assignment	
Content – information	
English	
Effectiveness in making a point	
Creativity	
TOTAL / PERCENTAGE / GRADE	

SCORING A MODEL

CRITERIA	SCORE
TOTAL / PERCENTAGE / GRADE	

APPENDIX II
BIBLIOGRAPHY

1. Bahamas Reef Environment Educational Foundation.
2. Balanced Science.
3. Ecosystems of the Bahamas, Bahamas National Trust.
4. General Science, Silver Burdett Publishers.
5. Human and Social Biology for the Tropics, P. Gadd
6. Life Cycle posters: Spiny Lobster, Queen Conch, White Crab, Nature Conservancy
7. New Integrated Science for the Caribbean, Second Edition by Lucy Durgadeen, Steve West & Eugenie Williams, Books 1, 2 & 3.
8. Science for Junior High, A Complete Course for Bahamian Junior High schools by Nevillett Pearce.
9. Wondrous West Indian Wetlands, Teachers' Resource Book.
10. **www.ask.com**
11. **www.best.bs**.

APPENDIX III
INSTRUCTIONAL SUPPLIES – GENERAL SCIENCE

(1 Laboratory with seating for 24 students)

Quantity	Description
12	Beakers, borosilicate with markings and spout, 1 litre
24	Beakers, borosilicate with markings and spout, 600 ml
24	Beakers, borosilicate with markings and spout, 400 ml
24	Beakers, borosilicate with markings and spout, 250 ml
24	Beakers, borosilicate with markings and spout, 100 ml
24	Measuring Cylinders, transparent PMP, graduated with spout, 250 ml
24	Measuring Cylinders, transparent PMP, graduated with spout, 100 ml
12	Measuring Cylinders, transparent PMP, graduated with spout, 50 ml
6	Measuring Cylinders, transparent PMP, graduated with spout, 500 ml
36	Conical Flasks, Pyrex, rim with markings, 250 ml
36	Test tube Holders, all metal
24	Tongs, crucible, stainless steel, 200 mm, bowed
36	Test tube racks, wooden 6-hole for test tubes & boiling tubes, with drying pegs
24	Bunsen burners, for propane
48	Wire gauze, stainless steel with ceramic centre 125 mm
36	Evaporating basins, flat-bottom, porcelain with spout, 100 ml
36	Laboratory thermometers, coloured alcohol, 1°C markings
36	Tripod stands, enameled cast iron, 125 mm sides, 200mm height
36	Retort Rods with bases (200 mm x 125 mm)
36	Boss heads, straight
36	Clamps, 3-prong, rubber covered
24 prs.	Petri Dishes, polystyrene (with covers) 900 mm dia.
24	Spotting tiles, 12-cavities, white plastic
48	Dropping pipettes, with rubber teats 30 ml
24	Reagent Bottles with stoppers, 250 ml
2 pk.	Rubber stoppers, assorted sizes and number of holes (0, 1, 2) 100
1 pk.	Cork Stoppers, assorted sizes (no holes)
2 sets	Cork borers (6 pieces)
24	Filter funnels, conical, transparent PP, 100 mm dia. 84 mm stem
8 pks.	Filter Paper, all purpose 125 mm dia.
8 pks.	Litmus paper, red
8 pks.	Litmus paper, blue
1 reel	Universal Indicator Paper
8 pks.	Cobalt Chloride paper
8 pks.	Potassium Iodide paper
2	Distillation (water) Kit
2	Separating (liquids) kit
2	Chromatography Kit
1	Molecular model, basic, Inorganic/organic students set
12	Spring balances, 2.5N/250g
4 sets	Masses, slotted, brass with hanger complete set 200g, hanger 20g
1 pk.	Crushing cylinder pk/3

INSTRUCTIONAL SUPPLIES – GENERAL SCIENCE

(1 Laboratory with seating for 24 students)

