

# Primary Science Curriculum

Ministry of Education Science and Technology

Antigua and Barbuda

This version of the primary science curriculum was last revised in September 2019

## Contents

Foreword: .....	3
Acknowledgements: .....	3
Organization of the curriculum: .....	4
Knowledge: .....	4
Process Skills: .....	4
Attitudes and Values:.....	4
Technology:.....	4
Structure of the Units: .....	4
Key Attitudes and Skills: Definitions.....	6
Grade IV: Term 1 .....	9
Unit 1:  Sense and Sensitivity .....	9
Unit 2:  Experimenting .....	14
Unit 3:  Measuring Physical Quantities .....	17
Unit 4:  Forms of Energy.....	21
Unit 5:  Forces and Structures .....	24
Grade IV: Term 2 .....	27
Unit 6:  Asexual reproduction.....	27
Unit 7:  Local and Regional Ecosystems .....	29
Unit 8:  Environmental Destruction .....	33
Unit 9:  Conservation Needs in Antigua and Barbuda .....	36
Grade IV: Term 3 .....	41
Unit 10:  Rocks and Soils .....	41
Unit 11:  Water .....	45
Unit 12:  Our Solar System .....	48
Appendix:.....	52
Alternative Assessment .....	52
Sample Checklist for Assessing Experimental Report.....	52
Sample Checklist for Assessing Practical Skills .....	53
Sample Rubric for Assessing Student Collaboration.....	54
Sample Rubric for Creation of a Model .....	54
Sample Rubric for Holistic Assessment of a Task .....	54
Recommended Resources for Primary Science Teachers.....	55

## Foreword:

Science education should prepare students to become socially well-adjusted citizens capable of utilizing the knowledge, attitudes and skills gained from the program into their daily lives. It should open up a variety of career pathways for students while simultaneously providing them with a foundation for further academic studies. The national primary science curriculum is designed to facilitate the realization of these goals.

Among the philosophical pillars supporting this design, is the core belief that the science program should be both fun and relevant. Thus, students should enjoy doing science. The subject matter with which they interact should stimulate and maintain their interest. This in turn is likely to foster a desire for further experiences within the field – and many opportunities abound to deepen ones experiences.

In partial recognition of this, the curriculum design deliberately encourages teachers to liberally incorporate materials, resources and processes within the students' experiences into science lessons. This should help students to realize that the application of scientific knowledge, skills and attitudes can – and often do – lead to significant benefits for society and for individuals. Modern society relies on many technological advances that resulted from the work of scientists. Today, science, technology and society keep influencing each other and this interdependency should be leveraged to highlight the relevance of studying science. Also, while students will go on to choose diverse career paths in life, the habits of mind developed from studying science will find application and functionality in almost every facet of life.

## Acknowledgements:

Revision of the curriculum required several years and input from many different individuals. Some of the key persons assisting with this revision are, Ms. Kendra Thomas, Ms. Joycelyn James, Ms. Allison Ledeatte, Ms. Soynie Lewis, Mrs. Leonora Roberts-Thomas and Mrs. Michiyo Robinson. On behalf of the Ministry of Education, I wish to offer thanks to these dedicated teachers – and the many others who contributed to the revision process. In particular, I wish to offer personal gratitude to Ms. Kendra Thomas and Ms. Joycelyn James, who worked in every phase of the project and who were pivotal in compiling and reviewing every unit at every grade level.

*Anthony Spencer*

W Anthony Spencer

Education Officer – Natural Sciences

## Organization of the curriculum:

The Antigua and Barbuda national Primary Science and Technology curriculum is adapted from the OECS Harmonized Science and Technology curriculum with some modifications designed to facilitate national preferences. It is organized around three domains; namely – “Knowledge”, “Skills”, and “Attitudes and Values”. These three domains are supported by a framework which highlights technology as an integral part of the student learning experience.

### Knowledge:

The content knowledge intended for student acquisition has been arranged into three strands which run throughout the curriculum. Each strand can be further broken down into a number of key themes as outlined in the table below:

Life Science	Physical Science	Earth and Space Science
<ul style="list-style-type: none"><li>• Ecosystems</li><li>• Structure and Function</li><li>• Diversity and Classification</li></ul>	<ul style="list-style-type: none"><li>• Energy</li><li>• Forces, motion and structures</li><li>• Matter and materials</li><li>• Experimental skills</li></ul>	<ul style="list-style-type: none"><li>• Earth’s resources</li><li>• Earth’s weather</li><li>• The solar system</li></ul>

### Process Skills:

In addition to being a formidable body of knowledge, science is also a way of knowing and doing. Although there is no single way of doing science, there are nevertheless certain generally accepted ways of acquiring and documenting scientific knowledge. The curriculum is designed to assist students to acquire a variety of science process skills by providing regular opportunities to practice and reflect on these skills.

### Attitudes and Values:

Whereas it is important to appreciate the vast amount of scientific knowledge that man has acquired, it is perhaps equally important to appreciate some of the attitudes and values that led to the creation of that body of knowledge. The curriculum provides definitions of some the key attitudes and values being highlighted at every grade level.

### Technology:

For the purposes of this curriculum, the term technology refers to the tools and processes people use to solve problems. This definition hints at the acknowledgement of a strong reciprocal relationship among science, technology and society, and in particular, the curriculum does not always distinguish between the latter two fields of endeavour.

### Structure of the Units:

The science curriculum covers primary school classes from kindergarten to grade 6 and, at each level, the content to be covered is arranged in discrete units which are then distributed among the three terms. The Ministry of Education’s National Curriculum Policy (2019) establishes minimum allotted time for science education in the primary schools. Based on these guidelines, the curriculum assumes that a minimum of five 30-minute periods have been allotted to science instruction at the kindergarten level and five 40-minute periods weekly for all other grades.

Since the curriculum is a spiral curriculum, there are recurring topics at various grade levels. However, at each level, the consistent and organized manner in which the units are presented should provide clarity about the depth and breadth of coverage required. Each unit in the curriculum begins by identifying the strand, the theme, the topic and an estimate of the time that should be allocated to covering unit. Focus questions are presented at this point and these should further help to highlight the key emphases for the unit.

The next section of the unit contains two components, namely, learning outcomes and specific objectives. The learning outcomes (including those specifically related to technology) can be considered as the broad goals which the unit covers while the specific objectives present a more precise statement of the required content.

To further clarify the expected depth of coverage, the next section includes a list of the “key concepts” encountered in the unit as well as a summary of the required content. It also offers a list the skills, attitudes and values that are particularly relevant in the unit.

Next is a section that contains suggested teaching activities. These activities generally end with a suggestion for a project that students can undertake. Additionally, the section also includes suggestions for integrating science with other curriculum areas and a variety of assessment ideas. The suggestions for assessment include both traditional pen and paper tests but there is also a deliberate emphasis on alternative forms of assessment.

Towards the end of the unit, there is a list of materials that might be required to perform the activities identified in the unit. There are also references to textbooks and Internet sites that might prove helpful in the delivery of the curriculum. Each unit then ends with visual aids that relate to some of the content within the unit.

Finally, at each level, some attempt has been made to arrange the units in such a way that teachers can progress sequentially through the content. However, rather than slavishly following the suggested activities and sequence of content in the curriculum, teachers are encouraged to be creative in covering the content that has been mapped out for each specific grade.

## Key Attitudes and Skills: Definitions

**APPROPRIATE EXPECTATIONS AT THE DIFFERENT GRADE LEVELS FOR THE ATTITUDES, SKILLS AND TECHNOLOGY OUTCOMES ARE AS FOLLOWS:**

<b>SKILLS:</b>	<i>In developing their skills of inquiry, problem solving and design, the students are expected to:</i>
<b>Observing</b>	<ul style="list-style-type: none"> <li>✓ Use as many senses as are appropriate and safe to gather information.</li> <li>✓ Identify differences and similarities between objects and events.</li> <li>✓ Identify sequence in events.</li> </ul>
<b>Measuring</b>	<ul style="list-style-type: none"> <li>✓ Use simple measuring instruments or model of measuring instruments.</li> </ul>
<b>Manipulating</b>	<ul style="list-style-type: none"> <li>✓ Set up simple experiments to compare results.</li> <li>✓ Manipulate simple equipment.</li> </ul>
<b>Recording</b>	<ul style="list-style-type: none"> <li>✓ Use pictures and charts to report results.</li> <li>✓ Fill out simple tables to report results.</li> </ul>
<b>Classifying</b>	<ul style="list-style-type: none"> <li>✓ Group objects according to several criteria.</li> </ul>
<b>Communicating</b>	<ul style="list-style-type: none"> <li>✓ Talk freely about their activities and the ideas they have, with or without making a written record.</li> <li>✓ Use appropriate vocabulary to describe their observations.</li> <li>✓ Listen to others' ideas and look at their results.</li> <li>✓ Report events by using demonstrations, role-play, simple drawings, paintings and paragraphs.</li> </ul>
<b>Inferring</b>	<ul style="list-style-type: none"> <li>✓ Notice patterns in simple measurements and events.</li> </ul>
<b>Interpreting data</b>	<ul style="list-style-type: none"> <li>✓ Discuss what they find out in response to questions.</li> <li>✓ Compare their findings with their predictions.</li> <li>✓ Notice changes when one variable is changed.</li> </ul>
<b>Experimenting</b>	<ul style="list-style-type: none"> <li>✓ Freely ask a variety of questions and suggest how they might be answered.</li> <li>✓ Suggest how they could investigate to find out answers to questions.</li> <li>✓ Identify the manipulated and responding variables in simple experiments</li> <li>✓ Suggest equipment materials and procedure for conducting investigations</li> </ul>
<b>Predicting</b>	<ul style="list-style-type: none"> <li>✓ Use evidence to make predictions.</li> <li>✓ Suggest how something may have happened.</li> </ul>
<b>Problem solving</b>	<ul style="list-style-type: none"> <li>✓ Suggest solutions to simple problems.</li> </ul>
<b>Designing</b>	<ul style="list-style-type: none"> <li>✓ Construct models either by following instructions or by using their own designs.</li> <li>✓ Select appropriate material to make models and gadgets.</li> </ul>

<b>ATTITUDES:</b>	<i>Students should be encouraged to:</i>
<b>Curiosity</b>	<ul style="list-style-type: none"> <li>✓ Ask questions about objects and events.</li> <li>✓ Find out more about events and objects on their own.</li> </ul>
<b>Inventiveness</b>	<ul style="list-style-type: none"> <li>✓ Suggest new ways of doing things.</li> <li>✓ Use equipment in novel ways.</li> </ul>
<b>Respect for evidence</b>	<ul style="list-style-type: none"> <li>✓ Provide explanations for their conclusions.</li> <li>✓ Listen to other children's results and explanations.</li> <li>✓ Recognize when conclusions do not fit the evidence</li> </ul>
<b>Persistence</b>	<ul style="list-style-type: none"> <li>✓ Complete activities.</li> <li>✓ Persist at tasks.</li> </ul>
<b>Respect for living things</b>	<ul style="list-style-type: none"> <li>✓ Show sensitivity to living things.</li> </ul>
<b>Cooperation</b>	<ul style="list-style-type: none"> <li>✓ Share with others.</li> <li>✓ Work together with others.</li> <li>✓ Accept responsibilities.</li> </ul>
<b>Concern for safety</b>	<ul style="list-style-type: none"> <li>✓ Observe safety instructions.</li> </ul>
<b>Concern for the environment</b>	<ul style="list-style-type: none"> <li>✓ Suggest ways to care for the environment.</li> <li>✓ Commit to protect the environment.</li> </ul>

<b>Technology</b>	<i>In developing their ability to interact appropriately with technology, students should:</i>
<b>Technological methods</b>	<ul style="list-style-type: none"> <li>✓ be able to discuss and make gadgets to solve problems.</li> <li>✓ be able to construct models</li> </ul>
<b>Nature of Technology</b>	<ul style="list-style-type: none"> <li>✓ realize that people make some things for their use.</li> <li>✓ understand that products are replicable.</li> <li>✓ realize that people can make unique things.</li> <li>✓ understand that others may be working on the same idea.</li> </ul>
<b>Use of Technology</b>	<ul style="list-style-type: none"> <li>✓ appreciate the use of devices, tools and structures made by humans in the home and community.</li> <li>✓ realize that human-made things can pollute the environment.</li> <li>✓ realize that people may abuse and misuse technology.</li> </ul>

# Grade 4



## Grade IV: Term 1

**Strand:** Life Science (*Structure and Function*)

**Unit 1:** Sense and Sensitivity

**Duration:** 10 periods

### Focus Question:

(1) How do our senses work?

