MINISTRY
OF
EDUCATION, YOUTH & INFORMATION
Every Child Can Learn, Every Child Must Learn

NATIONAL STANDARDS CURRICULUM

GEOGRAPHY

GRADES 7-9 APSE1

Ministry of Education, Youth and Information, Jamaica. August, 2018

NATIONAL STANDARDS CURRICULUM GUIDE

GRADES 7-9

GEOGRAPHY

APSE1

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- All others whose names do not appear, but who contributed to the production of the NSC

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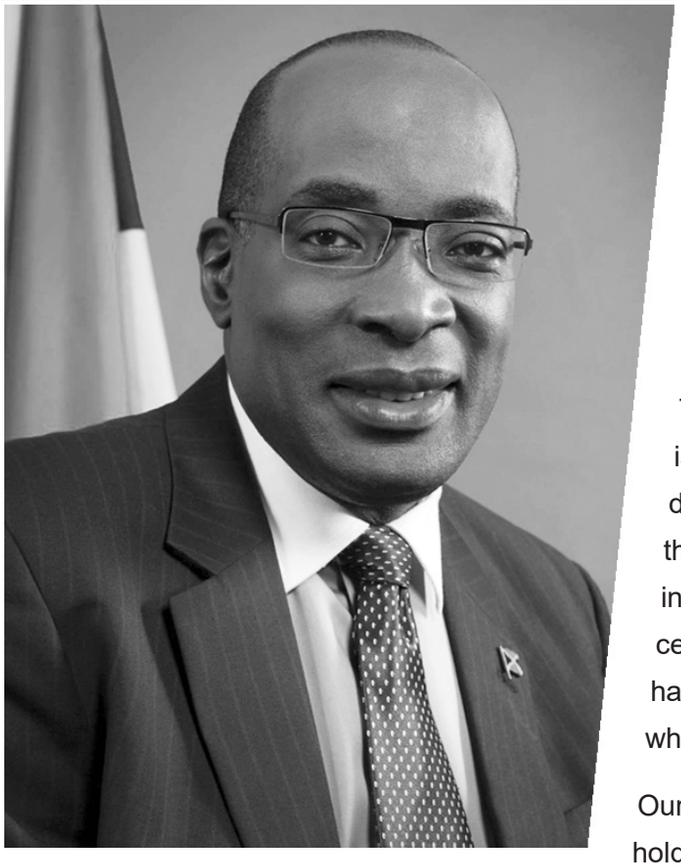


Education has always been pivotal to societal and economic development. It is for this reason that Jamaica remains unshaken and hopeful of a realized vision to be “the place of choice to live, work, raise families and do business.” The assurance of the possibility of all that such a vision entails comes from the recognition that Jamaica is endowed with tremendous God-given talent and creative potential and as a people of strong faith in spiritual principles and resilience; we are able to harness our capabilities, to make significant influence on the world. It is through this new National Standards Curriculum (NSC) that we hope to propel this vision of the education system whilst becoming more relevant, current and dynamic.

The team at the Ministry of Education Youth and Information is cognizant of the fact that the curriculum is the heart and mind of education and remains the most powerful means by which any country can develop and be sustainable. It is for this reason that the NSC has been designed with the understanding that people, learning and national development are at the core of our existence in a time of rapid change in the physical, social, economic and other dimensions of the global landscape. As a consequence, we celebrate the wisdom of the developers who through the engagement of numerous stakeholder groups, have responded favourably to the need for that kind of education that prepares our young people for life; while challenging our more mature to join in this lifelong journey of learning to learn.

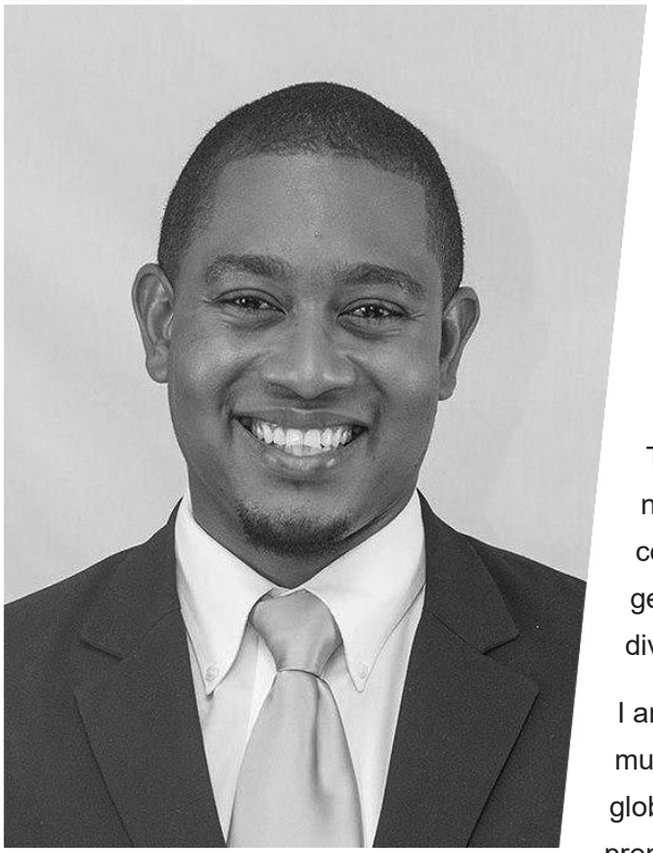
Our commitment to the development of each learner and our support and appreciation of the various stakeholder groups that are partnering with us in providing quality education, remain at the forefront of our efforts in ensuring that this journey transforms education. This commitment is conveyed through our adoption of a Pathway Approach to learning that demands of us to provide customized programmes, differentiated learning experiences and specialized support for our learners. Our actions have been fruitful as is evident by the systems and conditions we have put in place for successful implementation.

Like the rest of Jamaica, I look forward to the testimonials of students, parents, teachers and other stakeholders of the empowering effect of this learner- centred curriculum and remain confident that it will contribute to make Jamaica renown.

The Honourable, Senator Ruel Reid,CD

Minister of Education, Youth & Information

M E S S A G E



Building a modern society where young people can prosper and achieve their aspirations is paramount on the Ministry of Education, Youth and Information's (MoEYI) agenda. In its bid to advance this agenda the team at the MoEYI has developed the National Standards Curriculum (NSC) on a clear set of values that will permeate learning and become embedded in young people's approach to life. Young people need to be clear about their Jamaican identity. Justice, democracy, tolerance and respect need to be more than mere words; they need to become an essential part of people's lives. Young people's understanding of, and commitment to, sustainable development is critical to the future of Jamaica and of the world. These values that permeate the new curriculum and more importantly, will by its use, be ingrained in the fabric of the Jamaican society.

The development of a new curriculum is a major achievement in the life of any country. It is even more noteworthy because this curriculum embodies the set of knowledge, skills, values and attitudes that our country deems relevant at this particular time. It is intended that these attributes be conveyed to the next generation as a means of cultural continuity in preparation to cope with the future, both nationally and individually.

I am particularly excited about the prospects of the NSC honing key twenty-first century skills such as communication, collaboration, critical thinking and creativity in our youth as they prepare to take on their roles as global citizens. I encourage parents, students, teachers and indeed the community to partner with us as we prepare our young people not just for today, but for the rapidly changing times ahead.

The Honourable, Floyd Green, MP

State Minister in the Ministry of Education, Youth & Information

MESSAGE

In responding to the challenges confronting education in Jamaica, The Ministry of Education Youth and Information has taken strategic measures to address the need for a national curriculum that is relevant for the 21st century, the dynamics of the Jamaican context and the profile of the learners at the pre-primary, primary and secondary levels. One major output of these strategic actions is the National Standards Curriculum. This curriculum is intended to be one of the means by which the Jamaican child is able to gain access to the kind of education that is based on developmentally-appropriate practice and the supporting systems and conditions that are associated with high quality education.

This curriculum has the potential to inspire and provide challenges in the form of problem situations that all our learners can handle in ways that are developmentally appropriate. It compels us to move beyond the traditional functional perspectives of being literate to a focus on the physical and physiological as well as the ethical, social and spiritual.

I invite all our stakeholders to fully embrace this new curriculum which promises to excite imaginations, raise aspirations and widen horizons. Learners will become critical and creative thinkers with the mindset required for them to be confident and productive Jamaicans who are able to thrive in global settings as they take their place in the world of uninhibited change.

Mr. Dean Roy Bernard

Permanent Secretary , Ministry of Education, Youth & Information

M E S S A G E

It was the mandate of the Curriculum Units of the Ministry of Education, Youth and Information to spearhead the crafting of a new curriculum for the nation, in keeping with international standards, global trends in the educational landscape and societal goals and aspirations. The mandate had several facets: to establish clear standards for each grade, thereby establishing a smooth line of progression between Grades from 1 to 9; to reduce the width, complexity and amount of content; to build in generic competencies such as critical thinking across the subjects; to ensure that the curriculum is rooted in Jamaica's heritage and culture; to make the primary curriculum more relevant and more focused on skills development, and to ensure articulation between primary and secondary curricula, especially between Grades 6 and 7. To achieve this, the MoEYI embarked on an extensive process of panel evaluations of the existing curricula, consultation with stakeholders, (re)writing where necessary and external reviews of the end products.

Today, we are indeed proud that, the curriculum development teams have succeeded in crafting a curriculum which has met these expectations. Under the National Standards Curriculum (NSC) focus will be given to project-based and problem-solving learning, with an integration of Science, Technology, Engineering and Mathematics/Science, Technology, Engineering, Arts and Mathematics (STEM/STEAM) methodologies across the system. Learners will benefit from more hands-on experiences which should enhance the overall learning experience and cater to the different kinds of learners in our classroom. In addition, they will be exposed to work-based learning opportunities that will help them become productive citizens of Jamaica and the world at large.

It is anticipated that as school administrators and teachers system-wide implement the National Standards Curriculum that improvements will be evident in the general academic performance, attitude and behaviour of our students.