Quantity	Description
12	Safety Goggles, vented side shields, polycarbonate lens, wrap around frame
1 pk.	Safety Gloves, natural latex, medium, powder free (100)
1 pk.	Disposable Aprons, polyethylene, 710 x 1060 mm
8	Aprons
1	Safety Goggles storage bag 15 pockets
24	Wash bottles
48	Test tube brushes
2	Balance, 4-beam, one pan 311g capacity
4	Flasks, 500 ml flat-bottom, Pyrex borosilicate, narrow neck
12	Spatulas, spoon end, nickel 150mm
12	Beehive shelf, 100 mm
24	Gas jars, glass, 150 x 50 mm
36	Gas jar covers 75 mm dia.
	Trough, pneumatic with ground rim dia. 305 mm, 127 mm Height
12	Displacement vessels, large 100 x 50 mm
24	Pulley block, Triple wheel pulleys
24	Pulley block, Double wheel pulleys
24	Pulley block, Single wheel pulleys
24	Wheel & axles
24	Metre rulers, vertical markings, plastic, inches and mm markings
8	Thermal Conductivity Apparatus
8	Ring & Ball Apparatus
8	Radiometers
8	Convection (in gases)/Ventilation Apparatus
36	Biconvex lenses
36	Biconcave lenses
36	Biconvex mirrors, silver backed
36	Biconcave mirrors, silver backed
36	Equilateral prisms 50 x 50 mm
18	Ray boxes
8	Slinky, plastic
8	Spring, spiral
8 sets	Tuning Forks (8, 256-512)
8	Hammers for tuning forks
10	Bench meters, economy ammeters 0 – 5 A
10	Bench meters, economy ammeters 0 – 15 V
10	Switches (circuit) knife switch, single throw
24	Lamps (circuit board)
24	Connecting wires (red)
24	Connecting wires (black)
1	Ebonite rod
1	Glass rod
1	Silk pad
1	Fur pad
1	Wool pad
1	Electroscope
6	Resistor, sliding contact (rheostat), single tube, 8.5 ohm
2	Worcester Circuit Board
12	Bar magnets, rectangular, Alnico, pairs with keepers
12	Horseshoe magnets, chrome steel, 100 mm
4	Lodestones
24	Plotting compasses 16 mm dia.
6	225g plastic drum with sprinkler top containing iron filings

INSTRUCTIONAL SUPPLIES – GENERAL SCIENCE

(1 Laboratory with seating for 24 students)

Quantity	Description
1	Human torso model, anatomical torso, half-size, eleven piece, dissectible model
1	Eye model, 6 part, 5 x life size
1	Ear model, x 5
1	Dicotyledonous flower model
1	T. S. Dicotyledonous Leaf (tissues)
1	Skin section model
4	Dissecting Kits, basic
8	Dissecting pans with wax
24	Magnifier, folding, pocket, double lens
12	Microscopes, compound, light x4, x10, x42
2	Biology slide set (50 slides)
1	Chart of Queen Conch – Life Cycle
1	Chart of Spiny Lobster – Life Cycle
1	Chart of Nassau Grouper – Life Cycle
1	Chart of White Crab – Life Cycle
1	Periodic Table, wall mount poster
1	Laboratory Safety Techniques poster
1	Laboratory Safety poster
12	Prepared slides T. S. artery, vein, capillary
6	Quadrats (½ m^2)

Quantity	Description
12	Shelley the Conch
12	Leroy the Lobster
6 sets	Endangered and Threatened Species flyers – Bahamas National Trust (set of 10)
12	Science for Junior High, A Complete Course For Bahamian Junior High schools by Nevillett Pearce.
12	Integrated Science for Caribbean Schools Bk. 1
12	New Understanding Science Bk. 1
12	Human and Social Biology for the Tropics, Phil Gadd
12	New Integrated Science For the Caribbean, Second Edition by Lucy Durgadeen, Steve West & Eugenie Williams, Books 1, 2 & 3.