Learning Outcome	Specific Objectives
<p>At the end of this unit students should</p> <ol style="list-style-type: none"> <li>understand how our senses operate to detect the world around us.</li> <li>appreciate the importance of each of the senses.</li> </ol> <p><b>Technology:</b></p> <ul style="list-style-type: none"> <li>Understand the importance of precision in measurements.</li> </ul>	<ol style="list-style-type: none"> <li>At the end of this unit students should be able to               <ol style="list-style-type: none"> <li>identify the five senses and their related sense organs.</li> <li>identify the external parts of each sense organ.</li> <li>explain the process by which external stimulus is detected.</li> <li>explain the importance of each sense organ.</li> </ol> </li> </ol>

Key Concepts	CONTENT	Skills, Attitudes and Values
<ul style="list-style-type: none"> <li>Bitter</li> <li>Brain</li> <li>Ear</li> <li>Ear Canal</li> <li>Ear drum</li> <li>Epidermis</li> <li>Eye</li> <li>Eyelash</li> <li>Eyelid</li> <li>Hair</li> <li>Hearing</li> <li>Iris</li> <li>Mucus</li> <li>Nerves</li> <li>Nostrils</li> <li>Nose</li> <li>Organ</li> <li>Pinna</li> <li>Pore</li> <li>Pupil</li> <li>Receptors</li> <li>Salty</li> <li>Scent</li> <li>Sight</li> </ul>	<p><b>Content Principle:</b></p> <ul style="list-style-type: none"> <li>Our senses work together with the brain to help us to interpret our surroundings.</li> </ul> <p><b>Required Content:</b></p> <ul style="list-style-type: none"> <li>Each sense organ detects external stimuli and send messages via nerves to the brain. The brain tells us what we see, smell, feel, taste and hear</li> <li>The eye is the sense organ of sight.</li> <li>Some external parts of the eye are the eyelid, eyelashes, pupil, iris and tear duct.</li> <li>When we see an image the eye sends a message to the brain via the nerves and the brain sends back to tell us what we have seen.</li> <li>The ear is the sense organ of hearing.</li> <li>Some parts of the ear are pinna, ear canal and ear drum.</li> <li>When we hear a sound the ear sends a message to the brain via the nerves and the brain sends back to tell us what we have heard.</li> <li>The nose is the sense organ of smell.</li> <li>Some parts of the nose are the nostrils and septum.</li> </ul>	<p><b>Skills</b></p> <ul style="list-style-type: none"> <li>Communicating</li> <li>Observing</li> <li>Inferring</li> <li>Manipulating</li> <li>Measuring</li> <li>Reporting</li> </ul> <p><b>Attitudes and Values</b></p> <ul style="list-style-type: none"> <li><i>Cooperation</i></li> </ul>

<ul style="list-style-type: none"> <li>• Skin</li> <li>• Smell</li> <li>• Sour</li> <li>• Sound</li> <li>• Stimuli</li> <li>• Sweet</li> <li>• Taste buds</li> <li>• Tongue</li> </ul>	<ul style="list-style-type: none"> <li>• When we smell an odour the nose sends a message to the brain via the nerves and the brain sends back to tell us what we have smelled.</li> <li>• The tongue is the sense organ of taste.</li> <li>• The tongue includes taste buds which identify sweet, sour, salty and bitter tastes.</li> <li>• The skin is the main sense organ of touch. It can detect pain, pressure, temperature and texture.</li> <li>• The external parts of the skin are the hair, pore, epidermis.</li> </ul>	
--	---	--

Suggested Activities	Assessment	Cross Curricular Links
<ul style="list-style-type: none"> <li>• Go outside and ask students to observe their surroundings. Guide students to use all of their senses to make observations by asking questions such as “What do you smell, feel, see, hear”? Use answers given to elicit from students how they were able to make their observations. Link the senses to their sense organs.</li> <li>• Have students examine their own eyes with a mirror, students then work with a partner and examine each others’ eyes. Discuss and compare the observations including any parts of the eye that they can identify.</li> <li>• Use a large chart to identify some external parts of the eye.</li> <li>• Let students engage in some activities with both of their eyes open then try to do the same activities with one eye closed or an eye patch over one eye, e.g. thread a needle.</li> <li>• Discuss the importance of having two eyes.</li> <li>• Students take turns being blindfolded and led around the classroom or an obstacle course. Discuss the experience with each other.</li> <li>• Make paper glasses. Decorate the outside and write a message about the importance of their eyes on the inside. Engage in an “Eye Spy” fashion show where students showcase their glasses and share why they think their eyes are important: <ul style="list-style-type: none"> <li>○ <a href="https://picklebums.com/images/printables/picklebums_crazyglasses.pdf">https://picklebums.com/images/printables/picklebums_crazyglasses.pdf</a></li> <li>○ <a href="https://www.firstpalette.com/Craft_themes/Wearables/papereyeglasses/papereyeglasses.html">https://www.firstpalette.com/Craft_themes/Wearables/papereyeglasses/papereyeglasses.html</a></li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Use a rubric to assess students’ collaboration.</li> <li>• Give a quiz (e.g. matching exercises)</li> <li>• Use a rubric to assess presentations in exhibition.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Language Arts:</b> Composing poems, stories, cartoons, songs.</li> <li>• <b>Mathematics:</b> Measurement, use of tables.</li> <li>• <b>Performing Arts:</b> Skits, songs</li> <li>• <b>Visual Arts:</b> Drawings and models.</li> </ul>

<ul style="list-style-type: none"> <li>• Play a tape of various sounds and have students say what sound they heard.</li> <li>• Place objects in a matchbox e.g. seeds, paper clips, beads, cotton, stones. Have students shake the boxes to determine what object is in each box.</li> <li>• Have one student stand at the front of the classroom facing away from the class and one student stand to the back of the class. The student at the back whispers a sentence or phrase and the student at the front should repeat what was said. If necessary, the student at the back should move forward until the student at the front repeats the correct sentence/phrase. Measure and record the hearing distance using standard and non standard units e.g. meter ruler, students foot length. Repeat the activity with other students. Students complete tables with the data and make comparisons.</li> <li>• Blindfold one student and have him/her sit on a chair have four or five students stand to the back of the student in a semi- circle. Indicate silently to one of the students to clap, snap their fingers or hit an object. Have the blindfolded student indicate which student made the sound. Repeat with one of the ears covered.</li> <li>• Discuss the importance of having two ears.</li> <li>• Look at a chart showing parts of the ear discuss the structure of the ear with students.</li> <li>• Engage in an activity “The Nose Knows” by placing scented items into small containers such as pill bottles, e.g. coffee soaked cotton ball, garlic, thyme, cinnamon, tangerine peel. Cover the containers and leave for twenty-four hours. Refrain from using very pungent or strong scents such as perfume. Pre code each container and its cover for easy identification e.g. cover labelled “A” matches container labelled “10” etc. Randomly give each student a container or a cover. Students are required to find their partner with the matching scent. Seek permission from parents before allowing students to smell anything.</li> <li>• Give volunteers different things to taste. Have students describe the taste of the items.</li> </ul>		
--	--	--

<p>Through questioning, teacher guides students to determine that they taste with their tongue. Seek permission from parents before allowing students to taste anything.</p> <ul style="list-style-type: none"> <li>• Have students discuss their favourite taste.</li> <li>• Students close their eyes while other students use various objects (warm, cold, smooth, rough, hard, soft, damp, dry, etc.) to touch them on their hands, arms or feet. Students state what they felt.</li> <li>• Use glue to trace words onto cards. Add sand, glitter or rice to the glue. Students close their eyes and try to determine what word is on the cards using their sense of touch.</li> <li>• Get three containers one with very warm water (not hot) one with very cold water and the other with room temperature water. Students will place one hand in the warm water and the other hand in the cold water. After one minute, place both hands on the glass containing the room temperature water. Describe and discuss the results.</li> <li>• Look at the skin under hand lens and describe what is observed. Identify the pore, hair and epidermis.</li> <li>• Discuss the functions of the skin.</li> <li>• Discuss how the senses work together to help interpret our surroundings.</li> <li>• Explain to students the role of the brain in interpreting messages from the sense organs.</li> <li>• Discuss how to care for each sense organ.</li> <li>• <b>Project:</b> <ul style="list-style-type: none"> <li>○ Hold a “Senses on Parade” exhibition. Assign one sense to each group of students. Have students make models, display labelled diagrams, present senses activities that they would have previously done in the lessons, hold discussions on the functions and care of the sense organs. Present skits, stories, songs, poems, cartoons, riddles about the senses. Invite other students and parents to the exhibition.</li> </ul> </li> </ul>		
---	--	--

**Materials:**

Charts showing the structure of each sense organ, blindfold, taped sounds, match boxes, a variety of objects to be placed in the matchbox, mirror, meter rulers, scissors, glue, sand, rice, glitter, crayons, pill bottles with covers, items for scent activity (e.g. coffee, cotton balls, cinnamon, garlic), sugar, salt, lime, warm, cold and room temperature water.

**Books:**

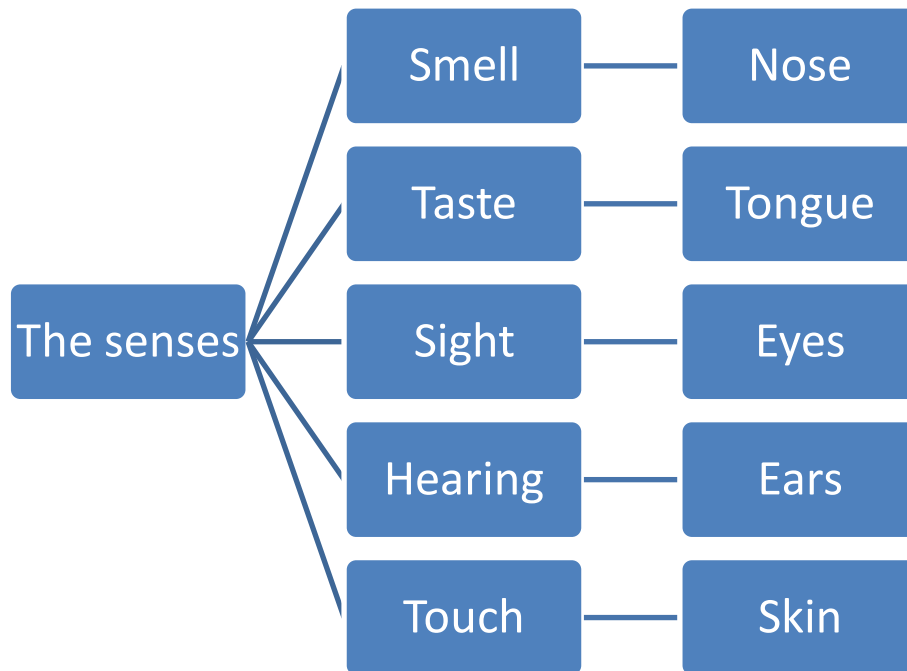
Bright Ideas Book 3

**URLs:**

<https://www.freesoundeffects.com/free-sounds/household-10036/>

<https://www.zapsplat.com/sound-effect-category/household/>

**Diagrams:**



**Grade IV:** Term 1  
**Strand:** Physical Science (*Experimental Skills*)  
**Unit 2:** Experimenting  
**Duration:** 15 periods

**Focus Question:**

(1) How do scientists work?

Learning Outcome	Specific Objectives
<p>At the end of this unit students should</p> <ol style="list-style-type: none"> <li>demonstrate some of the ways in which scientists work.</li> </ol> <p><b>Technology:</b></p> <ul style="list-style-type: none"> <li>Appreciate the use of devices and tools made by humans.</li> </ul>	<ol style="list-style-type: none"> <li>At the end of this unit students should be able to               <ol style="list-style-type: none"> <li>define observation.</li> <li>define inference.</li> <li>make predictions.</li> <li>follow instructions to perform simple experiments.</li> <li>use an approved format to record and report scientific work.</li> <li>identify controlled variables in an experiment.</li> <li>complete data tables.</li> <li>complete bar graphs.</li> </ol> </li> </ol>

Key Concepts	CONTENT	Skills, Attitudes and Values
<ul style="list-style-type: none"> <li>Aim</li> <li>Conclusion</li> <li>Experiment</li> <li>Inference</li> <li>Observation</li> <li>Procedure</li> <li>Report</li> <li>Table</li> <li>Variable</li> </ul>	<p><b>Content Principle:</b></p> <ul style="list-style-type: none"> <li>Scientific inquiry can follow established guidelines.</li> </ul> <p><b>Required Content:</b></p> <ul style="list-style-type: none"> <li>An <b>observation</b> is the act of noting something with one or more of the senses.</li> <li>An <b>inference</b> is a conclusion based on one or more observations.</li> <li>A <b>prediction</b> is a guess about a future event.</li> <li>A <b>variable</b> is a quantity whose value can change (It is usually a good idea to change only one variable at a time in an experiment).</li> <li>A <b>controlled variable</b> is one whose value does not change during an experiment</li> <li>The following is an approved format for reporting experiments at this level:           <ul style="list-style-type: none"> <li><b>Date:</b> {The date the experiment was done}</li> <li><b>Title:</b> {Title of the experiment}</li> <li><b>Aim:</b> {Purpose of the experiment}</li> <li><b>Materials:</b> A list of all equipment and supplies used</li> </ul> </li> </ul>	<p><b>Skills</b></p> <ul style="list-style-type: none"> <li>Communicating</li> <li>Experimenting</li> <li>Inferring</li> <li>Observing</li> <li>Predicting</li> <li>Recording</li> <li>Reporting</li> </ul> <p><b>Attitudes and Values</b></p> <ul style="list-style-type: none"> <li><i>Cooperation</i></li> <li><i>Curiosity</i></li> </ul>

	<ul style="list-style-type: none"> <li>○ <b>Variables:</b> {List some controlled variables}</li> <li>○ <b>Method:</b> {clear and simple description of major steps in the experiment}</li> <li>○ <b>Results:</b> {Record of the results of the experiment. This sometimes requires a table}</li> <li>○ <b>Conclusion:</b> {A simple statement (connected to the aim) of the main result of the experiment}</li> </ul>	
--	---	--

Suggested Activities	Assessment	Cross Curricular Links
<ul style="list-style-type: none"> <li>• Place an object on the desk and ask students to observe and then report their observations. (Eventually point out that an observation includes the use of one or more of any of the senses). Give students other opportunities to make and report observations. Compare the observations of different students.</li> <li>• Have some students make observations and other students draw inferences based on those observations. Note that inferences may be either correct or incorrect.</li> <li>• Present a set of observations to students in written and picture form. Have students propose inferences for their observations: <a href="https://www.tes.com/lessons/ybtJVI8MrrHZLA/what-is-inference">https://www.tes.com/lessons/ybtJVI8MrrHZLA/what-is-inference</a></li> <li>• Pour some sprite or ginger ale in a clear glass or jar. Have students predict what they think will happen when the raisins are placed in the Sprite. Have students record their predictions. Place a few raisins into the container. Let students observe and propose explanations for their observations.</li> <li>• Follow instructions to perform simple experiments and record the experiments using an approved format e.g. <ul style="list-style-type: none"> <li>○ How many drops of water can a ten-cent coin hold? <a href="https://www.stevespanglerscience.com/lab/experiments/penny-drops/">https://www.stevespanglerscience.com/lab/experiments/penny-drops/</a> Ask students to make predictions before performing the experiment.</li> <li>○ Does a large ball bounce higher than a small ball when dropped from the same height? Students make predictions before performing the experiments.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Use a rubric to assess students' written reports.</li> <li>• Assess oral response to questions.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Language Arts:</b> Writing reports</li> <li>• <b>Mathematics:</b> using numbers.</li> </ul>

<ul style="list-style-type: none"> <li>○ Does the type of water affect whether an object sinks or floats?</li> <li>○ Does the width of the wing affect how far a paper airplane fly?</li> <li>○ Which brand of dish soap forms the most lather with water?</li> <li>● Record experiments using a scientific format.</li> <li>● Identify the controlled variables in the experiments performed.</li> <li>● Have students record the results of the experiments in data tables. Teacher should construct the tables and have students record the data.</li> <li>● <b>Project:</b> <ul style="list-style-type: none"> <li>○ Divide the class into groups. Each group makes a “feelie box” and have other groups use observations to draw inferences about what is in the box.</li> </ul> </li> </ul>		
---	--	--

**Materials:**

Dropper, readily available classroom objects, materials for feelie box, coin, water, different sized rubber balls, a variety of items for floating and sinking activity, container, sprite/ginger ale, raisins, paper, different brands of dish soap, similar sized bottles with covers.