We anticipate the participation of all our stakeholders in this process as we work together to improve the quality of life and prospects for all the children of Jamaica and to realize our mantra that *every child can, and must, learn.*

Dr. Grace McLean

Chief Education Officer, Ministry of Education, Youth & Information

MESSAGE

The Ministry of Education Youth and Information (MoEYI) is committed to providing high quality education to all Jamaican children. We have heard the cries from the various sectors of the Jamaican society about the level of preparedness/readiness of our students for life in the 21st century; and we are taking the necessary steps to ensure that our students graduate with marketable skills. The MoEYI has reviewed and redesigned the Grades 1-9 curricula around the principles of Vision 2030 Goal number one; “Jamaicans are empowered to achieve their fullest potential”.

The National Standards Curriculum (NSC) will lay the foundation for students by preparing them for working lives that may span a range of occupations, many of which do not currently exist. This has been done by way of designers carefully integrating the theoretical principles of Science, Technology, Engineering and Mathematics/Science, Technology, Engineering, Arts and Mathematics (STEM/STEAM) methodologies into the curricula at all grade levels. The NSC illustrates that in order to make education effective for our 21st century children; we need to change how we teach, and what we teach.

We are satisfied that the curriculum designers and writers have produced a curriculum that is indeed fitting for the 21st century. The NSC was designed to develop students’ understandings of subject matter and their ability to apply what is learnt; it fosters their ability to communicate and solve problems collaboratively, think critically and create novel solutions.

The success of our children is dependent on the participation of all stakeholders in the learning process. We encourage you all to be our committed partners in education as the true impact of this curriculum will only be felt when we have all hands on board. I am indeed proud to be associated with the development and implementation of this curriculum; it will inspire hope in our nation and future generations; kudos to the various teams that contributed to its development.

Mrs Lena Buckle Scott

Deputy Chief Education Officer,

Curriculum and Support Services, Ministry of Education, Youth & Information

MESSAGE

The National Standards Curriculum (NSC) rests on the belief that all learners are endowed with the capabilities, gifts and talents to fulfil their divine purpose. These attributes are to be further enhanced or improved in a nurturing, inspiring and inclusive environment; one that caters to the whole person (soul, spirit and body - spiritual, emotional, social, physical and mental). As learners assume their roles and responsibilities individually and as communities of learning in such an environment, they become critical-reflexive thinkers, creative problem solvers, effective communicators and natural collaborators.

A curriculum design of this nature, calls for transformative change at the societal level (Elkind, 2004)[1] and not just at the school and classroom levels. This is a call for all stakeholders, as users of the curriculum, to adopt a critical -reflective and reflexive stance and join learners in the quest for meaning, purpose and stability as they help to shape the world. By integrating principles from various disciplines and their related methodologies, learners who interact with the curriculum are provided with enriching experiences, opportunities for creative expressions and authentic exploration of problems from a classical standpoint as well as in the context of workplace learning. This is due to the fact that the NSC recognizes the importance of each discipline in the problem solving process and in development.

Assessment as an element of the curriculum becomes primarily a learning process for charting progress through self-corrective measures that are informed by feedback from peers and teacher-facilitator. By providing assessment criteria statements in the curriculum, teachers are encouraged to facilitate learners functioning as self and peer assessors. This approach should see the learner developing self-direction with the support of mentors and coaches and forming an intrinsic desire to succeed. These attributes prepare them to face high stakes assessment as problems to be confronted with courage, a sense of readiness, insight and creative prowess.

These features of the NSC have the potential to influence learners' profile as Jamaicans who are gratified by an identity of cultural excellence that embodies moral obligations, intellectual rigour, innovativeness, environmental stewardship and productivity. The curriculum echoes the sentiments of our National Anthem, National Song and Pledge and serves as rich and credible source of the values and virtues that are woven together to convey the Jamaican identity. I wish for our school administrators, teachers, students and other stakeholders much success as they work with the document.

Dr Clover Hamilton Flowers

Assistant Chief Education Officer, Core Curriculum Unit, Ministry of Education, Youth & Information

[1] Elkind, D. (2004). The problem with constructivism. The Educational Forum, 68(4), 306–12.

TERMS	DEFINITIONS/MEANINGS
Range of Content	Provides an overview of the concepts, knowledge, skills and attitudes that will be developed in a unit of study.
About the Unit	Gives a brief overview of the content, skills that are covered in the unit and the methodologies that are used. As well as the attitudes to be developed.
Standards	Statements that explain what all students are expected to know and be able to do in different content areas by the end of a course of study e.g. by the end of period spanning grades 4 – 9.
Attainment Targets	An attainment target is a desired or expected level of performance at the end of a course of work, within a given/specified teaching-learning period. Attainment targets identify the knowledge, skills and understanding which students of different abilities and maturities are expected to have by the end of each Grade. It is the standard that we expect the majority of children to achieve by the end of the grade.
Benchmarks	Behaviours students are expected to exhibit at different stages of development and age/grade levels.
Theme/Strands	Unifying idea that recurs throughout a course of study and around which content, concepts and skills are developed.
Prior Learning	It is what students are expected to already know through learning and experience about a topic or a kind of text.
Specific Objectives	Specific objectives state what the student is expected to know or understand as a result of the learning experience. The specific objective is usually framed in the areas of the knowledge, skills and attitudes that the students are expected to achieve. Specific objectives tell us what the children will learn or will be taught.
Suggested Teaching/Learning Activities	A teaching/learning activity is an organised doing of things towards achieving the stated objectives. They are suggested activities that are crafted in a way to be an efficient vehicle which can move the student between what is to be learnt (objective) and what the student is to become (outcome).
Key Skills	Indicate the important skills that students should develop during the course of a unit. Key skills are aligned to the suggested teaching and learning activities in the unit which are intended to develop the skill to which it is aligned. Included in the key skills are the 21st century skills such as critical thinking and problem solving, collaboration, communication and ICT.

TERMS	DEFINITIONS/MEANINGS
Assessment	An assessment is a determination of whether intended results have been achieved. This section of the curriculum speaks to both the product that will be judged as well as the criteria against which it will be judged. It must be noted that this section does not introduce new activities. Instead, it speaks to the judging of the suggested teaching and learning activities Formal assessment may be conducted with the aid of instrument (e.g. via written test, portfolio) or by requiring students to complete assigned tasks (e.g. performance), and is usually recorded against a predetermined scale of grading. Informal assessment (e.g. via observation or spontaneous student expression) may also reveal important evidence of learning.
Points to Note	This section provides technical information that must be considered in delivering the unit. It may also include information that provides additional explanation of key concepts that may be unfamiliar to the teacher as well as suggestions for infusion within the unit.
Extended Learning	These are opportunities for students to utilise the knowledge and skills they would have acquired in the unit in authentic situations/experiences.
Learning Outcomes	A learning outcome is a demonstration/ behavioural evidence that an intended result has been achieved at the end of a course of study. The learning outcome tells us if pupils have understood and grasped what they have been learning.
Links to other Subjects	Suggests opportunities for integration and transfer of learning across and within different subject areas.
Key Vocabulary	This section consists of a number of words/phrases that addresses the skills, topics and content that must be covered in the unit.
Professional Portfolio	A professional portfolio is a structured and thoughtfully organized collection of artefacts which illustrates your skills and abilities, substantiated by samples of student work and realized through reflective writing, deliberation, and conversation with peers, teachers and faculty (Shulman, 1998).

The Geography National Standards Curriculum represents, for learners in the education system of Jamaica, an opportunity for a systematic exposure to Geography education. The Curriculum provides various opportunities for the development of geographical skills, learning through discovery, and problem-solving through exploration.

This Curriculum supports the Philosophical Framework of the National Standards Curriculum which aims to create successful lifelong learners; confident and productive individuals, who are deeply rooted in national culture, identity and citizenship as Jamaicans, and who are also able to effectively navigate an interconnected and interdependent world. The Geography National Standards Curriculum will contribute to the realisation of this aim as it is 'inclusive and caters for all students, whatever their needs, background or ambitions while being able to excite imaginations, raise aspirations and widen horizons' (National Standards Curriculum Philosophical Framework, 2017).

The Geography National Standards Curriculum is grounded in the theory of constructivism. Constructivism provides for a learner-centred teaching environment which focusses on active techniques such as exploration and experimentation. The curriculum is centred around the belief that learners come to knowledge by first recognising, then building on, the meaning of what is found in their social, cultural and physical environments. They learn the concepts which they can then apply in various environments. This approach promotes the relevance of the discipline of Geography, allowing learners to make sense of, and reconcile, their previous ideas and experiences, thereby expanding their knowledge.

Within the Geography National Standards Curriculum, the level of guidance provided by educators is determined by the nature/characteristics of the learners; the material to be learnt, which in-turn guides the learning activities. The Curriculum emphasises learners as active participants in lessons as they discover and construct knowledge on their own, through hands–on activities and the practising of skills in authentic situations. The guidance of educators will, therefore, shift across sequences of teaching and learning episodes thereby creating the space for highly structured guidance as well as more exploratory activities.

In keeping with one of the cornerstones of the National Standards Curriculum, the Geography National Standards Curriculum utilizes Progressivism as a teaching technique. In particular, traditional scientific methods of teaching and the more contemporary STEM/STEAM (Science, Technology, Engineering, Arts, and Mathematics) methodology have been employed throughout the Curriculum. This means that learners are encouraged to test their ideas by experimentation and derive knowledge from finding answers to the questions or problems that arise through experiencing the world. They will also develop ethical values and become stewards of the environment as they seek to develop solutions to identified problems through conducting research into current environmental issues and concerns.

The teaching techniques used in the Geography National Standards Curriculum value the learners' active participation in the teaching/learning process. These methods recognise the learner as an independent problem-solver as they promote creativity, collaboration, communication and critical thinking; holistically shaping the minds of the learners to enable them to positively contribute to the local, national and global systems of development.

AIMS OF GEOGRAPHY

The goal of the Geography National Standards Curriculum is to extend and deepen the range and quality of the educational experience of a young person in the areas of knowledge, understanding, skills, attitudes and competencies, and prepare them for the requirements of further studies and employment. It is in this light that the curriculum content is purposefully aligned with the Geography Caribbean Secondary Education Certificate (CSEC) syllabus. The subject provides the ideal context for the development of investigative and critical thinking skills, while promoting an environment which fosters collaboration, communication, creativity, and innovation.