Quantity	Description
1	Benedict's Solution 500 ml.
1	Biuret Solution 500 ml.
1	Calcium Carbonate marble chips 500g
1	Potassium Permanganate 250g
1	Manganese (IV) Oxide 200g
1	Sodium Hydroxide 1N, 2 litres
1	Hydrochloric Acid 1N, 2 litres
1	Sulphuric Acid 1N, 2 litres
1	Lime Water, 2 litres
1 reel	Magnesium ribbon
1	Methylene Blue 100 ml
1	Iodine Solution 250 ml
1	Copper (II) Sulphate hydrated 250g
1	Sulphur powder 200g

Quantity	Description
1	Fire Extinguisher, ABC, 5 lbs.
1	First Aid Kit, 50 piece

APPENDIX IV
PREREQUISITES

It is anticipated that students entering Grade 7 would possess scientific knowledge and skills listed:

Living Things

- The definition for a cell
- Three basic parts of a cell
- Function of the cell
- Meaning of "organism"
- Concept of grouping
- Characteristics of living things
- Vertebrates versus invertebrates
- Features of vertebrates
- Five classes of vertebrates
- External features of each group of vertebrates
- Internal characteristics of mammals group
- Metamorphosis (houseflies, butterflies, frogs)
- Plants as organisms
- Basic parts of a flowering plant (roots, stem, leaf with stalk, buds [leaf and flower], flower fruit, seed) **large variety**
- Identify using names for common ornamental plants
- Identify using names for common shrubs and trees
- Identify four indigenous trees
- Monocotyledonous and dicotyledonous seeds plants (features of venation and shapes of leaves, type of roots
- Animals rely on plants for food, medicine, clothing, building material, turpentine, dyes, resin, mulch, etc
- Teeth (two sets, four types external appearance), function of each type, oral hygiene)
- Definition of matter
- Identify examples of the three states of matter
- Definition of Force
- Solutions in terms of concentrated and dilute

Skills

- read scales on a ruler, bathroom or kitchen balances
- measure lengths in metres and centimeters
- make two dimensional line diagrams
- label diagrams with lines (to one side)
- read at minimum of grade 4 level
- write simple paragraphs
- format a simple letter
- follow simple oral, written instructions
- use a beaker and stirring rod
- measure time in seconds
- observe colours and changes
- observe differences in leaf (margin)shapes
- describe orally in sequence a five-step procedure
- place numbers in size/value order (1 to 10,000)
- correctly use mathematical computations (addition, subtraction, multiplication, division)

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 enables 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 one another
- 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.