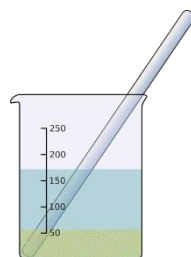
**Books:**

Primary Science Experiment Manual (2019)

**URLs:**

<https://www.lexialearning.com/blog/making-inferences-5-classroom-ready-activities>

**Diagrams:**





**Grade IV:** Term 1  
**Strand:** Physical Science (*Forces, Motion and Structures*)  
**Unit 3:** Measuring Physical Quantities  
**Duration:** 15 periods

**Focus Question:**

(1) How do we measure the physical properties of matter?

Learning Outcome	Specific Objectives
At the end of this unit students should 1. understand that matter has properties that can be measured.  <b>Technology:</b> <ul style="list-style-type: none"> <li>Appreciate the use of devices and tools made by humans.</li> </ul>	3. At the end of this unit students should be able to 3.1. list some physical properties of matter. 3.2. define mass, volume, length, temperature and time. 3.3. use instruments to measure the physical properties of matter. 3.4. identify the different units associated with various common measurements. 3.5. identify temperatures associated with common conditions.

Key Concepts	CONTENT	Skills, Attitudes and Values
<ul style="list-style-type: none"> <li>Balance</li> <li>Celsius</li> <li>Centimetre</li> <li>Cubic centimetre</li> <li>Clock</li> <li>Distance</li> <li>Gram</li> <li>Hour</li> <li>Kilogram</li> <li>Length</li> <li>Mass</li> <li>Matter</li> <li>Metre</li> <li>Measuring cylinder</li> <li>Millimetre</li> <li>Millilitre</li> <li>Minute</li> <li>Ruler</li> <li>Second</li> <li>Scale</li> <li>Time</li> </ul>	<p><b>Content Principle:</b></p> <ul style="list-style-type: none"> <li>Physical quantities can be measured using instruments calibrated in special units.</li> </ul> <p><b>Required Content:</b></p> <ul style="list-style-type: none"> <li><b>Matter</b> is anything that has mass and volume. Matter exists as solid, liquid or gas.</li> <li>Some physical properties of matter include; colour, shape, texture, volume, mass, length, temperature.</li> <li><b>Distance</b> is a measure of the space between two points. The distance along the longest side is called the <b>length</b> and the distance along the widest side is called the <b>width</b>. Distance can be measured using a ruler or measuring tape. The scientific unit of distance is the metre (m) but other related units include the millimetre (mm), the centimetre (cm) and the kilometer (km). Some common non scientific units of length are inches, feet, yards, and miles.</li> <li><b>Mass</b> is the amount of matter in a substance. It can be measured using a scale or balance. The scientific unit of mass is the kilogram but other related units include the gram (g) and the milligram (mg).</li> </ul>	<p><b>Skills</b></p> <ul style="list-style-type: none"> <li>Classifying</li> <li>Communicating</li> <li>Manipulating</li> <li>Measuring</li> <li>Observing</li> <li>Predicting</li> </ul> <p><b>Attitudes and Values</b></p> <ul style="list-style-type: none"> <li><i>Cooperation</i></li> <li><i>Curiosity</i></li> <li><i>Persistence</i></li> <li><i>Inventiveness</i></li> </ul>

<ul style="list-style-type: none"> <li>• Temperature</li> <li>• Watch</li> <li>• Width</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Volume</b> is the amount of space that an object takes up. Liquid volume can be measured using a measuring spoon, dropper, beaker and measuring cylinder. The scientific unit of volume is the cubic metre but other related units include the cubic centimetre (cm<sup>3</sup>) and the millilitre (ml). Other common non-scientific units include the cup, quart, gallon, quart, cup, tablespoon, and teaspoon.</li> <li>• The <b>temperature</b> of an object is its degree of hotness or coldness. It is measured using a thermometer. The scientific unit of temperature is the Kelvin. Other common non-scientific units include degrees Celsius (°C) and degrees Fahrenheit (°F).</li> <li>• Some common events and their associated temperatures are <ul style="list-style-type: none"> <li>○ Water normally freezes at 0 °C.</li> <li>○ Water usually boils at 100 °C.</li> <li>○ Normal body temperature is about 37 °C.</li> </ul> </li> <li>• Time is not a physical property of matter, however it can be measured using a clock or watch. <b>Time</b> is the measured period during which an action or process takes place. The scientific unit of time is the second but other common related units include minutes, hours, days and years.</li> <li>• The following guidelines should generally be observed when using the instruments identified <ul style="list-style-type: none"> <li>○ Use of Ruler <ul style="list-style-type: none"> <li>▪ Line up zero mark with edge of the object.</li> <li>▪ Take the reading at eye level.</li> <li>▪ Read the scale correctly with units.</li> </ul> </li> <li>○ Use of Electronic Balance: <ul style="list-style-type: none"> <li>▪ Place balance on a level surface.</li> <li>▪ Use taring facility.</li> <li>▪ Read the scale correctly with units.</li> <li>▪ Turn off scale when not in use.</li> </ul> </li> <li>○ Use of Measuring Cylinder: <ul style="list-style-type: none"> <li>▪ Place on a level surface.</li> <li>▪ Read the bottom of the meniscus.</li> <li>▪ Take the correct reading with units</li> <li>▪ Pour liquids without spillage.</li> </ul> </li> <li>○ Use of Thermometer: <ul style="list-style-type: none"> <li>▪ Immerse the bulb completely in the liquid.</li> <li>▪ Stir the liquid gently.</li> <li>▪ Avoid touching the sides and bottom of the container.</li> <li>▪ Take the reading with the bulb submerged.</li> <li>▪ Read the scale correctly with units.</li> </ul> </li> </ul> </li> </ul>	
---	--	--

Suggested Activities	Assessment	Cross Curricular Links
<ul style="list-style-type: none"> <li>• Provide students with a variety of objects and have them classify them based on any criteria. Have students present and explain their classification system. Discuss with students the physical properties of matter.</li> <li>• Hold a class discussion or invite personnel from the Bureau of Standards to talk about standardisation of measurements and instruments e.g. standardisation of gas pumps and supermarket scales.</li> <li>• Have students use rulers to measure and record the length of various objects. Use rulers of differing lengths and measuring tapes to measure the length of the same objects.</li> <li>• Provide students with a variety of objects and have them use a scale/balance to measure and record the mass of the objects.</li> <li>• Guide students to use a measuring cylinder to measure and record the volume of liquids. Use different sized measuring cylinders to measure similar volumes.</li> <li>• Guide students to use thermometers to measure and record the temperature of cold, cool, and warm substances as well as room temperature and body temperature.</li> <li>• Let students use timers to measure and record the time that elapses during an action or process.</li> <li>• Set up five stations around the classroom each with one of the instruments studied. Provide task cards at each station for students to complete. Provide students with recording sheets and have them rotate in groups through the stations and complete the tasks.</li> <li>• Read and respond to comprehension passages about measurement e.g. <a href="https://www.k12reader.com/worksheet/many-ways-to-measure/view/">https://www.k12reader.com/worksheet/many-ways-to-measure/view/</a></li> <li>• <b>Project:</b> <ul style="list-style-type: none"> <li>○ Have students construct instruments that can be used to measure volume and mass.</li> <li>○ Have students construct a thermometer.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Use anecdotes to assess group interaction.</li> <li>• Use a rubric to assess prototypes and performance on STEM challenges.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Mathematics:</b> Measurement</li> <li>• <b>Visual Arts:</b> Sketching, making models</li> </ul>

**Materials:**

A variety of objects, rulers, measuring tapes, scale/balance, measuring cylinders, thermometers, water, stopwatch

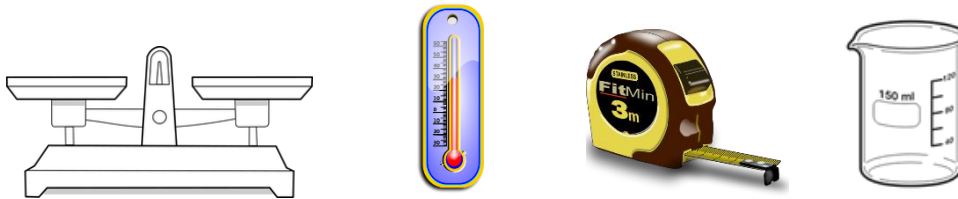
**Books:**

Modern Science and Technology for the Caribbean: Book 3

**URLs:**

<https://www.mtiinstruments.com/knowledge-center/15-measurement-activities-for-students/>

**Diagrams:**



**Grade IV:** Term 1  
**Strand:** Physical Science (*Energy*)  
**Unit 4:** Forms of Energy  
**Duration:** 10 periods

**Focus Question:**

(1) What are the various forms of energy?

Learning Outcome	Specific Objectives
<p>At the end of this unit students should</p> <ol style="list-style-type: none"> <li>understand that energy can be transferred from place to place in different forms.</li> </ol> <p><b>Technology:</b></p> <ul style="list-style-type: none"> <li>Appreciate the use of technological devices in their daily lives.</li> <li>Understand that others may be working on the same idea.</li> </ul>	<ol style="list-style-type: none"> <li>At the end of this unit students should be able to               <ol style="list-style-type: none"> <li>define energy.</li> <li>name the two main forms of energy.</li> <li>define potential energy.</li> <li>define kinetic energy.</li> <li>give simple examples of energy transformations.</li> <li>state the law of conservation of energy.</li> </ol> </li> </ol>

Key Concepts	CONTENT	Skills, Attitudes and Values
<ul style="list-style-type: none"> <li>Chemical</li> <li>Energy</li> <li>Electrical</li> <li>Heat</li> <li>Height</li> <li>Kinetic</li> <li>Light</li> <li>Motion</li> <li>Position</li> <li>Potential</li> <li>Sound</li> <li>Transformation</li> <li>Work</li> </ul>	<p><b>Content Principle:</b></p> <ul style="list-style-type: none"> <li>Energy exists in different forms.</li> <li>Energy can be transformed from one form to another.</li> </ul> <p><b>Required Content:</b></p> <ul style="list-style-type: none"> <li><b>Energy</b> is the ability to do work.</li> <li>There are two main forms of energy – Potential energy and Kinetic energy.</li> <li><b>Potential energy</b> is the energy that is stored. An object can have potential energy based on height, tension, compression or electricity.</li> <li><b>Kinetic energy</b> is the energy that an object has because it is moving. A moving ball, sound and light all have kinetic energy.</li> <li>The <b>law of conservation of energy</b> states that energy is neither created nor destroyed, it just changes from one form to another.</li> </ul>	<p><b>Skills</b></p> <ul style="list-style-type: none"> <li>Classifying</li> <li>Communicating</li> <li>Manipulating</li> <li>Observing</li> </ul> <p><b>Attitudes and Values</b></p> <ul style="list-style-type: none"> <li><i>Cooperation</i></li> <li><i>Curiosity</i></li> <li><i>Inventiveness</i></li> <li><i>Persistence</i></li> </ul>

Suggested Activities	Assessment	Cross Curricular Links
<ul style="list-style-type: none"> <li>• Show students pictures of people, animals and machines at work and at rest e.g. animal pulling a plough or standing still, a person running and at rest, a forklift lifting a load, a concrete mixer at work etc. Through questioning, deduce from students the concepts (i) work and (ii) energy. Have students construct their own meanings for energy and then with teachers assistance construct a class definition.</li> <li>• Discuss sources of energy e.g. water, wind, solar, fuel, food.</li> <li>• Make a catapult with a rubber band and a piece of paper. Stretch the rubber band. Have students observe the rubber band and state what they think will happen when the rubber band is released. Release the rubber band and have students state at which point/s the rubber band had energy. Discuss the concept of potential and kinetic energy using other illustrations e.g. a ball sitting at the edge of the desk, batteries in a radio, food on a plate.</li> <li>• Illustrate and discuss types of potential energy by compressing and releasing springs, viewing objects at different heights, opening and closing a simple circuit.</li> <li>• Illustrate and discuss kinetic energy by moving stationary objects and hitting objects to produce sounds.</li> <li>• Research and make rubber band powered cars. Discuss how the cars converts elastic potential energy to kinetic energy. Record the process using a suitable format: <ul style="list-style-type: none"> <li>○ <a href="https://yourmoderndad.com/diy-rubber-band-racer/">https://yourmoderndad.com/diy-rubber-band-racer/</a></li> <li>○ <a href="https://www.youtube.com/watch?v=v3pbVAYkGf0&amp;pbjreload=10">https://www.youtube.com/watch?v=v3pbVAYkGf0&amp;pbjreload=10</a></li> <li>○ <a href="https://www.youtube.com/watch?v=jmvgN3M1Ool">https://www.youtube.com/watch?v=jmvgN3M1Ool</a></li> <li>○ <a href="https://www.teacherspayteachers.com/Product/Free-STEM-or-STEAM-Printables-for-use-with-any-lesson-2022730">https://www.teacherspayteachers.com/Product/Free-STEM-or-STEAM-Printables-for-use-with-any-lesson-2022730</a></li> <li>○ <a href="https://www.teacherspayteachers.com/Product/Free-STEM-Challenge-Mini-Journal-1807836">https://www.teacherspayteachers.com/Product/Free-STEM-Challenge-Mini-Journal-1807836</a></li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Use a rubric to assess students as they perform experiments.</li> <li>• Use a rubric to assess students' written reports.</li> <li>• Use a rubric to assess students' project. Criteria can include ability to explain energy transformation.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Language Arts:</b> Comprehension</li> <li>• <b>Social Studies:</b> Technology and society</li> </ul>