Learners of Geography will acquire intellectual skills, research skills and other transferable skills which will enable them to critically evaluate theories and assess evidence to make informed decisions and use a wide range of technical methods to collect and analyse data to solve problems. These skills can be applied to everyday situations and as such the discipline aids in fostering 21st Century learners, with appropriate values and attitudes, which are essential for appreciating the fragile nature of the environment and for developing a sense of responsibility for its preservation through practices which are sustainable.

Learners will develop sound knowledge of the physical and human environment and understand how they interact and change overtime. They will also appreciate social and environmental issues that occur in various places and cultures over different timeframes. To achieve this, the curriculum relies heavily on the local area of the school which ought to provide a familiar geographical space, for fieldwork, within which ideas can be explored and tested by active experimentation.

The study of Geography will therefore enable students to become:

- Critical thinkers who are able to gain insight into current and future challenges through the study and management of current issues;
- Confident individuals who are aware of their sense of place and space, and are able to cope with uncertainty;
- Self-directed lifelong learners who are able to observe, explore, question and investigate issues and propose alternative methods to finding solutions to problems, and communicate findings effectively through the use of graphicacy and information and communication technology (ICT);
- Environmentally aware global citizens who appreciate the interdependence between humans and the environment, and are able to play an active role in managing the environment in a sustainable manner, while improving the quality of their lives and that of others;
- Individuals who are able to effectively collaborate as part of the global workforce; and
- Flexible 21st Century learners who are able to adjust to changing needs in a dynamic world.

Geography enables learners to recognise and appreciate that the world is an integrated system as they develop an understanding of spatial relationships and patterns as well as the interconnectedness among groups of people, and between people and their environment. Geography, therefore, allows the learner to connect to the past, understand the present and plan for the future.

GRADE 7

GEOGRAPHY

TERMS 1 - 3 UNITS

TERM 1

Unit 1: 2 weeks
Introduction to Geography

Definition of Geography
Branches and Sub-branches of Geography
The Five Themes of Geography
Statistical Diagrams – Flow Charts and Tables

Unit 2: 2 Weeks
Planetary Science

Components of the Solar System
Comets, Meteors and Asteroids

Unit 3: 5 weeks
Introduction to Map Reading and Photograph Interpretation 1

Features of Maps, Photographs and Plans
Types of Maps, Photographs and Plans
Importance of Maps, Photographs and Plans
Simple Map Symbols
Simple Map and Photograph Interpretation
Direction, Bearings and Straight Line Distance
Latitude and Longitude – Location
Interpreting Simple Contour Patterns

Unit 4: 3 weeks
Jamaica: Population, Migration and Settlement

Population Size and Distribution in Jamaica
Migration Types
Migration in Jamaica
Settlement Types in Jamaica
Simple Dot Maps and Flow Line Maps
Statistical Diagrams – Simple Bar Graphs

TERM 2

Unit 1: 4 weeks
Weather and the Hydrological Cycle

Definition of Weather
Weather Elements and Instruments
Weather Symbols/Simple Weather Maps
The Hydrological/Water Cycle

Unit 2: 2 weeks
Case Studies: Extreme Weather

Define the Concept 'Extreme Weather'
Case Study of a Hurricane, Flood or Drought in the Caribbean: Preparation and Effects
Tracking Storms and Hurricanes
Global Warming and Extreme Weather Systems

Unit 3: 3 weeks
Introduction to Rocks and Soils

Definition of Rocks and Soils
Formation of Rocks and Soils
Rock Types in Jamaica
Uses of Rocks
Soil Types in Jamaica
Uses of Soils
Weathering and Erosion
Simple Geology Maps

Unit 4: 3 weeks
Fieldwork and Investigation 1

Simple Fieldwork Techniques
Conducting Fieldwork
Drawing Conclusions
Ethics in Research

TERM 3

Unit 1: 2 weeks

Resources and Primary Economic Activities

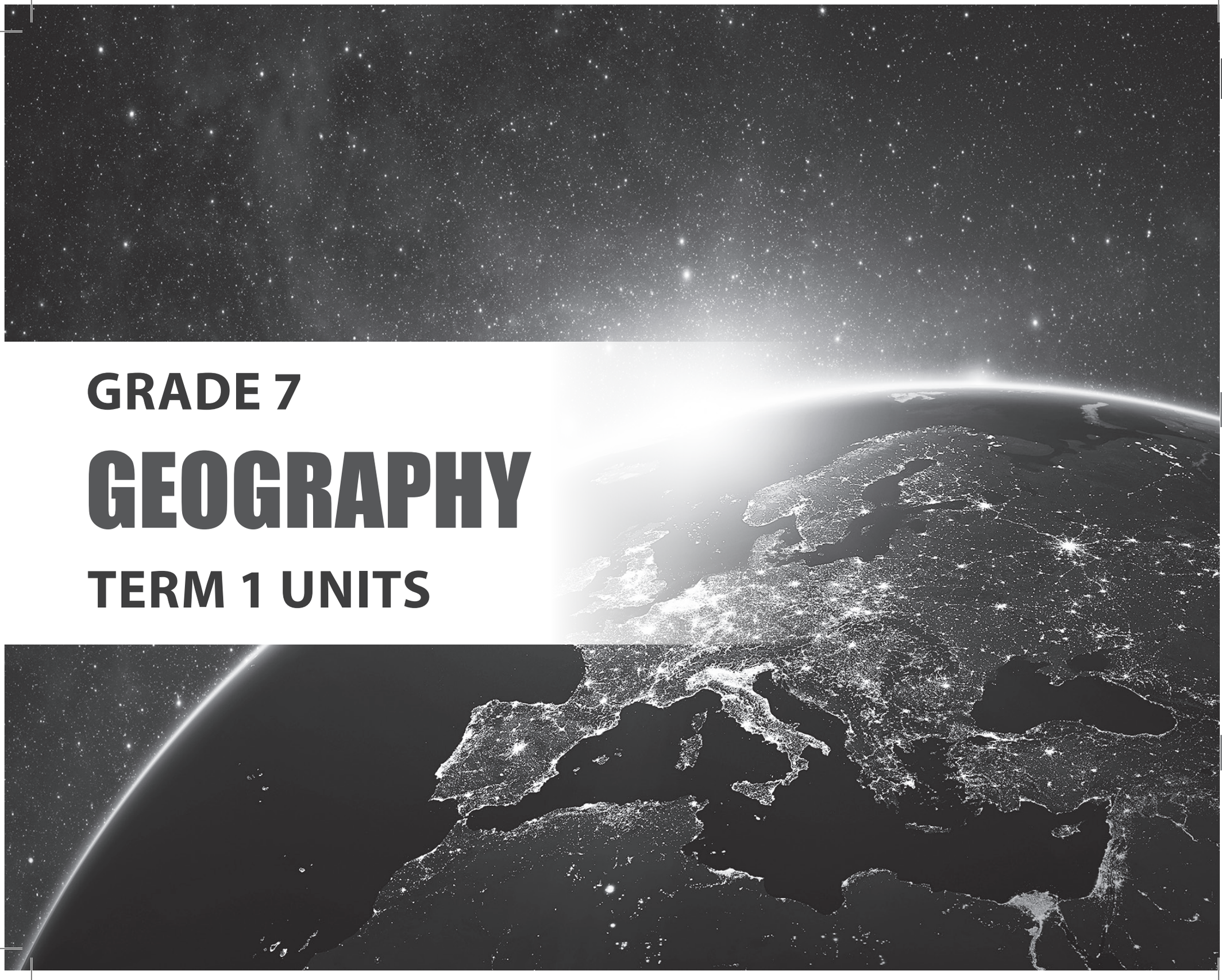
Definition of Resources
Types of Resources used in Primary Economic Activities
Types of Primary Economic Activities in Jamaica
Statistical Diagrams – Pie Charts

Unit 2: 4 weeks
Jamaica: Agriculture

Types of Resources used in Agriculture
Location of Agriculture in Jamaica
Types and Characteristics of Agriculture in Jamaica
Deforestation in Jamaica
Deforestation and Global Warming
Agricultural Sustainability
Economic and Land – Use Maps

Unit 3: 4 weeks
Management of Food in Jamaica: Food Safety and Security

Food Production and Distribution – Food Safety and Security
Impact of Climate Change on Agriculture
Changes in Technology in Agriculture



GRADE 7

GEOGRAPHY

TERM 1 UNITS

About the Unit

Introduction to Geography
In this Unit, students will be introduced to the discipline of Geography. Geography is enquiry-based and this Introduction to Geography is meant to stimulate an interest in places and help students to make sense of a complex and dynamic world. Geography helps students to understand their place in the world and how they can positively and effectively contribute to global change. Students will be exposed to the significance of the subject and the many uses and applications of the discipline in real world situations. Students should come to realise from the examination of the five thematic areas that Geography helps to explain many of the phenomena that occur in their environment. From studying the branches and sub-branches of Geography, there should be the recognition that basic knowledge of Geographic concepts and skills are important in any field that is identified.

The Unit introduces ways in which geographical data are represented and interpreted. An exposure to statistical diagrams enables students to summarise data – a skill that may be applied in other disciplines. Students should therefore develop an appreciation for and value the significance of studying Geography.

RANGE OF CONTENT

Knowledge Students should acquire information and develop an understanding of:
- The five themes of Geography and how they relate to various aspects of their environment
- The branches and sub-branches of Geography and the types of information contained within each
- Key concepts which form the foundation of the curriculum – Location; Place; Movement; Region and Human – Environment interaction

Skills Students should have the opportunity to develop and practise the following skills:
- Organising information into flow charts and tables
- Using and interpreting information from a variety of sources – flow charts; tables; videos; photographs; textual sources (reading and understanding simple geographical terminology)
- Social skills (for example, working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)

Attitude Students should develop:
- Positive attitudes towards themselves, others and their environment
- Self-confidence, self-esteem and a simple understanding of some of their perceptions

GUIDANCE TO THE TEACHER

- Ensure that students use a variety of sources to construct their definitions of Geography.
- Make use of as many visual aids as possible, to stimulate interest in each topic.
- Statistical Enquiry/Quantitative Geography should be introduced as a sub-branch of both Human and Physical Geography and not as a third and separate branch of Geography.