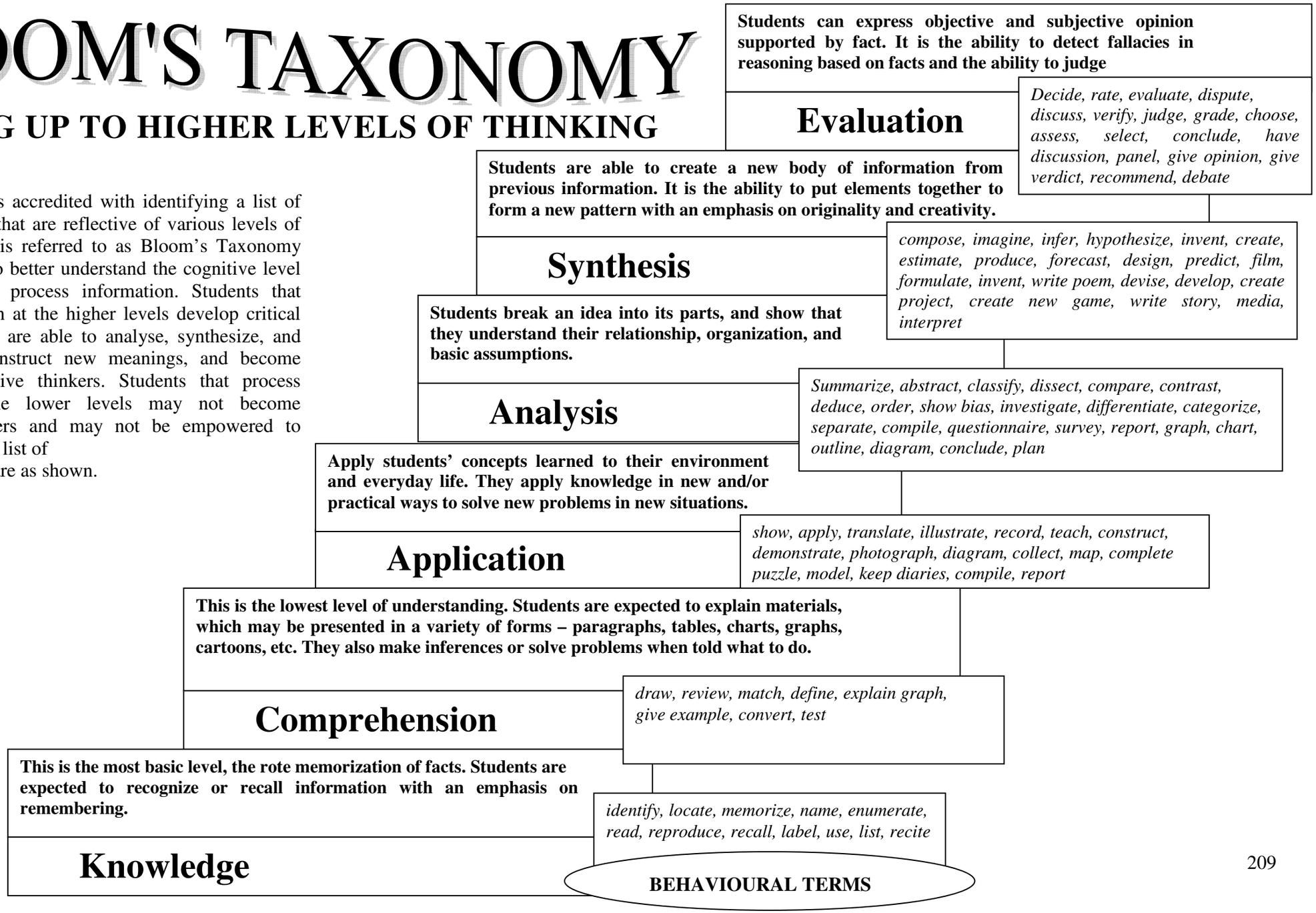
When using the Constructivism Theory, it should be noted that there are times when knowledge has to be imparted directly by the teacher in a detailed and explicit way. Although many benefits can be accrued from utilizing the Constructivism Theory, if it is not used properly, learning may become sporadic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

BLOOM'S 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.



Process Skills Development

Process skills are practical skills that allow students to use previous experiences, build upon them and link knowledge and skills learned at school to their environment and every day life.

Process skills help students to develop and apply critical thinking. Once given the opportunity to use and apply process skills, students develop the ability to reflect on and to evaluate their approaches to problem solving. As a result, students will come to the realization that there may be several solutions to any given problem. In this way, students can formulate hypotheses as testable ideas in their minds and can demonstrate deductive patterns of thought. Through integration of the basic and complex process skills listed, students should develop the ability to think logically and abstractly.

Basic Process Skills

Observing
Using one or more of the five senses (seeing, hearing, tasting, smelling, feeling) to find out about the world. Observing increases students' perceptions so that they can learn more about objects and events.

Classifying
Grouping objects or events based on similarities and/or categorizing based on existing relationships among objects or events.

Inferring
Explaining and interpreting observed events and collected data and explaining why they might have happened.

Communicating
Passing on information proposing interpretations, explanations, and causes from observed events and collected data.

Recognizing and Using Spatial Relationships
Observing where things are in relation to other things by estimating the relative positions of moving and non-moving objects to one another.