<ul style="list-style-type: none"> <li>• Demonstrate energy transformations using appliances, pictures and scenarios.</li> <li>• Play an energy circulation game: Give each student a discussion card with a picture or scenario on it. Let students move around the class and share with a partner the type of energy or energy transformation that is illustrated on the card. Students will then exchange their cards and continue circulating around the room until they have received at least six different cards e.g. <a href="https://www.teacherspayteachers.com/Product/Forms-of-Energy-Activity-FREE-Discussion-Cards-3873376">https://www.teacherspayteachers.com/Product/Forms-of-Energy-Activity-FREE-Discussion-Cards-3873376</a>.</li> <li>• Students make a list of all the types of energy that they have used for the day.</li> <li>• Discuss the Law of Conservation of Energy.</li> <li>• Read comprehension passages about energy: <a href="https://www.k12reader.com/worksheet/convert-energy-to-motion/view/">https://www.k12reader.com/worksheet/convert-energy-to-motion/view/</a></li> <li>• <b>Project:</b> <ul style="list-style-type: none"> <li>○ Make a toy that demonstrates transformation of energy.</li> </ul> </li> </ul>		
--	--	--

**Materials:**

Pictures, rubber bands, paper, skewers, paperclips, toothpicks, hot glue and glue gun. playdough, bottle covers, nail, cardboard, craft sticks, straws, paper cups, a variety of objects, small appliances e.g. cell phones, flashlight, radio, wires, bulbs, dry cells, cards for Energy Circulation Game.

**Books:**

Modern Science and Technology for the Caribbean: Book 3

**URLs:**

<https://www.youtube.com/watch?v=OnAA3Z-x4MQ>  
<https://frugalfun4boys.com/transfer-of-energy-science-experiment/>

**Diagrams:**



**Grade IV:** Term 1  
**Strand:** Physical Science (*Forces, Motion and Structures*)  
**Unit 5:** Forces and Structures  
**Duration:** 10 periods

**Focus Question:**

(1) How do forces affect structures?

Learning Outcome	Specific Objectives
<p>At the end of this unit students should</p> <ol style="list-style-type: none"> <li>1. realize that forces affect structures.</li> <li>2. be aware of ways of altering the shape and strength of structures to minimize the effect of forces.</li> </ol> <p><b>Technology:</b></p> <ul style="list-style-type: none"> <li>• Realize that they can design and make things which may be different from what others make.</li> <li>• Appreciate the use of structures in the home and community.</li> </ul>	<ol style="list-style-type: none"> <li>5. At the end of this unit students should be able to               <ol style="list-style-type: none"> <li>5.1. describe ways in which the strength of different structures can be altered.</li> <li>5.2. relate the strength of a structure to the material from which it is made.</li> <li>5.3. relate the strength of a structure to the shapes in its design.</li> <li>5.4. describe how natural and manmade structures are strengthened.</li> <li>5.5. describe ways in which forces alter the shape of different structures and materials.</li> </ol> </li> </ol>

Key Concepts	CONTENT	Skills, Attitudes and Values
<ul style="list-style-type: none"> <li>• Bend</li> <li>• Brace</li> <li>• Break</li> <li>• Buckle</li> <li>• Forces</li> <li>• Load</li> <li>• Motion</li> <li>• Nail</li> <li>• Screw</li> <li>• Shape</li> <li>• Strength</li> <li>• Structures</li> <li>• Strut</li> <li>• Support</li> </ul>	<p><b>Content Principle:</b></p> <ul style="list-style-type: none"> <li>• The strength of a structure depends on both the material from which it is made as well as its shape</li> </ul> <p><b>Required Content:</b></p> <ul style="list-style-type: none"> <li>• The strength of a structure can be altered by using different materials and different shapes.</li> <li>• Some materials are stronger than others.</li> <li>• The triangle is one of the strongest shapes because it is not easily deformed.</li> <li>• The careful use of struts, braces, screws, nails and other devices can improve the strength of a structure.</li> </ul>	<p><b>Skills</b></p> <ul style="list-style-type: none"> <li>• Designing</li> <li>• Experimenting</li> <li>• Inferring</li> <li>• Manipulating</li> <li>• Observing</li> </ul> <p><b>Attitudes and Values</b></p> <ul style="list-style-type: none"> <li>• <i>Cooperation</i></li> <li>• <i>Curiosity</i></li> <li>• <i>Inventiveness</i></li> <li>• <i>Persistence</i></li> <li>• <i>Respect for evidence</i></li> </ul>



Suggested Activities	Assessment	Cross Curricular Links
<ul style="list-style-type: none"> <li>• Tear single sheets of newspaper. Fold the paper and tear. Continue folding and tearing the paper until it can no longer be torn. Discuss observations.</li> <li>• Make an eggshell bridge and experiment to determine what weight it can support. Discuss observations. Record observations in Science Experiment Book: <a href="https://www.science-sparks.com/how-strong-is-an-eggshell/">https://www.science-sparks.com/how-strong-is-an-eggshell/</a></li> <li>• Make different shapes from pieces of cards that are the same size –e.g. tube, rectangular, pyramid, and flat –test the strength of each shape by placing weights on them. Record which shape is strongest/weakest.</li> <li>• Make frames of different shapes using toothpicks and playdough. Test to determine which one is strongest.</li> <li>• Observe structures in the environment or pictures of bridges, arches, electrical towers, lobster/crabs, beehives, spider webs, bamboo stems, framework of buildings and discuss how they are strengthened.</li> <li>• Make models of natural structures such as leaves, beehives, bird nests, spider webs, etc.</li> <li>• Investigate the ways in which forces can alter the shape of structures and materials by dropping them from the same height.</li> <li>• Talk to an engineer about building techniques.</li> <li>• <b>Project:</b> <ul style="list-style-type: none"> <li>○ Design and build a bridge made from toilet paper rolls and paper. Discuss how the materials used were strengthened and how the shape of the bridge contributes to its strength (group work).</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Use rubrics to assess students as they experiment.</li> <li>• Assess oral response of students.</li> <li>• Use a rubric to assess models. Criteria can include; creativity, design, strength, choice of materials, use of materials.</li> <li>• Assess' students lab report.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Language Arts:</b> Making oral presentations</li> <li>• <b>Mathematics:</b> 2D and 3D shapes</li> <li>• <b>Visual Arts:</b> Making models</li> </ul>

**Materials:**

Newspaper, egg shells, card paper, weights, tooth picks, playdough, straw, paper clips, pipe cleaners, egg cartons, thread/ string, pictures of natural and man-made structures.

**Books:**

Modern Science and Technology for the Caribbean: Book 3  
Bright Ideas Book 3

**URLs:**

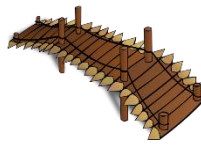
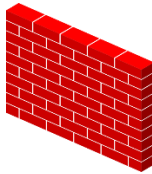
[https://www.teachengineering.org/view\\_activity.php?url=collection/cub\\_/activities/cub\\_intro/cub\\_intro\\_lesson01\\_activity1.xml](https://www.teachengineering.org/view_activity.php?url=collection/cub_/activities/cub_intro/cub_intro_lesson01_activity1.xml)

[https://www.teachengineering.org/view\\_lesson.php?url=collection/cub\\_/lessons/cub\\_brid/cub\\_brid\\_lesson04.xml](https://www.teachengineering.org/view_lesson.php?url=collection/cub_/lessons/cub_brid/cub_brid_lesson04.xml)

<http://inspirationlaboratories.com/science-at-home-strength-of-materials/>

<http://inspirationlaboratories.com/challenge-and-discover-build-a-bridge/>

**Diagrams:**



## Grade IV: Term 2

**Strand:** Life Science (*Diversity and Classification*)

**Unit 6:** Asexual reproduction

**Duration:** 10 periods

### Focus Question:

(1) How do plants grow and develop?

Learning Outcome	Specific Objectives
<p>At the end of this unit students should</p> <ol style="list-style-type: none"> <li>1. understand that there are many different ways of propagating plants.</li> <li>2. understand that technology can be utilized in growth and propagation of plants</li> </ol> <p><b>Technology:</b></p> <ul style="list-style-type: none"> <li>• Understand that people use processes and materials to satisfy their needs.</li> </ul>	<ol style="list-style-type: none"> <li>6. At the end of this unit students should be able to               <ol style="list-style-type: none"> <li>6.1. define asexual reproduction.</li> <li>6.2. describe common, natural methods of vegetative propagation.</li> <li>6.3. describe common, artificial methods of vegetative propagation.</li> </ol> </li> </ol>

Key Concepts	CONTENT	Skills, Attitudes and Values
<ul style="list-style-type: none"> <li>• Asexual reproduction</li> <li>• Artificial</li> <li>• Cutting</li> <li>• Grafting</li> <li>• Leaves</li> <li>• Natural</li> <li>• Plantlets</li> <li>• Propagation</li> <li>• Root</li> <li>• Stem</li> <li>• Vegetative reproduction</li> </ul>	<p><b>Content Principle:</b></p> <ul style="list-style-type: none"> <li>• Plants reproduce asexually from parts other than seeds.</li> </ul> <p><b>Required Content:</b></p> <ul style="list-style-type: none"> <li>• <b>Reproduction</b> is the process by which living things make new individual or offspring. It is important for the continuation of the species.</li> <li>• <b>Asexual or vegetative reproduction</b> is the ability of plants to grow new plants from existing plant parts.</li> <li>• Vegetative reproduction does not require seeds.</li> <li>• Plant parts that can reproduce by natural vegetative reproduction include leaves, stems and roots.</li> <li>• New plants can also be produced by artificial means. These include cuttings and grafting.</li> <li>• A <b>cutting</b> is a small portion of a parent plant that is used to grow a new plant.</li> <li>• <b>Grafting</b> is growing a new plant by attaching a piece of one plant to another so that they bond and become one plant.</li> </ul>	<p><b>Skills</b></p> <ul style="list-style-type: none"> <li>• Classifying</li> <li>• Communicating</li> <li>• Observing</li> <li>• Reporting</li> </ul> <p><b>Attitudes and Values</b></p> <ul style="list-style-type: none"> <li>• <i>Cooperation</i></li> <li>• <i>Curiosity</i></li> <li>• <i>Persistence</i></li> </ul>

Suggested Activities	Assessment	Cross Curricular Links
<ul style="list-style-type: none"> <li>• Cut open potatoes to examine them for the presence of seeds. Briefly revise the role of seeds in sexual reproduction in plants.</li> <li>• Allow students to examine a potato/onion/spider plant that has started the vegetative reproduction process. Discuss with students the concept of asexual reproduction.</li> <li>• In groups, have students set up specified plant parts in containers and observe and record the development of new plants e.g. bryophyllum (love bush) garlic bulbs, sweet potato, white potato, ginger, and chandelier plant leaves, the top portion of a pineapple fruit, cassava.</li> <li>• Visit Christian Valley or Bendals Agricultural station to observe plants propagated by cuttings and grafting and the processes.</li> <li>• Place cassava, sugar cane and hibiscus cuttings in soil to grow. Observe and record the process.</li> <li>• Discuss the differences between natural vegetative reproduction and artificial vegetative reproduction.</li> <li>• <b>Project:</b> <ul style="list-style-type: none"> <li>○ Start a “vegetative reproduction” garden.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Use a rubric to assess student lab reports</li> <li>• Assess oral response to questions.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Agricultural Science:</b> Plant propagation.</li> </ul>

**Materials:**

Potatoes, onions, pineapple, bryophyllum leaves, garlic bulbs, cassava, ginger, sugar cane cuttings, hibiscus cuttings, cassava cuttings, soil, containers, water.

**Books:**

Modern Science and Technology for the Caribbean: Book 3  
Bright Ideas Book 3

**URLs:**

<https://kidsgardening.org/lesson-plans-asexual-propagation/>

**Diagrams:**



**Grade IV:** Term 2  
**Strand:** Life Science (*Ecosystems*)  
**Unit 7:** Local and Regional Ecosystems  
**Duration:** 15 periods

**Focus Question:**

- (1) How are ecosystems important?
- (2) Where are the different types of ecosystems located in Antigua/Barbuda and the Caribbean?