Prior Learning

Check that students can:

- Use an Atlas
- Extract information from maps of Jamaica, the Caribbean and the World
- Identify major landforms
- State location using latitude and longitude

INTRODUCTION TO GEOGRAPHY

ATTAINMENT TARGET(S):
Gain knowledge and understanding of the physical and human processes and forces that shape the patterns of the Earth's surface and influence the distribution of people.

Standard(s): Students should acquire knowledge of different places on Earth and in the Solar System and an understanding of the spatial distribution of processes occurring within the Earth, on the Earth's surface, within the atmosphere and in the Solar System. They should also recognise that human and natural environments of the Earth consist of systems that are interdependent and understand the processes and forces that shape the patterns of the Earth's surface. They should understand the environment in which they live but also appreciate the diversity of other habitats and cultures globally.

Theme: The Human Habitat: Processes and Change

OBJECTIVES

Students should be able to:

- Formulate definitions of the concept of Geography
- Describe the two main branches of Geography
- Identify and classify sub-branches of Geography as physical or human
- Explain the importance of Geography
- Create flow charts to show relationships between the main branches and sub-branches of Geography
- Explain and apply the five themes of Geography to the surrounding environment
- Interpret geographical information from photographs
- Create tables from geographical information
- Conduct research ethically and present findings using appropriate statistical diagrams
- Collaborate effectively in groups to complete tasks

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

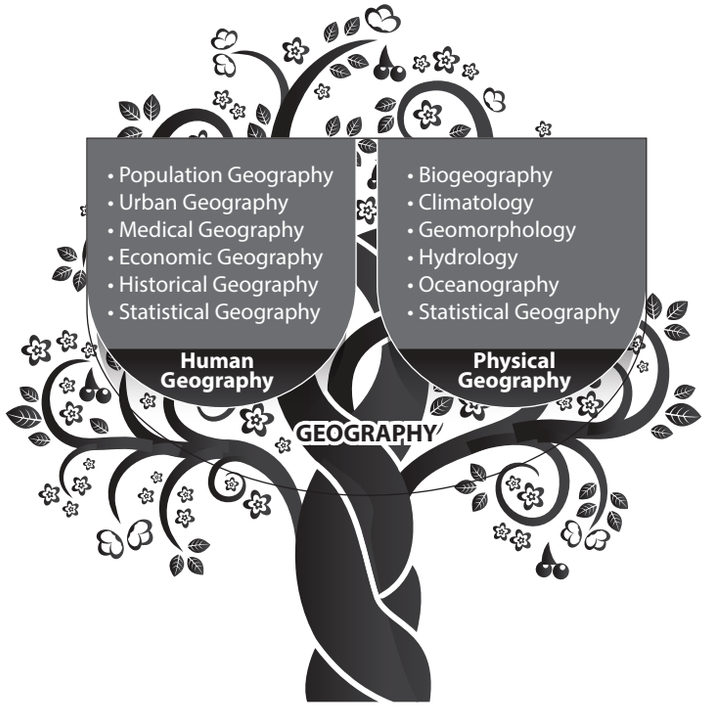
RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

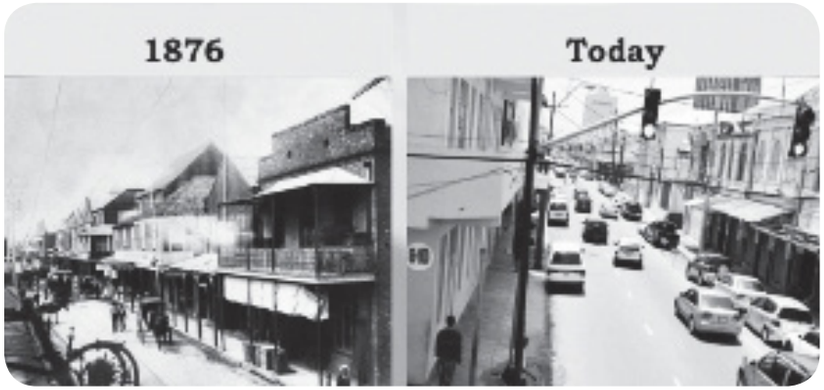
DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, examine various photographs in a gallery walk and explain what the photographs are showing. Determine what can be studied from what is shown in the photographs. The photographs should stimulate the students to formulate their own definition of Geography.	• Photograph interpretation; communicating; critical thinking; collaborating	Identifying what each picture is depicting; definition of Geography formulated
In groups, using various online sources, dictionaries or textbooks, explore the definitions of the root terms 'geo', 'graphy' and Geography. Write these definitions in their notebooks and compare these definitions to the ones originally formulated for the term Geography. Each group can suggest reasons why several definitions for Geography exist. In groups, discuss the various definitions for Geography and select the most appropriate one given a specific context or refine the definitions formulated to derive a comprehensive definition for the term Geography.	• Formulating definitions; communicating; critical thinking; collaborating	At least two definitions of the concept of Geography formulated; at least two reasons for the variety of definitions given; definition include the "the study of" and "earth"

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In guided discussions, brainstorm to generate a list, within a table, of phrases or sentences to indicate what they understand by the terms 'Human' and 'Physical'.	• Critical thinking; creating; communicating; collaborating	Table created with list under 'Human' and 'Physical'
In groups, given a set of photographs showing various aspects of the environment, indicate aspects within the photographs that fall into the 'Human' or 'Physical' category. Justify why they placed each aspect in each group. Create a table to show the various aspects in each category.	• Categorising geographic information; creating; photograph interpretation; collaborating; communicating	Aspects within the photographs identified correctly as 'Human' or 'Physical'; justification given for each classification
In groups, unscramble a set of words or phrases to arrive at a definition for the concepts 'Human Geography' and 'Physical Geography.' Using a variety of sources, explore more definitions of the concepts 'Human Geography' and 'Physical Geography'. Write one comprehensive definition for each concept. Based on the definitions, explore previous classifications of aspects of the photographs and reclassify the various aspects of the photographs, if necessary.	• Defining geographical concepts; classifying; collaborating; critical thinking; communicating	Definition written; aspects of the two branches of Geography classified – human activities highlighted under 'Human Geography' and the natural environment highlighted under 'Physical Geography'
In groups, given a set of cue cards with names of selected areas of geographical study conduct online or offline research to determine the nature of the areas of study. Each group should place these areas or sub-disciplines under the human or physical branch to create the sub-branches of Geography.	• Classifying; collaborating; creating; critical thinking; communicating	Various areas of geographical study classified as 'Human' or 'Physical'

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
Example: A tree may be used as a simple way for students to have a visual of 'branches' and 'sub-branches'.  		
In groups, research and design an appropriate statistical diagram to represent the branches and sub-branches of Geography. Individually, examine the flow chart or other statistical diagram designed and write a paragraph detailing the characteristics of the diagram used and the benefits and drawbacks of the method selected. Share the findings with the class and determine from discussions the most appropriate method to represent the branches and sub-branches.	• Researching for information; critical thinking; creating; communicating; collaborating	Flow chart or other appropriate statistical diagram constructed showing the two main branches and at least six sub-branches ; paragraph written detailing the characteristics of the statistical diagram used; at least one benefit and one drawback of the diagram used
In groups, using textbooks or online sources, conduct research to identify the five themes of Geography and complete the following activities to bring out the five themes identified:	• Researching for information; collaborating; critical thinking; communicating	Five themes of Geography identified

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
LOCATION: POSITION ON THE EARTH'S SURFACE (ABSOLUTE/ RELATIVE) – In groups, given a large blank map of Jamaica showing the fourteen parishes and a set of named cut – out landforms and man – made features, conduct research on each feature and place on the blank map in its correct location. On completion, students should determine the theme of the activity. The students should be asked to identify the location of places in absolute and relative terms. Simple personal terms to show relative position such as "left" or "right" may be initially used.	• Collaborating; finding location on maps; researching for information	Features placed on map in correct location; theme identified; absolute and relative position of at least three features given using latitude and longitude and compass direction
PLACE: PHYSICAL AND HUMAN CHARACTERISTICS – Each student will create an ABC poster or digital booklet or PowerPoint presentation of their community. The word used for each feature might describe a unique physical feature, the weather, or the people of the community and their traditions. When completed, with photographs, the poster or booklet should inform someone who is unfamiliar with your community what life is like there and show all the unique features of that place.	• Creating; exploring; observing; communicating; photograph interpretation; critical thinking	Theme identified; photographs depict the words used; descriptions of each photograph written
HUMAN/ENVIRONMENT INTERACTIONS: SHAPING THE LANDSCAPE – In groups, conduct research on a selected town in Jamaica or another Caribbean country. Given population statistics, calculate how the population of the town has increased and relate that population increase to changes in the physical and human environments to accommodate the population growth. In groups, create a gallery walk to show the changes over time of the selected town. From the gallery walk, write an essay detailing the changes over time.	• Researching for information; calculating; communicating; analysing; creating; critical thinking; collaborating	Growth in population calculated; essay written detailing at least five noticeable changes identified; theme identified