Measuring
Finding out the size or amount of an object or substance when compared to a certain unit. Identifying and ordering length, area, volume, mass, and temperature to describe and quantify objects or events.

Predicting
Suggesting possible results or outcomes that will happen in the future based on observations and inferences drawn form previous experiences. The suggestions have to be based on correct information.

Using Numbers
Applying ordering, counting, adding, subtracting, multiplying, and dividing to quantify data where appropriate in investigations or experiments.

Complex Process Skills

Interpreting Data
Explaining the meaning or importance of information.

Forming Hypotheses
Asking questions about a problem and making assumptions in order to draw out and test different solutions to the problem.

Separating and Controlling Variables
Recognizing the many factors (variables) that affect the relationship of the factors to one another so that one factor (variable) can be manipulated while the others are controlled.

Experimenting
Test hypotheses or predictions by first identifying things (variables) that are important, then deciding which variables to change or manipulate which will be held constant, and what results to expect.

Formulating Models
Constructing mental, verbal, or physical representations or ideas, objects, or events. The models are then used to clarify explanations or to demonstrate relationships.

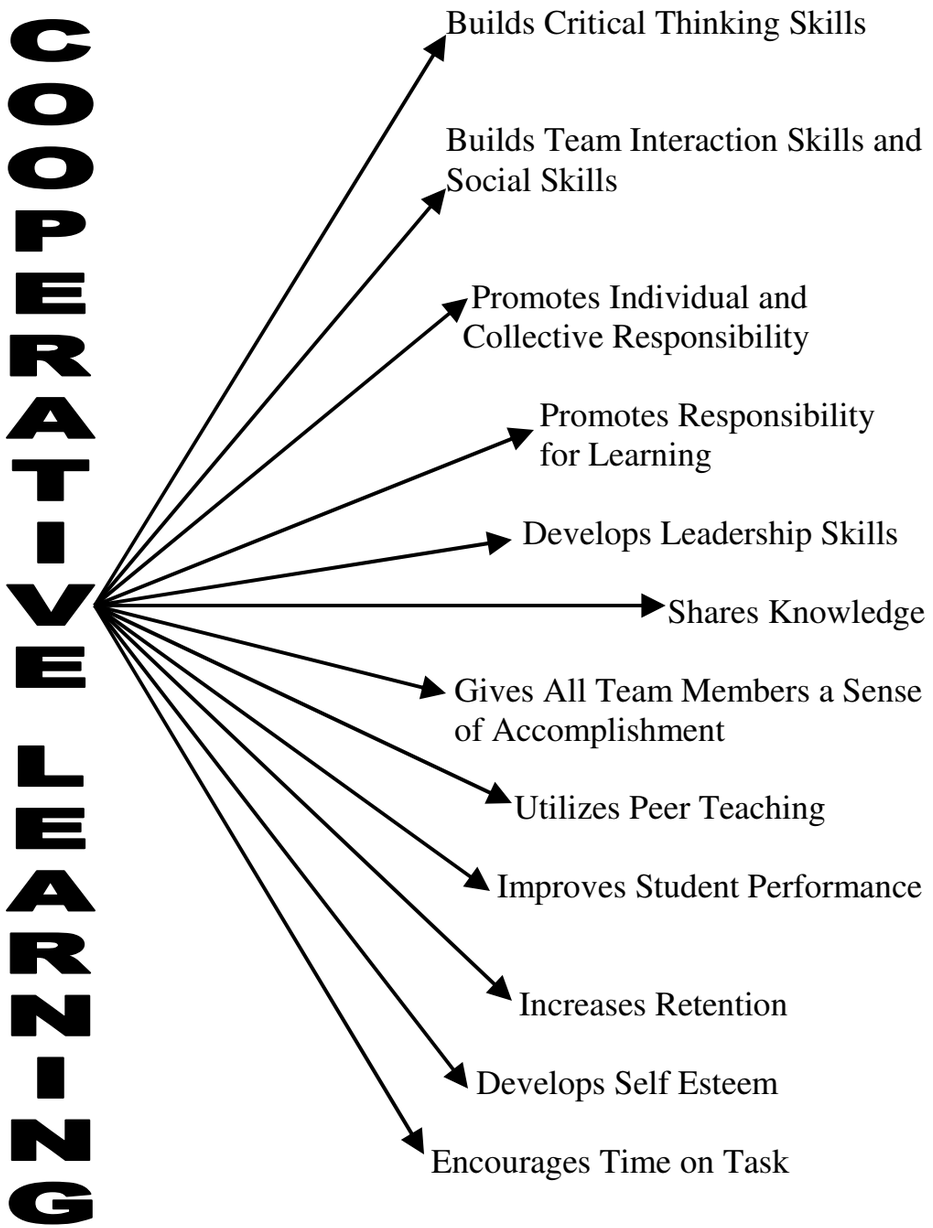
Defining Operationally
Describing the properties of things and their functions. These working definitions are based on actual experiences that the student had.