Learning Outcome	Specific Objectives
<p>At the end of this unit students should</p> <ol style="list-style-type: none"> <li>1. be aware of the location of ecosystems in Antigua and Barbuda and the Caribbean.</li> <li>2. understand how physical structure of the land contributes to its ecosystems.</li> <li>3. appreciate the importance of ecosystems.</li> </ol> <p><b>Technology:</b></p> <ul style="list-style-type: none"> <li>• Realize that human-made things can pollute the environment.</li> </ul>	<ol style="list-style-type: none"> <li>7. At the end of this unit students should be able to               <ol style="list-style-type: none"> <li>7.1. identify an ecosystem as a community of living (biotic) and non-living (abiotic) factors interacting in a specific environment.</li> <li>7.2. name some different types of ecosystems found in Antigua &amp; Barbuda and other Caribbean countries.</li> <li>7.3. identify biotic and abiotic factors in specific ecosystems.</li> <li>7.4. compare and contrast ecosystems found in Caribbean countries.</li> <li>7.5. describe the interdependence between biotic and abiotic factors in an ecosystem.</li> <li>7.6. explain how ecosystems help to provide natural resources.</li> </ol> </li> </ol>

Key Concepts	CONTENT	Skills, Attitudes and Values
<ul style="list-style-type: none"> <li>• Abiotic</li> <li>• Aquatic</li> <li>• Beach shores</li> <li>• Biodiversity</li> <li>• Biotic</li> <li>• Community</li> <li>• Coral reef</li> <li>• Ecosystem</li> <li>• Grassland</li> <li>• Habitat</li> <li>• Inter-dependence</li> <li>• Lagoon</li> <li>• Mangrove</li> <li>• Marsh</li> <li>• Pond</li> <li>• Population</li> <li>• Scrubland</li> </ul>	<p><b>Content Principle:</b></p> <ul style="list-style-type: none"> <li>• Ecosystems provide useful resources.</li> <li>• Each Caribbean island has unique biodiversity.</li> </ul> <p><b>Required Content:</b></p> <ul style="list-style-type: none"> <li>• An <b>ecosystem</b> is made up of communities of <b>biotic</b> (living) and <b>abiotic</b> (non-living) factors interacting with their environment.</li> <li>• The organisms within an ecosystem depend on each other and are affected by the non-living factors.</li> <li>• Some ecosystems found in Antigua and Barbuda and the Caribbean include ponds, rainforests, mangrove swamps, sandy and rocky beach shores, coral reefs, salt marshes, lagoons and grasslands.</li> <li>• Ecosystems provide natural resources which drive economic activity and social development. They also contribute to human wellbeing.</li> </ul>	<p><b>Skills</b></p> <ul style="list-style-type: none"> <li>• Communicating</li> <li>• Inferring</li> <li>• Manipulating</li> <li>• Observing</li> </ul> <p><b>Attitudes and Values</b></p> <ul style="list-style-type: none"> <li>• <i>Concern for the environment</i></li> <li>• <i>Cooperation</i></li> <li>• <i>Curiosity</i></li> <li>• <i>Respect for living things</i></li> </ul>

<ul style="list-style-type: none"> <li>• Species</li> <li>• Swamp</li> <li>• Terrestrial</li> <li>• Wetland</li> </ul>	<ul style="list-style-type: none"> <li>• A change in one part of an ecosystem can affect the entire system.</li> <li>• Every biotic and abiotic factor has a specific role (niche) to play in an ecosystem. Removal or introduction of one can cause disruption in the ecosystem.</li> </ul>	
--	--	--

Suggested Activities	Assessment	Cross Curricular Links
<ul style="list-style-type: none"> <li>• Students go into the schoolyard and observe the various types of living and non-living things in a particular area (teacher can rope off an area or let students make quadrants from string, wood or paper and make their observations in those areas.) <ul style="list-style-type: none"> <li>○ Students record the type of organisms, the number (population) and any interactions they observe between living things and living things and living things and non-living things.</li> <li>○ Discuss with students the concept of an ecosystem using the information collected as reference. Teacher makes an anchor chart to illustrate the concept, as the discussion progresses. Example of an anchor chart: <a href="https://i.pinimg.com/originals/e8/d7/ea/e8d7ea4a531f60fb5895a73445c1ada7.jpg">https://i.pinimg.com/originals/e8/d7/ea/e8d7ea4a531f60fb5895a73445c1ada7.jpg</a></li> <li>○ Students illustrate how an ecosystem is organised on a circle map or pyramid, using the information they recorded: <a href="https://www.teacherspayteachers.com/Product/Ecosystems-Circle-Map-329748">https://www.teacherspayteachers.com/Product/Ecosystems-Circle-Map-329748</a></li> <li>○ Discuss how the ecosystem satisfies the needs of the plants and animals that live there.</li> </ul> </li> <li>• Go on a field trip to the Barbuda Lagoon and document the interactions seen.</li> <li>• View pictures of various types of local and regional ecosystems. Identify the biotic and abiotic factors, habitats, and interactions in each.</li> <li>• Compare and contrast the types of biotic and abiotic factors in various ecosystems using graphic organizers.</li> <li>• Make ecosystem posters, mobiles cubes.</li> </ul>	<ul style="list-style-type: none"> <li>• Use rubrics to assess models.</li> <li>• Assess students' oral responses</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Language Arts:</b> Oral expression, reading comprehension</li> <li>• <b>Mathematics:</b> use of tables and graphs</li> <li>• <b>Social Studies:</b> the environment</li> <li>• <b>Visual Arts:</b> Making models</li> </ul>

<ul style="list-style-type: none"> <li>• Use various graphic organisers to represent the ecosystems: <a href="https://www.teacherspayteachers.com/Product/Ecosystem-Graphic-Organizers-3035264">https://www.teacherspayteachers.com/Product/Ecosystem-Graphic-Organizers-3035264</a></li> <li>• Discuss and compare the various records.</li> <li>• Go on an island tour to observe the different types of ecosystems on the island. Students should be provided with maps, worksheets or journals in which they record the type of ecosystem, the location, a sketch, the type of living and non-living things and any interactions observed.</li> <li>• Engage in follow up discussion about the importance of the interactions between abiotic and biotic factors in an ecosystem.</li> <li>• Read and discuss comprehension passages about ecosystems e.g. <a href="https://www.k12reader.com/worksheet/ecosystems/view/">https://www.k12reader.com/worksheet/ecosystems/view/</a></li> <li>• Identify the various types of ecosystems on blank maps of Antigua and Barbuda.</li> <li>• Compile a picture book of local and Caribbean ecosystems.</li> <li>• Discuss the importance of the various ecosystems.</li> <li>• Compare and contrast similar ecosystems in various Caribbean islands, e.g. rainforests in Antigua and rainforests in Dominica or mangroves in Barbuda and mangroves in Montserrat.</li> <li>• Set up and observe eco-columns, terrariums, aquariums, ponds, etc.</li> <li>• <b>Project:</b> <ul style="list-style-type: none"> <li>○ Make models of various types of ecosystems.</li> </ul> </li> </ul>		
---	--	--

**Materials:**

String, paper, crayons, glue, scissors, shoe boxes, pictures of ecosystems, pictures of plants and animals found in various ecosystems, plastic bottles, water, glass jars, plants, fish, snails, soil, earth worms.

**Books:**

Modern Science and Technology for the Caribbean: Book 3  
Bright Ideas Books 3 and 4

**URLs:**

<https://www.youtube.com/watch?v=P1X-WpfUvm4>

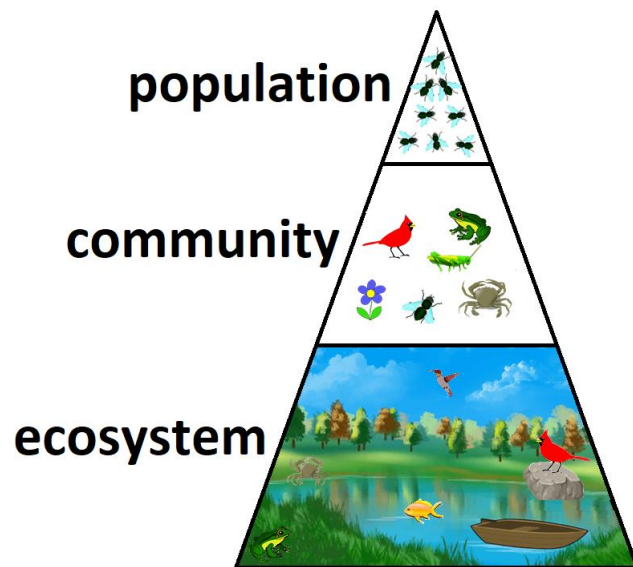
<http://www.learnnc.org/lp/pages/3451>

<http://www.pbslearningmedia.org/resource/lps07.sci.life.eco.lpexpecosystems/exploring-the-systems-in-ecosystems/>

<http://www.neok12.com/Ecosystems.htm>

<http://www.teachersdomain.org/resource/lps07.sci.life.oate.ecosystem>

**Diagrams:**





**Grade IV:** Term 2  
**Strand:** Life Science (*Ecosystems*)  
**Unit 8:** Environmental Destruction  
**Duration:** 10 periods

**Focus Question:**

- (1) How do natural phenomena and human interaction impact the environment?
- (2) What can be done to minimise negative impacts on the environment?

Learning Outcome	Specific Objectives
<p>At the end of this unit students should</p> <ol style="list-style-type: none"> <li>1. be aware that the environment may be destroyed by man’s activities as well as nature.</li> <li>2. appreciate the importance of preventing/reducing environmental destruction by human behaviour.</li> </ol> <p><b>Technology:</b></p> <ul style="list-style-type: none"> <li>• Recognise that human made things can pollute the environment.</li> </ul>	<p>8. At the end of this unit students should</p> <ol style="list-style-type: none"> <li>8.1. describe the effects of man’s activities on the environment.</li> <li>8.2. investigate the effects of wave action, hurricanes, volcanoes and earthquakes on the environment (e.g. beach, coral reefs).</li> <li>8.3. cite ways in which man can help to reduce environmental destruction.</li> </ol>

Key Concepts	CONTENT	Skills, Attitudes and Values
<ul style="list-style-type: none"> <li>• Backfill</li> <li>• Beach</li> <li>• Conservation</li> <li>• Coral reef</li> <li>• Deforestation</li> <li>• Dredging</li> <li>• Drought</li> <li>• Erosion</li> <li>• Extinction</li> <li>• Fires</li> <li>• Habitat</li> <li>• Invasive species</li> <li>• Illegal dumping</li> <li>• Landfill</li> <li>• Litter</li> <li>• Mangrove</li> <li>• Mining</li> <li>• Pollute</li> <li>• Sand-mining</li> <li>• Tsunami</li> </ul>	<p><b>Content Principle:</b></p> <ul style="list-style-type: none"> <li>• Natural processes as well as man’s activities can cause environmental destruction.</li> <li>• Humans are responsible for minimizing their impact on the environment.</li> </ul> <p><b>Required Content:</b></p> <ul style="list-style-type: none"> <li>• Human and natural activities impact on the environment, upsetting the balance in nature. This leads to destruction of the environment.</li> <li>• Natural occurrences that impact on the environment include: hurricanes, volcanoes, earthquakes, tsunamis, droughts and flooding. We may not be able to control natural processes but learning about them can enable us to mitigate against their impact on the environment.</li> <li>• Some of man’s activities that impact the environment include: pollution, mining, deforestation, overhunting/overfishing, dredging, mangrove removal, backfilling.</li> <li>• Humans can control their impact on the environment.</li> </ul>	<p><b>Skills</b></p> <ul style="list-style-type: none"> <li>• Communicating</li> <li>• Observing</li> <li>• Recording</li> </ul> <p><b>Attitudes and Values</b></p> <ul style="list-style-type: none"> <li>• <i>Concern for the environment</i></li> <li>• <i>Respect for living things</i></li> </ul>

Suggested Activities	Assessment	Cross Curricular Links
<ul style="list-style-type: none"> <li>• Pour bottled water into a large clear container. Ask students if they would drink it. Put a few drops of gravy browning into the water then discuss with students whether they would drink it. Pour clean water into the container until the food colouring is not visible. Discuss with students how pollution is not always visible but it impacts the environment.</li> <li>• In groups students place different types of pollutants in a clean container of water e.g. cooking oil, trash, dirt. Students try to undo the pollution by taking out the trash, sieving, using dish liquid, sponges, etc. Discuss how impacting the environment can be extremely difficult to remedy.</li> <li>• Observe the environment and pictures of the environment to determine how it has been destroyed by natural forces and man's activities. Discuss the destruction observed. (Fort James Beach, Dickenson Bay Beach, Crabbe Hill, Darkwood bridge, Guiana Island, Fitches Creek Mangrove)</li> <li>• Go on field trips to various areas e.g. Fitches Creek Swamp (beach, mangrove, etc.) and observe the environment: litter, erosion, depletion of sand, vegetation and so on.</li> <li>• Give students picture cards showing various types of environmental destruction, students record and present how these activities impact on the environment.</li> <li>• View pictures/videos of the destruction caused by beach erosion, flooding, hurricanes, earthquakes etc. Discuss.</li> <li>• Invite resource person from the EAG or Environment Division to talk about environmental destruction.</li> <li>• Write a report on the destruction of the environment by man and those caused by natural phenomena.</li> <li>• Suggest ways in which man can prevent destruction of the environment.</li> <li>• Make and display posters, lapbooks, mobiles, flip books, concept maps about man's impact on the environment and the solutions.</li> </ul>	<ul style="list-style-type: none"> <li>• Assess students participation in class activities</li> <li>• Informally assess the moving vote activity. Note students' arguments and responses.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Language Arts:</b> Writing skits and reports</li> <li>• <b>Performing Arts:</b> Dramatic presentation</li> <li>• <b>Social Studies:</b> The environment</li> <li>• <b>Visual Arts:</b> Making posters and mobiles</li> </ul>

<ul style="list-style-type: none"> <li>Engage in a 'Moving Votes' exercise. Teacher designates different areas of the classroom for student choices – Agree, Disagree or Unsure. Various statements about the environment are read, e.g. Dumping garbage near the mangrove does not affect marine life. Students stand in designated areas to show their response to the statement. Each group of students discuss among themselves why they made the specific choice. Arguments are then presented to the entire body. Students are free to move to any group if they are convinced by the arguments.</li> <li>Write and perform a "Be the Solution Not the Problem" skit</li> <li>Plan and perform mini lectures on the topic.</li> <li><b>Project:</b> <ul style="list-style-type: none"> <li>Plan and execute a "Pollution Solution" public awareness campaign. Invite parents, members of the community, etc. to view display.</li> </ul> </li> </ul>		
--	--	--

**Materials:**

Water, gravy browning, container, cooking oil, dirt, trash, sieve, picture cards, crayons, markers, scissors, manila, construction paper, glue.