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: **Example:** Harbour Street, Kingston, Jamaica in the 1800's and 2000's  *Source: diGJamaica Blog. Posted on October 23, 2014. The Gleaner Company Ltd. http://digjamaica.com/blog/2014/10/23/then-now-harbour-street-downtown/*		
MOVEMENT: HUMANS INTERACTING ON THE EARTH – Individually or in groups, interview an agreed number of teachers at their school or elders in their communities. Students should gather information on where each person was born and reasons they moved to the place where they presently live and work. With the information gathered, students should plot the movement and mode of travel each person used on a blank map of Jamaica. Create a table to classify the reasons for migrating given by each individual. These reasons should be grouped into those that caused people to move from the areas where they were born and those that attracted them to where they are now living and working.	• Communicating; gathering data; analysing; creating; mapping; map reading; critical thinking; collaborating	Accurate data gathered; map completed with arrows drawn to show source and destination areas; table created with two push and pull factors listed; theme identified
REGIONS: HOW THEY FORM AND CHANGE – In groups, interview an agreed number of students in various grades in the school to find out where they live in relation to the school. Plot the location of each interviewee's house on a blank map, then using that information to delineate the general school region. Share and discuss each map produced. Use atlases or Google Earth software to identify whether	• Communicating; gathering data; mapping; map reading; creating; collaborating; critical thinking	Interview schedule completed; Interview conducted appropriately; region plotted accurately; physical and political regions identified and described

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: there are physically and politically distinct regions or administrative zones within the school region. Write descriptions of the school region.		
Individually, based on the understanding derived from the activities, write a brief description of each of the five themes. Conduct research using textbooks or online sources to supplement each description.	• Critical thinking; communicating; researching for information	Description written fits the characteristics of each theme

Learning Outcomes

Students will be able to:

- ✔ Define the concept of Geography
- ✔ Describe the two main branches of Geography
- ✔ Classify areas of geographical study as Physical or Human
- ✔ Create flow charts to show relationships
- ✔ Explain and apply the five themes of Geography to the real world
- ✔ Develop an awareness of the connections between people and places
- ✔ Interpret geographical information from photographs
- ✔ Create simple maps to show migration patterns
- ✔ Create simple tables from geographical information

Points to Note

- The same set of pictures may be used for more than one of the suggested teaching and learning activities.
- Maps can be projected on a wall or a white surface. This will allow the size to be adjusted as needed.

Extended Learning

Ask students to identify at least three career options and research how knowledge of Geography may help with those careers. Present findings at Career Day.

Ask students to identify activities within their communities that fall within each of the five themes in Geography. Have them take photographs and compile a scrap book or write a poem or song to depict the activities which fall under each theme. Submit products for a class competition.

Points to Note

- Students may be asked to use information they should have been exposed to in the Grades 4 to 6 Social Studies National Standards Curriculum.

- Help students collect historical data online as well as from various institutions which keep these kinds of records. Most major towns will have archived records of physical changes.

- Ensure that students are reminded that regions are areas that share common characteristics.

- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

Students should be reminded to:
- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials
- Follow guidelines to promote healthy use of ICT tools
- Respectfully conduct interviews
- Guard sensitive data obtained during data gathering

Extended Learning

RESOURCES

Atlas; Computer; Cartridge Paper; Dictionary; Internet; Multimedia Projector; Newspaper clippings; Photographs; Speakers; Textbooks
http://www.harpercollege.edu/mhealy/g101ilec/intro/int/g3intrfr.htm

https://www.csustan.edu/sites/default/files/TeacherEd/FacultyStaff/betts/Handouts/PDFs/Five%20Themes%20of%20Geography.pdf

KEY VOCABULARY

Absolute Location; Bar Graph; Environment; Flow Chart; Geography; Human; Infrastructure; Interaction; Location; Migration; Movement; Physical; Place; Region; Relative Location; Infrastructure; Table; Theme

LINKS TO OTHER SUBJECTS

English Language; History; Mathematics; Social Studies; Visual Arts

About the Unit

Planetary Science

In this Unit students will learn about the components of the Solar System. Planetary Science is one of the fastest growing and most exciting areas of scientific research. As technology increases, the study of the Solar System increases. The increasing information about how our Solar System was formed and how it has changed will help students to understand more about Earth.

RANGE OF CONTENT

Knowledge Students should acquire information and develop an understanding of:
- The characteristics of the planets and other features of the Solar System
- The classification systems used for planets and spatial distribution of each group
- The effect of gravitational pull on objects in space and on each planet

Skills Students should have the opportunity to develop and practise the following skills:
- Making models to scale
- Using and interpreting information from a variety of sources –videos; photographs; textual sources (reading and understanding simple geographical terminology)
- Social skills (for example, working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)

Attitude Students should develop:
- Positive attitudes towards themselves, others and their environment
- Self-confidence, self-esteem and a simple understanding of some of their perceptions
- Willingness to perceive and evaluate natural phenomena from a scientific point of view

GUIDANCE TO THE TEACHER

- Exercise sensitivity to the various ideas students may have about how the Universe and the Earth were formed.

Prior Learning

Check that students can:

- Name in sequence all the planets in the Solar System
- Identify the characteristics of Earth which makes the planet habitable

PLANETARY SCIENCE

ATTAINMENT TARGET(S):

Gain knowledge and understanding of the physical and human processes and forces that shape the patterns of the Earth's surface and influence the distribution of people.

Standard(s): Students should acquire knowledge of different places on Earth and in the Solar System and an understanding of the spatial distribution of processes occurring within the Earth, on the Earth's surface, within the atmosphere and in the Solar System. They should also recognise that human and natural environments of the Earth consist of systems that are interdependent and understand the processes and forces that shape the patterns of the Earth's surface. They should understand the environment in which they live but also appreciate the diversity of other habitats and cultures globally.

Theme: The Human Habitat: Processes and Change

OBJECTIVES

Students should be able to:

- Formulate definitions for the terms Universe, Galaxy, Solar System, Planet, Outer Space, Dwarf Planet, Star, Meteor, Meteoroid, Meteorite, Moon, Asteroid, Comet
- Describe the characteristics of Earth which makes the planet habitable
- Describe, explain and compare the characteristics of the components of the Solar System
- Identify and classify planets according to composition and size
- Calculate changes in the weight of objects in space due to changes in gravitational pull and suggest how these changes may impact man's exploration of Space
- Determine the orbit and circumference of celestial bodies
- Investigate the impact that objects in Space have on Earth
- Appreciate the importance of developing an understanding of objects in Space

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: View online videos produced by NASA (National Aeronautics and Space Administration) about the Universe. From the video, extract information on the components of the Universe and how people presently study aspects of the Universe. Write a brief description of the characteristics of the Universe.	• Observing; communicating; critical thinking	Components of the Universe identified and described
In groups, view images of the Solar System and record the components noted. Conduct research on each element in the Solar System. Using trashables create a scaled model of the Solar System and demonstrate the movements of the various components identified. Create an appropriate diagram to classify the planets into the following: 1. Gaseous or Terrestrial 2. Planet or Dwarf Planet	• Photograph interpretation; measuring; calculating; collaborating; creating; communicating	At least three different components of the Solar System identified; scaled model of the Solar System created; movement of components in the Solar System demonstrated; planets classified according to given criteria
Measure their weight on a bathroom scale. In groups, given a table showing the gravitational force of various objects in Space in relation to Earth's gravitational force, calculate what their own body weight would be on those objects. Discuss how their calculated weight, combined with the characteristics of the objects in Space, would affect their ability to move and live on those objects.	• Measuring; calculating; communicating; critical thinking; collaborating	Weight changes calculated given Gravitational Force

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria

Students will:

The Impact of Changes in Gravitational Force

OBJECT	Gravitational Force in relation to Earth's Gravitational Force	Student's Weight (lbs)	Weight on Object (lbs)
Earth	1	120	120.00
Mercury	0.38	120 x 0.38	45.60
Venus	0.91	120 x 0.91	109.20
Earth's Moon	0.17	120 x 0.17	20.40

View a short online video showing moon landings. Make notes on what is observed and discuss how these observations relate to findings about weight and components of Outer Space.	• Observing; communicating	Characteristics of the moon described; weightlessness as a result of reduced Gravitational Force noted
In groups, conduct research by viewing short online videos to determine the potential impact of meteor showers and meteorite strikes on Earth. Note the impacts and suggest ways to prevent large scale damage to Earth.	• Observing; critical thinking; communicating; collaborating	At least three effects identified

Learning Outcomes

Students will be able to:

- ✔ Design representations in conventional and creative ways to answer spatial and relational questions between objects in the Solar System
- ✔ Identify differences among planets, moons, comets and asteroids
- ✔ Formulate definitions for the terms Universe, Galaxy, Solar System, Planet, Outer Space, Dwarf Planet, Star, Meteor, Meteoroid, Meteorite, Moon, Asteroid, Comet
- ✔ Create models to show the components and workings of the Solar System
- ✔ Classify planets according to composition and size
- ✔ Understand that gravitational force changes with mass of objects in Space
- ✔ Calculate weight changes due to changes in gravitational force
- ✔ Report on the effects that objects in Space have on Earth

Points to Note

- Use an original online video that shows one of the moon landings and ensure students discuss if they can relate what they see to what they have learnt about Outer Space and Gravitational Force.

- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

  Students should be reminded to:
  - Demonstrate safe online behaviours
  - Acknowledge the owners of digital materials and encourage others to do so
  - Follow guidelines to promote healthy use of ICT tools

Extended Learning

Conduct research online and construct a home-made telescope. As a class, select one common day to examine the night sky. Record observations and share with class. Discuss differences in observations.

RESOURCES

Atlas; Bathroom Scale; Cartridge Paper; Computer; Markers; Multimedia Projector; Ruler; Scissors; Tape; Textbooks; Videos

http://starchild.gsfc.nasa.gov/docs/StarChild/solar_system_level2/planet_hop.html

https://www.youtube.com/watch?v=ZHAqT4hXnMw

https://solarsystem.nasa.gov/planets/

KEY VOCABULARY

Asteroid; Astronomical Unit; Ceres; Comet; Dwarf Planet; Earth; Elliptical; Eris; Gas Planets; Gravity; Gravitational Force; Inner Planets; Jupiter; Light Year; Makemake; Mars; Mercury; Meteor; Meteorite; Meteoroid; Milky Way; Moon; Neptune; Orbit; Outer Planets; Outer Space; Planet; Pluto; Revolution; Rotation; Saturn; Solar System; Space; Star; Sun; Terrestrial; Uranus; Venus

LINKS TO OTHER SUBJECTS

English Language; History; Mathematics; Physics; Social Studies; Visual Art

About the Unit

Introduction to Map Reading and Photograph Interpretation 1

The ability to read a map, even a very simple one, is a skill that must be learned and can require considerable time and effort. Map reading skills are important to just about everyone, as maps are frequently used to convey important information and relationships that occur over time and space. Maps help the reader to understand the world around them. In this Unit, the students will be introduced to basic map reading skills as well as the importance of photographs in studying Geography. The connection between maps and photographs will be emphasised.