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 the 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 are written with behavioural terms at the beginning.)
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 analyzed 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 is 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, 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, Examination and Assessment Division

APPENDIX V

Safety in the Teaching/Learning Environment

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 teacher's 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 away tools and equipment safely the way your teacher tells you to, as soon as you finish using them; do not leave them 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.

APPENDIX VI

General Science Curriculum
Grade Level Evaluation Form

Kindly complete this format the end of the first year using it with Grade *7.*

Section A

Place a tick in the box which best describes your response to items 1 – 11. Your honest responses are both valuable and appreciated.

No.	Item	Always	Often	Seldom	Never
1.	Are the content and concepts included in the *seventh* grade curriculum age-appropriate?				
2.	Is sufficient information given in the content column to provide guidance as to the depth to be covered?				
3.	Are sufficient opportunities given for students to develop the designated 17 skills?				
4.	Are the suggested methods of assessment directly related to the learner outcomes and targeted skill?				
5.	To what extent did you use the suggested methods of assessment?				
6.	Did students complete assignments?				
7.	Were the identified resource materials available?				
8.	Are the suggested activities appropriate for concept formation and reinforcement of main points?				
9.	Were you able to use the suggested activities?				
10.	Did the curriculum provide sufficient guidance in how to adapt it to meet the needs of students of higher or lower ability levels?				
11.	Were you able to introduce local examples to relate to students' interest and experiences?				

Section B

Indicate your responses in the space provided.

12. Which topics/concepts, if any were too difficult?

_____

_____

13. Which topics/concepts if any would be better suited at *primary* level?

_____

_____

14. Which skills, if any, were over-emphasized?

_____

_____

15. Which skills, if any, were under-emphasized?

_____

_____

16. Which units, if any, were given too much time to be completed?

_____

_____

17. Which units, if any, were allocated insufficient time to be completed?

_____

_____

18. Which skills, if any, did students show an improvement in during the year?

_____

_____

19. What is the approximate percentage of students who was able to attain the standards for *Grade Seven*?

_____

_____

20. Which part(s), if any, of the grade level curriculum was/were successfully implemented? Why?

_____

_____

_____

_____

21. Which part(s), if any, of the grade level curriculum was/were not successfully implemented? Why?

_____

_____

_____

22. Was there any aspect of the curriculum for *seventh* grade that placed the students at a disadvantage because of their location (island/district/type of school)? If so, state which parts and why.

_____

_____

_____

Section C
Please circle the appropriate category which describes the school to which you are posted and your years of teaching experience.

School Type:	Junior High	Secondary	All-Age
Student Population:	30 – 199	200 – 450	451 +
Location:	Family Islands	Grand Bahama	New Providence

Your years of experience in the Bahamian school system:

0 – 3 years	4 – 9 years	10 – 15 years	16 + years