**Books:**

Modern Science and Technology for the Caribbean: Book 3  
Bright Ideas Book 4

**URLs:**

- [https://drive.google.com/file/d/0B8\\_71tjoHnsNaTBhQ1IBVHhDTXc/edit?pli=1](https://drive.google.com/file/d/0B8_71tjoHnsNaTBhQ1IBVHhDTXc/edit?pli=1)
- <http://www.discoveryeducation.com/teachers/free-lesson-plans/protecting-our-planet.cfm>
- <https://www.teachervision.com/pollution/teacher-resources/55842.html>
- <http://sciencelearn.org.nz/Contexts/Enviro-imprints/Teaching-and-Learning-Approaches>

**Diagrams**



**Grade IV:** Term 2  
**Strand:** Life Science (*Ecosystems*)  
**Unit 9:** Conservation Needs in Antigua and Barbuda  
**Duration:** 10 periods

**Focus Question:**

(1) How can we protect our natural environment?

Learning Outcome	Specific Objectives
<p>At the end of this unit students should</p> <ol style="list-style-type: none"> <li>1. have a greater appreciation for our natural environment.</li> <li>2. understand the importance of sustainably using natural resources.</li> <li>3. devise ways in which we can contribute to protecting our natural environment.</li> </ol> <p><b>Technology:</b></p> <ul style="list-style-type: none"> <li>• Realize that human-made things can pollute the environment.</li> </ul>	<ol style="list-style-type: none"> <li>9. At the end of this unit students should be able to               <ol style="list-style-type: none"> <li>9.1. give reasons why the environment should be protected.</li> <li>9.2. identify ways to protect the environment.</li> <li>9.3. distinguish among reuse, reduce and recycle.</li> </ol> </li> </ol>

Key Concepts	CONTENT	Skills, Attitudes and Values
<ul style="list-style-type: none"> <li>• Biodegradable</li> <li>• Composting</li> <li>• Conservation</li> <li>• Deforestation</li> <li>• Ecosystem</li> <li>• Environmental destruction</li> <li>• Extinct</li> <li>• Garbage</li> <li>• Habitat</li> <li>• Landfills</li> <li>• Land pollution</li> <li>• Non-biodegradable</li> <li>• Recycling</li> <li>• Reducing</li> <li>• Resources</li> <li>• Reusing</li> <li>• Soil erosion</li> </ul>	<p><b>Content Principle:</b></p> <ul style="list-style-type: none"> <li>• The environment is worth protecting.</li> </ul> <p><b>Required Content:</b></p> <ul style="list-style-type: none"> <li>• <b>Conservation</b> is the careful management of our natural resources. We depend on our environment for survival and depletion of its natural resource also poses a threat to the quality of our lives.</li> <li>• Methods of conservation include the three R's- Reduce, Reuse and Recycle.</li> <li>• To <b>reduce</b> is to cut down on the use of resources and/or waste generation. We can generate less garbage if we purchase products that are packaged in reusable materials. Car- pooling reduces fossil fuels used for travel.</li> <li>• To <b>reuse</b> is to utilize an object in essentially the same form after it has served its first purpose. Refilling a water bottle instead of discarding it is an example of reusing.</li> </ul>	<p><b>Skills</b></p> <ul style="list-style-type: none"> <li>• Classifying</li> <li>• Observing</li> <li>• Predicting</li> </ul> <p><b>Attitudes and Values</b></p> <ul style="list-style-type: none"> <li>• <i>Concern for the environment</i></li> <li>• <i>Cooperation</i></li> <li>• <i>Respect for living things</i></li> </ul>

	<ul style="list-style-type: none"> <li>• To <b>recycle</b> is to convert an old product into something totally new so that it can be useful again.</li> <li>• Efforts need to be made to conserve our natural resources.</li> </ul>	
--	---	--

Suggested Activities	Assessment	Cross Curricular Links
<ul style="list-style-type: none"> <li>• Discuss man’s interdependence on the environment for his survival.</li> <li>• Place students in groups. Provide each group with a toothpick and a cookie that contains raisins, chocolate chips and nuts. The chocolate chips, raisins and nuts will represent specified natural resources (rocks, oil, gold, plants etc.). Have students make a sketch of their cookie before the activity begins. Instruct students to carefully remove as many natural resources from the cookie as possible using the toothpick. One group of students will remove their natural resources under the supervision of the teacher or a student that represents an environmental protection agency, one group will work within a shorter time than the other groups, one group will be instructed to work on only a specified portion of the cookie and the other group will work without any restrictions. At the end of the activity have students make a sketch of their cookie. Have students view all the cookies and compare and discuss the results. (Cookies may be substituted with playdough with objects such as pebbles, seeds, beads, buttons pressed in.</li> <li>• Read and discuss comprehension passages about conservation: <a href="https://www.k12reader.com/worksheet/ecology-taking-care-of-earth/">https://www.k12reader.com/worksheet/ecology-taking-care-of-earth/</a></li> <li>• Discuss sustainable use of our natural resources.</li> <li>• Play “What Would You Do?” <ul style="list-style-type: none"> <li>○ Present students with various scenarios and have them discuss what course of action they would take and why e.g. You are a farmer who owns one of the largest and most successful farms on the island. People travel from near and far to buy</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• Assess students’ responses to What Would You Do scenarios.</li> <li>• Assess write up on “Analysing Trash” activity.</li> <li>• Assess the artefacts and the instructions for making them. Criteria may include choice of materials, creative use of materials, functionality, durability. Instructions criteria may include clarity, use of language, sequence.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Language Arts:</b> Reading Comprehension, writing clear instructions, poetry, song writing</li> <li>• <b>Mathematics:</b> Measurement, use of tables and graphs</li> <li>• <b>Social Studies:</b> Earth’s Resources</li> <li>• <b>Visual Arts:</b> Making artefacts</li> </ul>

<p>your produce because they are large and perfect. Insects do not destroy your crops because you use pesticides and the chemical fertilizers that you use ensure that your produce are large. Your business has enabled you to build a nice home and support your wife and children one of whom is in university. The local environmental group has blamed your use of pesticides on the rapid decline of fish in a pond near your farm. What would you do?</p> <ul style="list-style-type: none"> <li>• Talk to resource persons from EAG, The Environment Division, National Solid Waste Management Authority, Antigua and Barbuda Waste Recycling Centre, and National Parks about conservation needs in Antigua and Barbuda.</li> <li>• Discuss the importance of the Styrofoam and plastic bag ban and the implications for the health of the environment in Antigua and Barbuda.</li> <li>• Discuss the open and closed seasons imposed by the Fisheries Division for specific marine species.</li> <li>• Engage in conservation activities such as tree planting exercises (Department of Environment), collecting recyclable materials, beach or community clean up, producing public service announcement videos, creating and distributing: flyers, posters, brochures on conservation.</li> <li>• Discuss the importance of Styrofoam and plastic bag ban and the implications for the health of the environment in Antigua and Barbuda.</li> <li>• Field trip to landfill and recycling centre.</li> <li>• Present students with information on how long some items last in the environment and have them create a timeline from present day to future, on how long items they presently use will impact the environment e.g. <a href="http://www.mrsstiletto.nl/duurzaam/how-long-until-its-gone/">http://www.mrsstiletto.nl/duurzaam/how-long-until-its-gone/</a></li> <li>• Collect and sort garbage. Identify those that can be reused and recycled and ways in which this can be done. Represent the information</li> </ul>		
---	--	--

<p>in tables and graphs. Discuss how the amount of garbage generated can be reduced.</p> <ul style="list-style-type: none"> <li>• Collect old newspapers and make recycled paper.</li> <li>• Use old and discarded materials to create a useful artefact e.g. old clothes can be used to make floor mats or cushions, plastic bags – flowers, toilet paper rolls – pencil holders or table top organizers, paper/newspaper – biodegradable planters, glass/plastic jars – beakers or funnels for science activities, old CD’s – broken to make mosaics with bottle covers and caps. Write instructions on how to make your artefacts.</li> <li>• Make compost in a bottle: <a href="https://sciencing.com/make-compost-kids-4912501.html">https://sciencing.com/make-compost-kids-4912501.html</a></li> <li>• Write a poem/ song about the importance of conservation.</li> <li>• Make up a “Conservation in Antigua &amp; Barbuda” board game.</li> <li>• Write and implement a conservation plan for your school/ home. Be sure to include water and energy and the three R’s.</li> <li>• It is illegal for a person to fish for, take, place for sale, purchase or have in possession any of the following species during the closed season. The following are closed seasons for specific species imposed by the Fisheries Division of Antigua and Barbuda. <ul style="list-style-type: none"> <li>○ January 1<sup>st</sup> to March 31<sup>st</sup>: Nassau grouper, Red Hind and Coney</li> <li>○ May 1<sup>st</sup> to July 31<sup>st</sup>: Parrot (Chub) Fish, all species</li> <li>○ May 1<sup>st</sup> to June 30<sup>th</sup>: Lobster – It is also illegal to harm, take, have in your possession, place for sale or purchase lobster which is carrying eggs, undersized, lobster which is molting or with lobster with a tar spot.</li> <li>○ July 1<sup>st</sup> to August 31<sup>st</sup>: Conch.</li> <li>○ No Open Season for Marine Turtles</li> </ul> </li> <li>• <b>Project:</b> <ul style="list-style-type: none"> <li>○ Make a t-shirt bag <a href="http://climatekids.nasa.gov/tshirt-bag">http://climatekids.nasa.gov/tshirt-bag</a></li> </ul> </li> </ul>		
--	--	--

**Materials:**

Cookie/playdough, plastic bags, gloves, newspaper, sieve, blender, kitchen waste (vegetable matter) glass and plastic jars, old CDs, old clothes, crayons, markers, glue, scissors, manila, construction paper.

**Books:**

Modern Science and Technology Student and Activity Book 3  
Bright Ideas Book 6

**URLs:**

<https://www.teacherspayteachers.com/Product/FREE-Earth-Day-Craftivity-229783>

<https://www.teacherspayteachers.com/Product/Earth-Day-FREE-559428>

<http://www.teachingideas.co.uk/themes/theenvironment/>

<http://www.makeuseof.com/tag/10-environmental-games-teach-kids-earth-ecology-conservation/>

<https://cdn.simplykinder.com/wp-content/uploads/2017/04/Earth-Day-Sort-PDFS.pdf>

**Diagrams:**



## Grade IV: Term 3

**Strand:** Earth and Space Science (*Earth's Resources*)

**Unit 10:** Rocks and Soils

**Duration:** 10 periods

### Focus Question:

(1) How are rocks and soils related?

Learning Outcome	Specific Objectives
<p>At the end of this unit students should</p> <ol style="list-style-type: none"> <li>know the properties of soil.</li> <li>understand soil formation.</li> <li>demonstrate an understanding of how soil is formed.</li> <li>be aware that rocks are related to soil.</li> </ol> <p><b>Technology:</b></p> <ul style="list-style-type: none"> <li>Construct models.</li> </ul>	<p>10. At the end of this unit students should be able to</p> <ol style="list-style-type: none"> <li>classify rocks according to colour, texture, hardness, lustre.</li> <li>identify three main types of rocks.</li> <li>list the functions of rocks in the environment.</li> <li>construct objects using rocks.</li> <li>discuss the relationship between rocks and soil.</li> <li>identify three main types of soil.</li> <li>list main the components in the profile of loam soil.</li> <li>compare the properties of different types of soil.</li> <li>identify the causes and effects of soil erosion.</li> <li>identify ways in which soil erosion may be prevented.</li> </ol>

Key Concepts	CONTENT	Skills, Attitudes and Values
<ul style="list-style-type: none"> <li>Clay</li> <li>Erosion</li> <li>Humus</li> <li>Igneous</li> <li>Loam</li> <li>Metamorphic</li> <li>Resources</li> <li>Rock</li> <li>Sedimentary</li> <li>silt</li> <li>Soil</li> <li>Weathering</li> </ul>	<p><b>Content Principle:</b></p> <ul style="list-style-type: none"> <li>Rocks and soils are important resources that need to be conserved.</li> </ul> <p><b>Required Content:</b></p> <ul style="list-style-type: none"> <li>A <b>rock</b> is a solid that is composed of one or more minerals.</li> <li><b>Minerals</b> are pure non-living substances such as iron, aluminium, diamond and copper.</li> <li>Rocks differ in colour, hardness, lustre and texture.</li> <li>Rocks are classified based on how they are formed.</li> <li><b>Sedimentary</b> rocks are formed from particles of sand, pebbles, shells and other pieces of materials. They are usually soft and will crumble easily.</li> <li><b>Metamorphic</b> rocks are formed under the surface of the earth due to intense heat and pressure. They are hard and may be light or dark coloured.</li> </ul>	<p><b>Skills</b></p> <ul style="list-style-type: none"> <li>Classifying</li> <li>Communicating</li> <li>Hypothesizing</li> <li>Experimenting</li> <li>Manipulating</li> <li>Measuring</li> <li>Observing</li> <li>Recording</li> </ul> <p><b>Attitudes and Values</b></p> <ul style="list-style-type: none"> <li><i>Cooperation</i></li> </ul>

	<p>Metamorphic rocks often have ribbon like layers and shiny crystals in them.</p> <ul style="list-style-type: none"> <li>• <b>Igneous</b> rocks are formed when magma (melted rocks found deep in the earth) cool down and become hard. These rocks are usually hard and dark. They may have tiny holes and spaces in them or smooth, shiny surfaces.</li> <li>• Soil is formed when rain, wind, sun and ice act on rock and break them down. This process is known as <b>weathering</b>.</li> <li>• Soil is the upper layer of the earth in which plants normally grow. It is a complex mixture of organic and inorganic matter including rock particles of varying types, shapes, sizes and colours.</li> <li>• Three main types of soil are sand, clay and loam. Loam soil may be made up of sand, silt, clay and organic matter (humus).</li> <li>• Different types of soil drain and retain water at different rates.</li> <li>• <b>Soil erosion</b> is the washing away of topsoil by the action of wind and water. Soil erosion may be prevented by planting trees and cover crops, building terraces, and contour ploughing.</li> </ul>	
--	--	--