RANGE OF CONTENT

Knowledge Students should acquire information and develop an understanding of:
- Human and physical environmental phenomena and processes relating to Jamaica and other places

Skills Students should have the opportunity to develop and practise the following skills:
- Using and interpreting a variety of information sources for example, maps and photographs
- Present and communicate information in a variety of ways including sketch maps and photographs
- Social skills (for example, working effectively alone or in groups; following instructions; teamwork and cooperation; communicate effectively to transmit information)

Attitude Students should develop:
- Positive attitudes towards themselves, others and their environment
- Self-confidence, self-esteem and a simple understanding of some of their perceptions
- Willingness to perceive and evaluate natural phenomena

GUIDANCE TO THE TEACHER

- Students should be initially provided with maps that display a limited amount of information. This will help them properly focus on the information that is provided.
- Give students enough assistance to identify and correct errors and enough opportunities to practise skills across a range of challenges sufficient to obtain mastery.
- It is important that map reading and interpretation combines reading and mathematics skills to help build spatial sense and visual literacy.
- Remember that many road signs utilise map symbols so these should be related to map reading.
- Maps are drawn from an overhead angle and since it is rare students see the earth from this perspective, use aerial photographs and satellite imagery to bridge the gap and also show the link between maps and aerial photographs.
- Aim for diversity in maps and map functions and link maps to the real world.

Prior Learning

Check that students can:

- Use the Atlas and maps of Jamaica, the Caribbean and the World
- Locate places using global coordinates
- Interpret basic information from photographs

INTRODUCTION TO MAP READING, AND PHOTOGRAPH INTERPRETATION 1

ATTAINMENT TARGET(S):
Appreciate the importance of maps, photographs and statistical diagrams to the study of Geography and their importance in everyday life.

Standard(s): Students should develop map reading and interpretation skills and the ability to interpret a range of photographs for geographical information. In addition, be able to use mathematical reasoning as a tool for problem–solving and as a means of extracting information from various sources representing geographical data.

Theme: Spatial Thinking and Analysis: Maps, Photographs and Statistical Diagrams.

OBJECTIVES

Students should be able to:

- Define the terms map, photograph and plan
- Distinguish among different types of maps
- Identify the types of photographs
- List the uses of photographs
- Distinguish among ground level and aerial photographs and satellite imagery
- Create a list of the essential features of a map
- Associate colours and symbols on maps with landscape features
- Draw and interpret simple contour patterns of landforms
- Explain the uses of the essential features of maps
- Interpret simple ground level and aerial photographs, satellite imageries and maps
- Develop a logical argument to explain the importance of maps photographs and plans
- Differentiate among maps, photographs, and plans
- Draw simple sketch maps and plans
- Use four point compass rose to state relative location
- Use Cardinal Points and protractors to establish direction and angular bearing between two locations
- Use map scales to measure straight line distances between two points
- Locate places using map Coordinate Systems

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, examine a simple map, an aerial photograph and a plan of their school or area or town. From these, make a list of the characteristics of each. From the characteristics identified, formulate a definition for map, photograph and plan. Compare the definitions formulated to definitions in textbooks or online sources. Explain the differences noted among the map, photograph and plan. Outline the differences in a table.	• Observing; critical thinking; collaborating; creating; communicating	Characteristics of maps, plans and photographs listed; At least three differences among the map, plan and photograph identified
In groups, examine samples of various types of maps and create a list of the common features noted among all the maps. In groups, examine a map without the appropriate features. Discuss the difficulty encountered in interpreting the information on the map without the five features.	• Observing; collaborating; critical thinking; communicating	The five common features of the maps listed – Border; Legend/Key; Arrow/Cardinal Point; Scale; Title
In groups, brainstorm to determine the purpose of each of the features identified. List the advantages of the following features on a map: Border; Legend/Key; Arrow/Cardinal Point; Scale; Title. Each group will present findings to the class. Verify findings using textbooks or online sources.	• Collaborating; critical thinking; communicating	General purpose of each map feature identified

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: Work in groups to examine one type of map, and determine the type of information the map is representing (each group should get a different type of map). Using a document camera or multimedia projector, project the map on the white board or wall while the description is being given. Project the various types of maps and identify the differences among them.	• Map reading; observing; critical thinking; communicating	Type of information the map shows correctly identified; differences among the various types of maps identified
In groups, use a given Legend and a sheet of paper to draw a sketch map of a selected area from an aerial photograph. Each group should be given photographs of separate areas, which share some common characteristics. Present and discuss their maps. Indicate why use of symbols is necessary and why particular symbols were chosen for the features that appear on their maps.	• Drawing; labelling; photograph interpretation; communicating; critical thinking; collaborating	Sketch map drawn and labelled – conventional colours, signs and symbols used to show features
In groups, given different scenarios develop logical arguments to explain the importance of maps. Scenarios may include: 1) In groups, using a simple Road Map, students should find their way from one point to another. From this activity, argue the importance of this type of map. 2) In groups, using an Ordnance Survey Map of a place/country the students would not have visited, determine the importance of a map. 3) In groups, given a series of maps of an area over a period of time (for example Jamaica 1800 to 2015), determine this importance of maps.	• Map reading and interpretation; collaborating; critical thinking	At least five reasons maps are important identified
In groups, given a digital camera, take a series of photographs at various angles on the school compound: Take a horizontal photograph standing on the ground and an oblique photograph of the same area while standing on an elevated object (such as upstairs a building). Obtain a Google Earth image of the area for which the photographs were taken. Project the three images using the Multimedia Projector and discuss the type of information each view gives. Explain how the information is different in each photograph even though all are showing the same place.	• Observing; taking photographs; photograph interpretation; collaborating; communicating; critical thinking	Photographs taken at a horizontal and oblique angle (where possible) ; differences in the information presented by each photograph identified

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: In groups, conduct research to determine various methods used to establish direction. Groups may use the path of the Sun or a magnetic compass. To use the path of the Sun, in the school yard, set up a piece of stick perpendicular to the ground. Mark the tip of the shadow cast by the stick. Take this reading at least an hour before midday. Cut a piece of string the same length as the shadow. Take measurements of the shadow every 10 – 12 minutes. Note that the shadow will shrink as midday is approached and grow after midday has passed. Continue to measure the length of the shadow until it is exactly the same length as the measurement at the start. Mark the tip of the length of the shadow. Draw a line connecting the first and second marks. This forms the East – West line. If the student stands with the first mark on the left and the second on the right, they will face True North. Groups will create a four point Compass Rose after establishing True North. Using a string and protractor, determine direction and bearing from their location to another. Straight line distances will be measured between points in the school yard. Create a mnemonic to remember the position of each Cardinal Point.	• Observing; measuring; communicating; critical thinking; drawing; experimenting; collaborating; using magnetic compass	Compass Rose created with the four major Cardinal Points; protractor placed on Compass Rose with 0 degree aligned to North on the Compass Rose; distance between points accurately measured; measuring tape correctly used; mnemonic created
Given a world map, draw four point Compass Roses to find direction and bearing of one place to another (major cities should be used). Straight – line distances between cities measured in centimetres should be converted using the linear scale.	• Drawing; finding location on maps; map reading; measuring; critical thinking; communicating	Compass Rose accurately placed on map; direction accurately determined; Protractor accurately placed on map; bearing measured (± 2^0 margin of error)
In groups, recall how a grid system is established to find location of places. Read location of places using global coordinates.	• Map reading; critical thinking; collaborating; communicating	Location determined with latitude read first and longitude second

Learning Outcomes

Students will be able to:

- ✔ Use various types of maps to obtain information
- ✔ Define the terms map, photograph and plan
- ✔ Identify different types of maps
- ✔ Determine the importance of the five common features of maps
- ✔ Associate symbols and colours on maps with landscape features
- ✔ Interpret information from a variety of photographs
- ✔ Differentiate among maps, photographs, and plans
- ✔ Draw simple sketch maps and plans
- ✔ Establish direction
- ✔ Find direction and angular bearing
- ✔ Use map scales to measure straight line distances between two points
- ✔ Locate places using lines of latitude and longitude

Points to Note

- Most of the maps suggested are found in the Students' Atlases.
- In large classes, it is helpful to project maps on the board to ensure all students are looking at the same point or feature or symbol.
- Refrain from drawing cardinal points on the board in the first instance – some students leave with the perception that 'North' is above their heads. It is important that students are allowed to use a magnetic compass.
- Introduce students to True North; Grid North and Magnetic North.
- Note that not all symbols found in the Key/Legend on maps may be used on the area represented by the map.
- Allow students to interact with maps and generate their own notes on the features.
- Where possible, reproduce maps in colour.
- When photographs are used in text they are typically called Plates.

Extended Learning

Use Google Earth software to get an aerial view of their community. From that image, draw and label a sketch map of the community. Use conventional symbols and colours to represent the various features drawn on the map.

Points to Note

- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

Students should be reminded to:

- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials and encourage others to do so
- Follow guidelines to promote healthy use of ICT tools

Extended Learning

RESOURCES

Aerial Photographs; Arrows (photocopied); Atlas; Camera; Climatic Map; Compass; Computer; Dictionary; Dot Map Economic Map; Flow Chart/Map; Geology Map; Google Earth Software; Internet; Multimedia Projector; Photographs; Physical Map; Plans; Political Map; Protractor; Resource Map; Road Map; Ruler; Satellite Imagery; Speakers; Textbooks; Thematic Maps; Topographic Map; World Map

https://bostoncollege.instructure.com/courses/1283570/pages/virtual-lab-1-topographic-maps-contours-and-making-cross-sections
https://www.slideshare.net/adeshipp/photographs-geography?qid=ab5c2168-6795-41fe-ac7c-d3a15645de30&v=&b=&from_search=1
http://www.icsm.gov.au/mapping/maps_intro.html

KEY VOCABULARY

Aerial; Angular Bearing; Back Bearing; Bearing; Border; Cardinal Point; Choropleth Map; Climatic Map; Compass Point; Direction; Dot Map; Economic Map; Feature; Flow Chart/Map; Geology Map; Ground Level; Horizontal; Imagery; Key; Latitude; Legend; Location; Longitude; Map; Measure; Photograph; Physical Map; Plan; Political Map; Resource Map; Road Map; Satellite Imagery; Scale; Sketch; Straight Line; Symbol; Thematic Map; Title; Topographic Map; True North; Vertical

LINKS TO OTHER SUBJECTS

Agricultural Science; English Language; History; Mathematics; Social Studies; Visual Arts

About the Unit

Jamaica: Population, Migration and Settlement

In this Unit, the students will be introduced to Demography. Populations are dynamic and Jamaica's population is no exception. The distribution and movement of the Jamaican population will be examined. Simple graphical methods used to represent population data will be constructed using census data. The types of settlements found in Jamaica will be examined and how people move between these types of settlement studied.

RANGE OF CONTENT

Knowledge Students should acquire information and develop an understanding of:
- How physical, social, cultural and economic phenomena interact and the effects of such interaction
- Several key concepts, such as location, spatial distribution pattern and change over time

Skills Students should have the opportunity to develop and practise the following skills:
- Using and interpreting a variety of information sources for example, maps, photographs and cartoons
- Presenting and communicating information in a variety of ways including sketch maps and photographs
- Social skills (for example, working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)

Attitude Students should develop:
- Positive attitudes towards themselves, others and their environment
- Self-confidence, self-esteem and a simple understanding of some of their perceptions
- Appreciation of social, cultural and environmental diversity

GUIDANCE TO THE TEACHER

- Updated population data should be obtained from the Statistical Institute of Jamaica (STATIN) and/or Planning Institute of Jamaica (PIOJ).

Prior Learning

Check that students can:

- Appreciate that people move temporarily as well as permanently
- Identify main towns in each parish in Jamaica

JAMAICA: POPULATION, MIGRATION AND SETTLEMENT

ATTAINMENT TARGET(S):
Gain knowledge and understanding of the physical and human processes and forces that shape the patterns of the Earth's surface and influence the distribution of people.

Standard(s): Students should acquire knowledge of different places on Earth and in the Solar System and an understanding of the spatial distribution of processes occurring within the Earth, on the Earth's surface, within the atmosphere and in the Solar System. They should also recognise that human and natural environments of the Earth consist of systems that are interdependent and understand the processes and forces that shape the patterns of the Earth's surface. They should understand the environment in which they live but also appreciate the diversity of other habitats and cultures globally.

Theme: The Human Habitat: Processes and Change

OBJECTIVES

Students should be able to:

- Define the terms population, migration and settlement
- Using a dot map, describe Jamaica's population distribution
- Given population data, create a simple dot map
- Outline how major physical landform features influence population distribution in Jamaica
- Explain the concentration of Jamaica's population in coastal zones
- Draw simple bar graphs to show population of Jamaica by parish
- Compare urban settlements to rural settlements in Jamaica
- Using Kingston as a case study, describe a metropolitan area
- Identify the two main categories of migration
- Citing evidence, from given scenarios, explain why people move from one place to another in Jamaica
- Identify the main types of migration in Jamaica
- Identify the effects of migration on rural and urban settlements in Jamaica
- Construct flow charts/flow maps to show the migration of people
- Understand how population data are obtained
- Cooperate with census takers

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, brainstorm to arrive at a definition of the term population. After arriving at the definition, given a blank map of Jamaica and population figures for each parish, design a method to represent the population figures on the map. Compare the method designed to a Dot map of Jamaica. Write a simple description of where the population is mainly found in Jamaica.	• Critical thinking; creating; map reading and interpretation; collaborating; communicating	Description of the population spread includes exact location of the population concentrations; method designed to show population spread; Dot map accurately interpreted
Overlay the population distribution map on other types of maps such as a relief map or economic resource map of Jamaica and simply describe how the population spread is influenced by other factors.	• Map reading and interpretation; critical thinking; communicating	Spread of population related to other factors such as relief of land and availability of resources
Using Google Earth, project a map of the community on the white board or on a wall. Obtain the population data from STATIN or PIOJ for major towns and cities in Jamaica. Cut paper circles of specific diameters to represent a set number of people. Write a description of the spread and factors affecting the spread.	• Collaborating; measuring; critical thinking; creating; map reading	Dot map created with dots placed in areas where the population is located; all dots used are the same size and represent a specific number of people
As a class activity, create a bar graph by arranging themselves into twelve lines according to the date and month they were born. Using chalk, draw and label the axes of the bar graph on the floor. Draw an outline around the students in each line to represent the bar. Label the axes appropriately. Discuss what each bar represents.	• Collaborating; measuring; communicating; critical thinking; interpreting graphs	Bar graph created with each bar representing the number of students born in each month; axes correctly labelled

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
Using a graph sheet, draw bars to represent the number of people in each parish in Jamaica. Label axes appropriately.	• Drawing; critical thinking; creating; communicating	Bar graph drawn and axes correctly labelled
In groups, brainstorm to arrive of a set of criteria to determine when a settlement may be considered rural or urban. Conduct research to identify the present standard used to determine rural and urban. Revise the set of criteria formulated. Examine photographs showing various communities. Based on the criteria developed categorise each community examined as a rural settlement or urban settlement.	• Critical thinking; collaborating; photograph interpretation; communicating	Criteria to determine rural and urban settlement created; settlements classified as rural or urban
In groups, given stories detailing migration experiences written by the teacher or downloaded from the internet, identify the categories of migration and list the reasons people move from a place; reasons they selected a particular destination and the effects the migration would have on the place they left and the place in which they settled.	• Critical thinking; communicating; analysing; collaborating	Categories of migration identified; at least three reasons for migration identified; reasons classified as push and pull factors
Individually, write and produce a short creative piece containing information on reasons persons may migrate from their community and reasons they select their destination. The piece should also identify some of the effects of migration on the point of origin (source) and the destination.	• Critical thinking; analysing; communicating; creating	At least five reasons people migrate depicted; at least two effects on the source areas and two effects on the destination identified
In groups, given cartoons/photographs, discuss reasons people migrate. *Example: Poor Roads Affecting St. Elizabeth Dairy Farmers*  *Sections of the Cabbage Valley Road in North East St. Elizabeth* *Source: The Gleaner. Poor Roads Drain St. Bess Dairy Farmers. Photo: Christopher Serju (Gleaner Writer). January 6, 2014.* *http://jamaica-gleaner.com/gleaner/20140106/news/news2.html*	• Communicating; critical thinking; photograph interpretation; collaborating	At least five reasons for migration identified from photographs

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, given migration figures; a blank map of Jamaica and arrow cut – outs, design a flow chart/flow map to show movement from one area to another. Arrows should be positioned from the source to the destination. Arrows are to be scaled to show volume of migrants.	• Finding location; map reading; creating; collaborating; critical thinking; communicating	Flow chart/flow map created – arrows placed to show source and destination and their widths scaled to show volume of migrants
In groups, determine types of information they would like to find out about a selected group in the school. Conduct research on how censuses are carried out and design a method of collecting the information needed. Conduct the census and gather the data.	• Researching for information; gathering data; creating; collaborating; critical thinking; communicating	Steps for conducting a census identified; data sheets designed and completely filled in; census conducted successfully

Learning Outcomes

Students will be able to:

- ✔ Define the terms population, migration and settlement
- ✔ Use a dot map to describe population distribution
- ✔ Create simple dot maps
- ✔ Outline how major physical landform features influence population distribution in Jamaica
- ✔ Draw simple bar graphs
- ✔ Identify the two main categories of migration
- ✔ Identify similarities and differences between rural and urban settlements
- ✔ Give reasons why people move from one place to another in Jamaica
- ✔ Identify the effects of migration on rural and urban settlements in Jamaica
- ✔ Construct flow charts/flow maps to show migration of people
- ✔ Conduct a simple census taking exercise

Points to Note

- The arrows on flow charts/maps should be accurately drawn to show direction of movement, and their width scaled to show volume of movement.

Extended Learning

Calculate the net population growth for Jamaica. Investigate the major reasons people migrate from Jamaica and identify five advantages and five disadvantages of this kind of movement.

Points to Note

- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

Students should be reminded to:
- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials and encourage others to do so
- Follow guidelines to promote healthy use of ICT tools

Extended Learning

Students should examine their own communities and classify it as urban or rural. They should give five reasons for their classification.

Students may interview elders in their communities to identify areas where they were born and reasons they moved from their original home. Investigate why they chose your community to settle.