Suggested Activities	Assessment	Cross Curricular Links
<ul style="list-style-type: none"> <li>• Sieve a sample of soil to identify rocks.</li> <li>• Collect different types of rock samples from home or at school and compare and contrast them. Test the rocks for hardness by scratching them with a copper coin, a steel craft knife and a glass jar. Compare colour and lustre.</li> <li>• Experiment with various types of rocks to determine whether they sink or float, their reaction with vinegar and magnets. Drop rocks from the same height and observe what happens. Make predictions, record results in Science Experiment Book using appropriate format.</li> <li>• Go for a walk to identify how things made from rocks are used around the school/ community.</li> <li>• Complete compare and contrast charts about three types of rocks</li> <li>• Make models of rocks.</li> </ul>	<ul style="list-style-type: none"> <li>• Assess comparison charts</li> <li>• Assess Rock Identification Manual</li> <li>• Assess experimental write up of soil drainage and retention activity</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Agricultural Science:</b> Soil erosion</li> <li>• <b>Social Studies:</b> Weathering</li> <li>• <b>Visual Arts:</b> making paper weights, model rock and pet rocks</li> </ul>

<ul style="list-style-type: none"> <li>• Paint/decorate rocks to be used as paper weights, pet rocks, etc.</li> <li>• Make a class display or a personal rock collection.</li> <li>• Class discussion on weathering.</li> <li>• Read and respond to comprehension passages on the rock cycle e.g. <a href="https://www.k12reader.com/worksheet/the-rock-cycle/view/">https://www.k12reader.com/worksheet/the-rock-cycle/view/</a></li> <li>• Discuss the three main types of soils.</li> <li>• Pour a sample of top soil into a clear jar. Pour some water into the jar and allow students to observe what happens. Cover the jar, shake it then allow it to settle for twenty-four hours. Observe, make a labelled drawing and discuss the results.</li> <li>• Compare different soil types by observing and manipulating to determine colour, texture, particle size, composition.</li> <li>• Experiment to determine drainage and retention of soils by pouring equal volumes of water over equal volumes of different soils. Collect and measure the volume of water that drains in order to determine the soil drainage and retention. Make predictions, identify and control variables, record the results in tables. Make conclusions. Record experiments in Science Journal/ Experiment Book.</li> <li>• Observe instances of soil erosion in their school environment and surroundings.</li> <li>• Observe environment and identify the different agents that cause erosion. Perform experiments to observe how soil erosion may be prevented. Shape some loose soil into a hill on tray. Use a watering can to simulate rain falling from overhead onto the soil. Repeat the activity using soil that has plants with roots still attached.</li> <li>• Blow onto loose soil with a straw and onto soil that contains plants with roots attached. Compare the results and discuss.</li> <li>• Discuss the effects of erosion and how it might be prevented (planting trees, cover crops, terracing, using rocks as barriers, etc.).</li> <li>• <b>Project:</b> <ul style="list-style-type: none"> <li>○ Make a “Rock Identification Manual”.</li> </ul> </li> </ul>		
--	--	--

**Materials:**

Soil samples, sieve, a variety of rocks, copper penny or wire, steel, glass jar, comparison charts, glue, sand, shells, small stones, water, magnets, vinegar, dropper, containers, funnels, measuring cylinders, tray.

**Books:**

Modern Science and Technology for the Caribbean: Book 2  
Bright Ideas Book 4

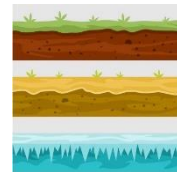
**URLs:**

<http://www.teachjunkie.com/sciences/rocks-for-kids-15-fun-activities/>

<https://www.tes.co.uk/teaching-resource/rocks-and-soils-6184519>

<http://www.parents.com/blogs/homeschool-den/2013/02/24/freebies/three-types-of-rocks-our-activities-and-a-free-worksheet-packet/>

<http://www.learner.org/interactives/rockcycle/types.htmlstaff.bbhcscd.org/kucharskie/files/2009/11>

**Diagrams:**

**Grade IV:** Term 3  
**Strand:** Earth and Space Science (*Earth's Resources*)  
**Unit 11:** Water  
**Duration:** 10 periods

**Focus Questions:**

- (1) What are the properties of water?
- (2) What are the uses of water?

Learning Outcome	Specific Objectives
At the end of this unit students should <ol style="list-style-type: none"> <li>1. understand that properties of water make it useful.</li> <li>2. appreciate the usefulness of water.</li> </ol> <p><b>Technology:</b></p> <ul style="list-style-type: none"> <li>• Devise solutions to problems.</li> </ul>	11. At the end of this unit students should be able to <ol style="list-style-type: none"> <li>11.1. identify ways in which water is useful to humans.</li> <li>11.2. classify substances as soluble or insoluble by their ability to dissolve in water.</li> <li>11.3. explain how a solution is formed.</li> <li>11.4. identify situations where water is useful because of its solvent properties.</li> <li>11.5. compare the rate of evaporation of water under different circumstances.</li> </ol>

Key Concepts	CONTENT	Skills, Attitudes and Values
<ul style="list-style-type: none"> <li>• Dissolve</li> <li>• Evaporation</li> <li>• Insoluble</li> <li>• Mixture</li> <li>• Soluble</li> <li>• Solute</li> <li>• Solution</li> <li>• Solvent</li> </ul>	<p><b>Content Principle:</b></p> <ul style="list-style-type: none"> <li>• Water is a vital natural resource.</li> </ul> <p><b>Required Content:</b></p> <ul style="list-style-type: none"> <li>• Water is a basic human need.</li> <li>• Water is important for human consumption, hygiene, cooking, agriculture, transportation, generating electrical energy and recreation.</li> <li>• Water is referred to as the <b>Universal Solvent</b> because many substances can dissolve in it.</li> <li>• A <b>solution</b> is formed when a solute dissolves in a solvent. The <b>solute</b> is the substance being dissolved and the <b>solvent</b> is the substance that does the dissolving.</li> <li>• A <b>soluble</b> substance dissolves in water.</li> <li>• Substances dissolve at different rates.</li> <li>• An <b>insoluble</b> substance does not dissolve in water.</li> <li>• Insoluble substances form <b>mixtures</b>.</li> <li>• If left in the open, water can change its state from a liquid to a gas. This process is called <b>evaporation</b>.</li> </ul>	<p><b>Skills</b></p> <ul style="list-style-type: none"> <li>• Communicating</li> <li>• Classifying</li> <li>• Manipulating</li> <li>• Measuring</li> <li>• Predicting</li> <li>• Recording</li> <li>• Reporting</li> <li>• Observing</li> </ul> <p><b>Attitudes and Values</b></p> <ul style="list-style-type: none"> <li>• <i>Cooperation</i></li> <li>• <i>Persistence</i></li> <li>• <i>Respect for evidence</i></li> </ul>

Suggested Activities	Assessment	Cross Curricular Links
<ul style="list-style-type: none"> <li>• Ask students to state all the ways in which they have used water during the day. Make a list of all the ways humans use water. Discuss the importance of water. Have students make an accordion book to illustrate the uses of water: <a href="https://www.homeschoolshare.com/lapbook-templates.php">https://www.homeschoolshare.com/lapbook-templates.php</a></li> <li>• Place students in groups and present them with samples of three clear, colourless liquids e.g. sprite, water and vinegar. Have students describe each liquid and then try to determine which one is water. Each group shares its findings.</li> <li>• Have students put a spoonful of salt into a container of water and stir. Discuss what happens. Explain the concept of a solution and how it is formed.</li> <li>• Provide groups of students with a variety of substances e.g. sugar, sand, cooking oil, flour, rubbing alcohol, small pebbles, cornmeal, coffee, drink mix, soil etc. and have them add equal volumes of each substance to a constant volume of water. Students should stir the mixtures then record their findings. Students should then observe and record what happens when the combinations are poured through a piece of filter paper in a funnel.</li> <li>• Discuss the concepts of soluble and insoluble substances using the substances that were tested. Students classify substances based on whether or not they are soluble in water.</li> <li>• Students complete Frayer model charts and comparison/contrast charts about mixtures and solutions: <ul style="list-style-type: none"> <li>○ <a href="https://www.template.net/business/word-templates/frayer-model-template/">https://www.template.net/business/word-templates/frayer-model-template/</a></li> <li>○ <a href="https://www.template.net/design-templates/print/blank-venn-diagram/">https://www.template.net/design-templates/print/blank-venn-diagram/</a></li> </ul> </li> <li>• Compare the dissolving time of various soluble substances e.g. white sugar, brown sugar, fine salt, rock (coarse) salt by placing equal volumes of the solute into the same volume of water and noting the time it takes for them to dissolve while gently stirring.</li> </ul>	<ul style="list-style-type: none"> <li>• Use a rubric to assess students' use of the measuring cylinder.</li> <li>• Assess experimental write up.</li> <li>• Use rubrics to assess students' accordion books, Frayer and comparison charts.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Mathematics:</b> Measurement.</li> </ul>

<ul style="list-style-type: none"> <li>• Discuss situations where the solvent properties of water is useful.</li> <li>• Put a small volume water on the stove top to boil or in the well of a scented oil burner. Allow the water to completely evaporate. Discuss the concept of evaporation.</li> <li>• <b>Project:</b> <ul style="list-style-type: none"> <li>○ Experiment to determine factors that affect the rate of evaporation e.g. temperature and wind.           <ul style="list-style-type: none"> <li>▪ Place similar volumes of warm and cold water, in similar containers, outdoors for a similar period</li> <li>▪ Place similar volume of water in similar containers in the same location, cover one container with plastic wrap and leave the other uncovered.</li> <li>▪ Place similar volumes of water into similar containers, place one under a fan and the other away from the fan.</li> </ul> </li> </ul> </li> </ul>		
--	--	--

**Materials:**

Substances such as sugar, salt, cornmeal, alcohol, coffee, cooking oil, vinegar, filter paper, funnel, measuring cylinder, beaker, plastic wrap, Frayer Model Chart, comparison chart, electrical or hand fan.

**Books:**

Modern Science and Technology for the Caribbean: Book 3

**URLs:**

<https://www.youtube.com/watch?v=JSMS5jGVTc8>

**Diagrams:**



**Grade IV:** Term 3  
**Strand:** Earth and Space Science (*The Solar System*)  
**Unit 12:** Our Solar System  
**Duration:** 10 periods

**Focus Questions:**

- (1) What is rotation and how it is related to day and night?
- (2) What is revolution and how is related to the phases of the moon?

Learning Outcome	Specific Objectives
At the end of this unit students should <ol style="list-style-type: none"> <li>1. understand some of the effects of the relative motions of the sun, earth and moon from our perspective.</li> <li>2. become aware of moon cycles.</li> </ol> <p><b>Technology:</b></p> <ul style="list-style-type: none"> <li>• Constructing models.</li> </ul>	12. At the end of this unit students should be able to <ol style="list-style-type: none"> <li>12.1. define rotation.</li> <li>12.2. explain how rotation causes day and night.</li> <li>12.3. demonstrate how rotation causes day and night.</li> <li>12.4. define revolution.</li> <li>12.5. explain how revolution is related to the concept of a year.</li> <li>12.6. explain how the phases of the moon arise.</li> <li>12.7. identify the four main phases of the moon.</li> </ol>

Key Concepts	CONTENT	Skills, Attitudes and Values
<ul style="list-style-type: none"> <li>• Axis</li> <li>• Day</li> <li>• Earth</li> <li>• First quarter</li> <li>• Full moon</li> <li>• Last quarter</li> <li>• New moon</li> <li>• Night</li> <li>• Orbit</li> <li>• Reflect</li> <li>• Revolution</li> <li>• Rotation</li> <li>• Solar system</li> <li>• Sun</li> <li>• Year</li> </ul>	<p><b>Content Principle:</b></p> <ul style="list-style-type: none"> <li>• The earth’s movement on its axis causes day and night.</li> <li>• The movement of the earth around the sun causes the seasons.</li> <li>• The movement of the moon around the earth causes the phases of the moon.</li> </ul> <p><b>Required Content:</b></p> <ul style="list-style-type: none"> <li>• The earth is always spinning on its axis. This movement is known as rotation. As the earth rotates it causes day and night. Places on the earth facing the sun will have day while those places that are away from the sun experience night. The earth makes one complete rotation on its axis in 24 hours or one day.</li> <li>• The earth travels around the sun on a circular path known as its orbit. The movement of the earth around the sun is called revolution. As the earth moves around the sun this causes the seasons to change. It takes 365¼ days or one year for the earth to complete one revolution around the sun.</li> </ul>	<p><b>Skills</b></p> <ul style="list-style-type: none"> <li>• Communicating</li> <li>• Recording</li> <li>• Reporting</li> <li>• Observing</li> </ul> <p><b>Attitudes and Values</b></p> <ul style="list-style-type: none"> <li>• <i>Cooperation</i></li> <li>• <i>Curiosity</i></li> <li>• <i>Persistence</i></li> </ul>



	<ul style="list-style-type: none"> <li>• The moon is a cold ball of rock that orbits the earth. The moon has no light of its own but it reflects the sun's light, we see this reflected light as moonlight.</li> <li>• It takes about 27 days for the moon to completely orbit the earth. As the moon moves around the earth we are only able to see the part that is reflecting the sun's light towards us and it appears to change shape. These changes are called the phases of the moon.</li> <li>• Four of the main phases of the moon are <ul style="list-style-type: none"> <li>○ New moon: None of the lit side of the moon is visible</li> <li>○ First quarter: Half of the lit side of the moon is visible (<math>\frac{1}{4}</math> of the entire moon)</li> <li>○ Full moon: all of the lit side of the moon is visible</li> <li>○ Last quarter: Half of the lit side of the moon is visible (<math>\frac{1}{4}</math> of the entire moon).</li> </ul> </li> </ul>	
--	--	--

<b>Suggested Activities</b>	<b>Assessment</b>	<b>Cross Curricular Links</b>
<ul style="list-style-type: none"> <li>• Talk about sunrise and sunset. At what times do they generally occur?</li> <li>• Demonstrate the relationship between the earth, moon and sun by physically positioning themselves at various angles using mirror (moon) person (earth) flashlight (sun)[this activity can be used to demonstrate rotation, revolution, occurrence of days, years and phases of the moon.</li> <li>• Use flashlight and globe/ball to demonstrate rotation causing day and night.</li> <li>• Complete a concept map to show the differences between rotation and revolution.</li> <li>• Show students a picture of the moon. Make a model of the moon by covering balls with soft playdough. Have students throw stones/ marbles at the "moon" to create craters.</li> <li>• Talk about how the moon moves around the earth and where it gets its light from.</li> <li>• Make a model to show how the earth and moon move around the sun: <a href="https://www.teacherspayteachers.com/Product/Space-Model-of-Earth-Moons-orbit-565681">https://www.teacherspayteachers.com/Product/Space-Model-of-Earth-Moons-orbit-565681</a></li> <li>• Demonstrate the phases of the moon using Oreo or chocolate Bimbo cookies or black and white paper.</li> </ul>	<ul style="list-style-type: none"> <li>• Use rubrics to assess concept maps and Fan books.</li> <li>• Assess students' oral responses.</li> <li>• Use a rubric to assess students' project(s). Criteria can include consistency in recording observations.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Language Arts:</b> Poetry, reading comprehension</li> <li>• <b>Visual Arts:</b> Making models.</li> </ul>

<ul style="list-style-type: none"> <li>• Learn and recite the phases of the moon poem: <ul style="list-style-type: none"> <li>○ <a href="https://www.teacherspayteachers.com/Product/Moon-Phases-Poem-FREE-Easy-to-Read-Font-925434">https://www.teacherspayteachers.com/Product/Moon-Phases-Poem-FREE-Easy-to-Read-Font-925434</a></li> </ul> </li> <li>• Make a phases of the moon fan book:</li> <li>• Read and respond to comprehension passages about the moon and moon phases e.g. <ul style="list-style-type: none"> <li>○ <a href="https://www.k12reader.com/worksheet/phases-of-the-moon/view/">https://www.k12reader.com/worksheet/phases-of-the-moon/view/</a></li> <li>○ <a href="https://www.k12reader.com/worksheet/why-does-the-moon-orbit-earth/view/">https://www.k12reader.com/worksheet/why-does-the-moon-orbit-earth/view/</a></li> </ul> </li> <li>• Use a variety of materials to build a “moon lander” vehicle that will remain upright when dropped from a specific height.</li> <li>• <b>Projects:</b> <ul style="list-style-type: none"> <li>○ Make paper cut outs of the sun, moon and earth and write acrostic poems on each.</li> <li>○ With teacher’s assistance study a moon calendar to determine which day of the month new moon, full moon first quarter and last quarter can be observed. Observe the moon on those dates make sketches and descriptions of the moon in a moon observation journal: <ul style="list-style-type: none"> <li>▪ <a href="http://www.3dinosaurs.com/pdf/readingchart/bookmarks-moonphases.pdf">http://www.3dinosaurs.com/pdf/readingchart/bookmarks-moonphases.pdf</a></li> <li>▪ <a href="http://stardate.org/nightsky/moon">http://stardate.org/nightsky/moon</a></li> </ul> </li> </ul> </li> </ul>		
---	--	--

**Materials:**

Globe/ball, flashlight, mirror, drawings of the earth, sun and moon (for model) glue, scissors, crayons, blank concept maps, Oreo or other type of cookie, two different coloured paper e.g. black and white for moon phases activity, tennis ball, small stones, sun, moon and earth template, picture of the moon, phases of the moon fan book templates, paper fasteners, cardstock/manilla paper, moon phases journal page.

**Books:**

Modern Science and Technology for the Caribbean: Book 3

**URLs:**

<http://www.mensaforkids.org/teach/lesson-plans/the-moon/>

<http://www.primaryhomeworkhelp.co.uk/moon/facts.htm>

<http://www.brighthubeducation.com/lesson-plans-grades-1-2/107382-revolution-and-rotation-of-earth-lesson-and-activity/>

<http://www.cpalms.org/Public/PreviewResource/Preview/46329>

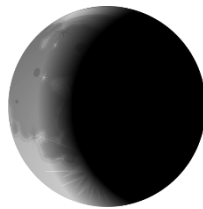
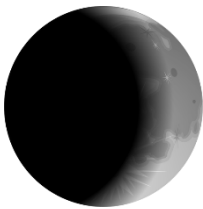
<http://spaceracers.org/en/parents-educators/lesson-plans/moon-phases>

<http://sciencebob.com/oreo-cookie-moon-phases/>

<http://thesciencepenguin.com/2014/09/7-ideas-to-teach-students-about-moon-phases.html>

<http://www.planetsforkids.org/moon-moon.html>

**Diagrams:**



## Appendix:

### Alternative Assessment

Historically, the main form of classroom assessment has involved students providing written responses to questions posed by teachers. While the many varieties of this form of assessment are still very relevant, there are other options available to the science teacher. These include the use of rubrics and checklists to either assess students as they perform different tasks or to assess the quality of their products. Below are samples of checklists and rubrics that can be used to assess student performance in science.

### Sample Checklist for Assessing Experimental Report

#	Criteria	Possible	Actual
1	<b>Presentation {report on experiment} (2 to 6)</b>		
2	Records date, title, aim	1	
3	Records accurate list of materials	1	
4	Report has logically arranged sections	1	
5	Reports all steps in procedure	1	
6	Uses acceptable language/expression	1	
7	<b>Use of Table {8 to 12}</b>		
8	Records suitable title	1	
9	Suitable columns chosen with headings	1	
10	Correctly records units	1	
11	Uses borders	1	
12	Table is generally neat	1	
13	<b>Use of Graph (14 to 19)</b>		
14	Records suitable title	1	
15	Chooses suitable scales	1	
16	Labels axes correctly	1	
17	Correctly records units	1	
18	Plots points correctly (max 2)	2	
19	Graph is generally neat	1	
20	<b>Drawings (21 to 23)</b>		
21	Title present	1	
22	Reasonable size	1	
23	All labels correct	1	

## Sample Checklist for Assessing Practical Skills

#	Criteria	Possible	Actual
1	<b>Use of ruler (2 to 4)</b>		
2	Lines up zero mark with beginning of object	<b>1</b>	
3	Avoids parallax (reads at eye level)	<b>1</b>	
4	Reads scale correctly (with unit)	<b>1</b>	
5	<b>Measuring Liquid Temperature (6 to 10)</b>		
6	Immerses bulb in liquid	<b>1</b>	
7	Takes reading with bulb submerged in liquid	<b>1</b>	
8	Stirs liquid	<b>1</b>	
9	Avoids touching sides of container	<b>1</b>	
10	Reads scale correctly with unit	<b>1</b>	
11	<b>Use of beaker/measuring cylinder (12 to 16)</b>		
12	Cylinder placed on a level surface		
13	Reads cylinder at eye level		
14	Reads bottom of meniscus		
15	Reads scale correctly (with unit)		
16	No spillage during pouring		

### Sample Rubric for Assessing Student Collaboration

Category	Excellent (4)	Good (3)	Fair (2)	Needs help (1)	Score
<b>Contribution to discussion</b>	Fully participates in discussions and decision making	Participates somewhat in discussions and decision making	Hardly participates in discussions and decision making	Does not participate in discussions or decision making	
<b>Contribution to task</b>	Fully contributes to the execution of tasks	Contribute somewhat to the execution of tasks	Hardly contributes to the execution of tasks	Does not contribute to the execution of tasks	
<b>Attitude</b>	Never publicly criticises project or partners	Sometimes publicly criticises project or partners	Rarely publicly criticises project or partners	Often publicly criticises project or partners	
<b>Support for others</b>	Encourages and supports everyone in the group	Encourages and supports some persons in the group	Hardly supports or encourages others in the group	Discourages rather than supports others in the group	

### Sample Rubric for Creation of a Model

Category	Excellent (4)	Good (3)	Fair (2)	Weak (1)	Score
<b>Neatness</b>	Very neat, exemplary, workmanship, visually appealing	Looks good but a few visible signs of areas for improvement	Not very neat. Significant evidence of room for improvement	Sloppy, untidy visually unappealing	
<b>Functionality</b>	Superior performance. Well suited for intended use	Fairly well suited for intended purpose	Needs some improvement for acceptable performance	Poorly suited for its intended purpose	
<b>Durability</b>	Strong and durable. Reusable many times without destruction	Fairly strong but needs careful handling	Not very strong; easily damaged	Very fragile; Easily destroyed	
<b>Creative use of materials</b>	Excellent choice for number and quality of materials	Good choice for number and quality of materials	Weak choice of number or quality of materials	Poor choice of number and quality of materials	
<b>Accuracy of replication</b>	Excellent replica of the original	Good replica of the original	Fair replica of the original	Inaccurate replica of the original	

### Sample Rubric for Holistic Assessment of a Task

Score	Description
4	Demonstrates full understanding of the task. All requirements of the task are included in the response.
3	Demonstrates some understanding of the task. Most requirements of the task are included in the response.
2	Demonstrates little understanding of the task. Many requirements of the task are omitted in the response.
1	Demonstrates no understanding of the task. Response is disorganized and irrelevant.

## Recommended Resources for Primary Science Teachers

Online Resources	Notes
Teachers Pay Teachers	<p><a href="https://www.teacherspayteachers.com/">https://www.teacherspayteachers.com/</a> Offers both free and paid-for resources.</p> <p>Registration required for full access</p>
YouTube	<p><a href="https://www.youtube.com/">https://www.youtube.com/</a> A video sharing website with a large repository of educational videos.</p> <p>No sign up, registration or subscription required.</p>
TeacherTube	<p><a href="https://www.teachertube.com/">https://www.teachertube.com/</a> Self described as <i>"A free community for sharing instructional videos and content for teachers and students ... an education focused, safe venue for teachers, schools, ..."</i></p> <p>Subscription required for full access.</p>
Teaching Channel	<p><a href="https://www.teachingchannel.org/">https://www.teachingchannel.org/</a> Self described as <i>"online community where teachers can watch, share, and learn diverse techniques to help every student grow"</i>.</p> <p>Subscription required for full access.</p>
Pinterest	<p><a href="https://www.pinterest.com/">https://www.pinterest.com/</a> Host a wide variety of online resources.</p> <p>Subscription required for full access.</p>
Science Sparks	<p><a href="https://www.science-sparks.com/">https://www.science-sparks.com/</a> Provides ideas for science activities and lessons</p> <p>Subscription required for full access.</p>
Mystery Science	<p><a href="https://mysteryscience.com/">https://mysteryscience.com/</a> Provides ideas for science activities and lessons</p> <p>Paid subscription required for full access</p>
National Geographic Kids	<p><a href="https://kids.nationalgeographic.com/">https://kids.nationalgeographic.com/</a> Provides a variety of educational videos and texts.</p> <p>Free content is available.</p>
HomeSchoolShare	<p><a href="https://www.homeschoolshare.com/">https://www.homeschoolshare.com/</a> Self described as an <i>"on-line cooperative effort of several homeschooling moms to provide free but quality literature-based unit studies and resources"</i></p> <p>No subscription required</p>

Local Resources	Notes
Antigua and Barbuda Fisheries Division	<p>Manages and regulates the national fisheries and marine resources.</p> <p>Point Wharf, Lower North Street Saint John's, Antigua And Barbuda</p> <p><b>Tel:</b> 1 (268) 462-6106 <b>Email:</b> <a href="mailto:fisheriesantigua@gmail.com">fisheriesantigua@gmail.com</a> <b>Web:</b> <a href="https://www.facebook.com/268fisheries/">https://www.facebook.com/268fisheries/</a>,</p>
Antigua and Barbuda Humane Society	<p>An animal welfare organization.</p> <p>Bethesda Village, St. Pauls, Antigua</p> <p><b>Tel:</b> 1 (284) 461-4957 <b>Email:</b> <a href="mailto:abhumane@candw.ag">abhumane@candw.ag</a> <b>Web:</b> <a href="https://www.antiguaanimals.com/">https://www.antiguaanimals.com/</a></p>
Department of Environment	<p>Mandated to maintain an up-to-date national environmental policy.</p> <p>Department of Environment #1 Victoria Park Botanical Gardens Factory Road St. John's, Antigua</p> <p><b>Tel:</b> 1 (268) 462-4625 <b>Email:</b> <a href="mailto:antiguaenvironmentdivision@gmail.com">antiguaenvironmentdivision@gmail.com</a>, <a href="mailto:doe@ab.gov.ag">doe@ab.gov.ag</a> <b>Web:</b> <a href="https://www.environment.gov.ag/en/">https://www.environment.gov.ag/en/</a></p>
Environmental Awareness Group (EAG)	<p>A not-for-profit organization interested in care for the environment.</p> <p>Cnr Market and Church St St. John's, Antigua</p> <p><b>Tel:</b> 1 (268) 462-6236 <b>Email:</b> <a href="mailto:eagantigua@gmail.com">eagantigua@gmail.com</a> <b>Web:</b> <a href="https://www.eagantigua.org/">https://www.eagantigua.org/</a></p>
Wadali Animal Nature Park	<p>Guided tours exhibiting flora and fauna.</p> <p><b>Tel:</b> 1 (268) 732-2895 <b>Email:</b> <a href="mailto:wadadli_parks@hotmail.com">wadadli_parks@hotmail.com</a> <b>Web:</b> <a href="https://www.facebook.com/The-Wadadli-Animal-Nature-Park-451816011541661/">https://www.facebook.com/The-Wadadli-Animal-Nature-Park-451816011541661/</a></p>