RESOURCES

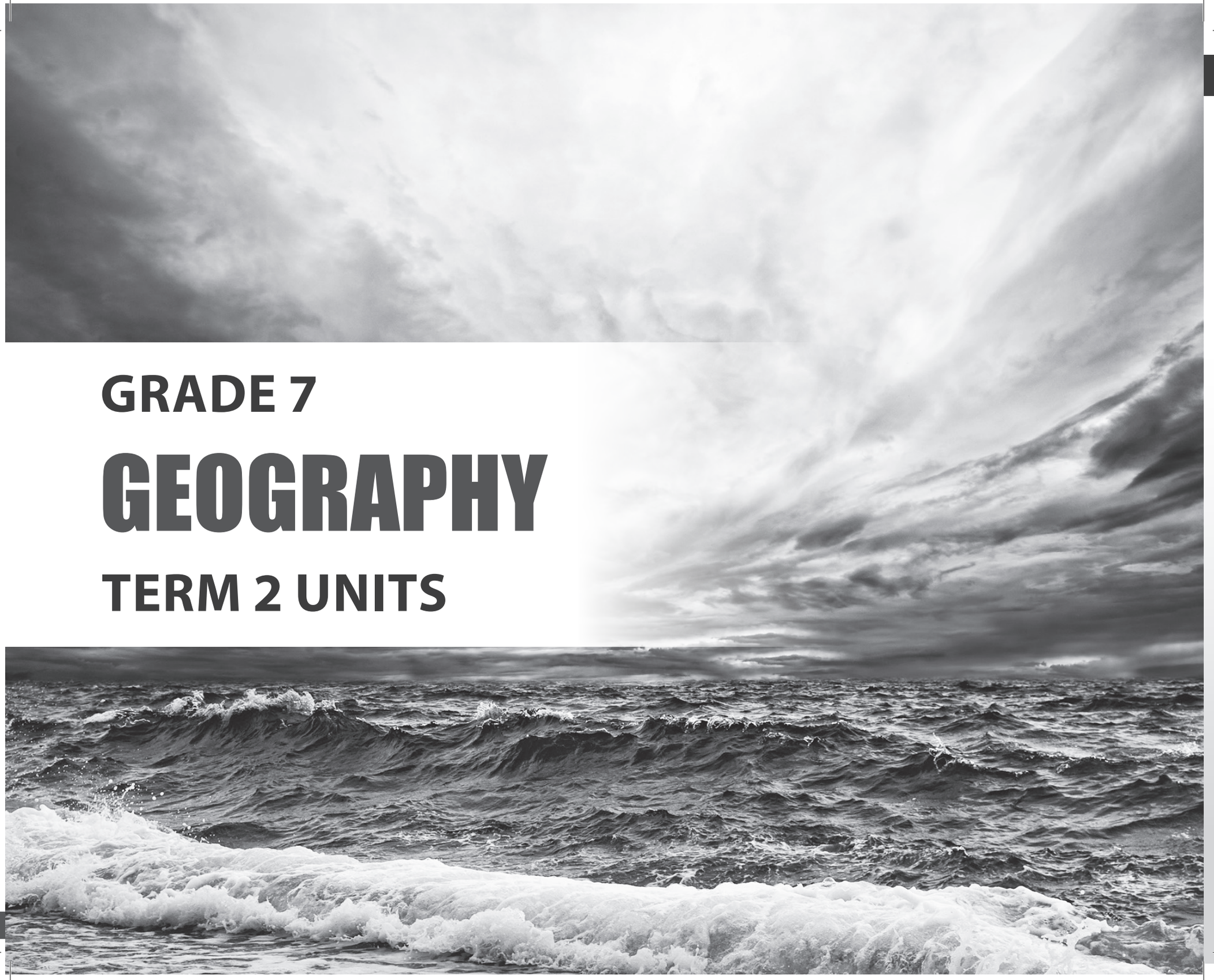
Calculator; Computer; Dictionary; Graph Sheets; Internet; Maps of Jamaica; Multimedia Projector; Photographs; Population Statistics; Speakers; Text books; Videos; World Map
http://statinja.gov.jm/
http://statinja.gov.jm/Demo_SocialStats/Newpopulation.aspx

KEY VOCABULARY

Bar graph; Birth; Census; Death; Demography; Even; External migration; Flow chart/map; Internal migration; International migration; Migration; Population; Population distribution; Pull Factors; Push Factors; Rural; Rural - rural migration; Rural - urban migration; Settlement; Sparse; Spread; Uneven; Urban; Urban - rural migration; Urban - urban migration

LINKS TO OTHER SUBJECTS

English Language; Drama; History; Mathematics; Social Studies; Visual Arts



GRADE 7

GEOGRAPHY

TERM 2 UNITS

TERM 1

Unit 1: 2 weeks
Introduction to Geography

Definition of Geography
Branches and Sub-branches of Geography
The Five Themes of Geography
Statistical Diagrams – Flow Charts and Tables

Unit 2: 2 Weeks
Planetary Science

Components of the Solar System
Comets, Meteors and Asteroids

Unit 3: 5 weeks
Introduction to Map Reading and Photograph Interpretation 1

Features of Maps, Photographs and Plans
Types of Maps, Photographs and Plans
Importance of Maps, Photographs and Plans
Simple Map Symbols
Simple Map and Photograph Interpretation
Direction, Bearings and Straight Line Distance
Latitude and Longitude – Location

Interpreting Simple Contour Patterns

Unit 4: 3 weeks
Jamaica: Population, Migration and Settlement

Population Size and Distribution in Jamaica
Migration Types
Migration in Jamaica
Settlement Types in Jamaica
Simple Dot Maps and Flow Line Maps
Statistical Diagrams – Simple Bar Graphs

TERM 2

Unit 1: 4 weeks
Weather and the Hydrological Cycle

Definition of Weather
Weather Elements and Instruments
Weather Symbols/Simple Weather Maps
The Hydrological/Water Cycle

Unit 2: 2 weeks
Case Studies: Extreme Weather

Define the Concept 'Extreme Weather'
Case Study of a Hurricane, Flood or Drought in the Caribbean: Preparation and Effects
Tracking Storms and Hurricanes
Global Warming and Extreme Weather Systems

Unit 3: 3 weeks
Introduction to Rocks and Soils

Definition of Rocks and Soils
Formation of Rocks and Soils
Rock Types in Jamaica
Uses of Rocks
Soil Types in Jamaica
Uses of Soils
Weathering and Erosion
Simple Geology Maps

Unit 4: 3 weeks
Fieldwork and Investigation 1

Simple Fieldwork Techniques
Conducting Fieldwork
Drawing Conclusions
Ethics in Research

TERM 3

Unit 1: 2 weeks
Resources and Primary Economic Activities

Definition of Resources
Types of Resources used in Primary Economic Activities
Types of Primary Economic Activities in Jamaica
Statistical Diagrams – Pie Charts

Unit 2: 4 weeks
Jamaica: Agriculture

Types of Resources used in Agriculture
Location of Agriculture in Jamaica
Types and Characteristics of Agriculture in Jamaica
Deforestation in Jamaica
Deforestation and Global Warming
Agricultural Sustainability
Economic and Land – Use Maps

Unit 3: 4 weeks
Management of Food in Jamaica: Food Safety and Security

Food Production and Distribution – Food Safety and Security
Impact of Climate Change on Agriculture
Changes in Technology in Agriculture

About the Unit

Weather and the Hydrological Cycle

In this Unit, students will learn about each of the seven elements of weather – Temperature, Rainfall, Pressure, Wind Speed and Direction, Sunshine Duration and Cloud Cover. Students will learn to use simple weather instruments to measure and record each element of weather. And using data gathered, forecast the weather. Students will develop an understanding of media weather reports and be able to prepare adequately based on information given by the Meteorological Offices of Jamaica.

Students will also understand how water moves in the environment through understanding of the basic stages of the Hydrological/Water Cycle. Application of the concepts will allow students to recognise some reasons why there may be water shortages in their area.

RANGE OF CONTENT

Knowledge Students should acquire information and develop an understanding of:
- Examples of physical environmental phenomena and processes relating to Jamaica and the rest of the World
- How physical environmental phenomena interact and the effects of such interaction
- Key concepts of location, spatial distribution and interaction, interrelationship and pattern

Skills Students should have the opportunity to develop and practise the following skills:
- Using and interpreting a variety of information sources for example photographs, diagrams, cartoons and textual sources
- Present and communicate information in a variety of ways including diagrams and models
- Social skills (for example, working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)

Attitude Students should develop:
- Positive attitudes towards themselves, others and their environment
- Self-confidence, self-esteem and a simple understanding of some of their perceptions
- Appreciation of social, cultural and environmental diversity

GUIDANCE TO THE TEACHER

- Ensure students understand the term 'cycle' and can describe how the processes are related within the Hydrological/Water cycle.
- While students will learn about the global hydrological cycle, teachers should ensure that they can also modify the cycle to show how it operates on local/small scales.

Prior Learning

Check that students can:

- Identify the elements of weather and some of the instruments used to measure them
- Describe the basic components of the Hydrological/Water cycle

WEATHER AND THE HYDROLOGICAL CYCLE

ATTAINMENT TARGET(S):
Gain knowledge and understanding of the physical and human processes and forces that shape the patterns of the Earth's surface and influence the distribution of people.

Standard(s): Students should acquire knowledge of different places on Earth and in the Solar System and an understanding of the spatial distribution of processes occurring within the Earth, on the Earth's surface, within the atmosphere and in the Solar System. They should also recognise that human and natural environments of the Earth consist of systems that are interdependent and understand the processes and forces that shape the patterns of the Earth's surface. They should understand the environment in which they live but also appreciate the diversity of other habitats and cultures globally.

Theme: The Human Habitat: Processes and Change

OBJECTIVES

Students should be able to:

- Formulate a definition for the term weather
- Revise definition of weather based on standard text definition
- Describe the characteristics of each element of weather
- Identify weather instruments used to measure each element of weather
- Identify the various units of measurement for each element of weather
- Read weather instruments to gather information about the elements of weather
- Draw simple outlines of each weather instrument
- Annotate the main characteristics of each weather instrument
- Write a simple weather report from weather data collected
- Use weather symbols to create simple weather maps/synoptic charts
- Outline the main components of the Hydrological/Water Cycle
- Define the concept Hydrological /Water Cycle
- Define key terms: precipitation, condensation, surface run off, evaporation, transpiration, infiltration, groundwater, aquifers, source, and river
- Describe the stages in the Hydrological/Water Cycle
- Create flow charts to establish the relationship among the components of the Hydrological/Water Cycle in different environments
- Identify the processes in the Hydrological/Water Cycle that give rise to rivers
- Appreciate the importance of the various components of the Hydrological/ Water Cycle in maintaining a balance in the supply of water for human and animal use

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, create interactive charts using weather image pieces created online or printed weather image pieces displaying weather elements. After creating daily charts of the weather at their school for a week, formulate a definition of weather and discuss how the weather changes daily. Compare class definition of weather with that in textbooks or online sources and revise definition if needed.	• Photograph interpretation; communicating; creating; collaborating; critical thinking; observing	Creating a complete representation of the day's weather; definition formulated to include "short term changes" or "daily changes" in the state of the atmosphere
In groups, research information, using online or offline sources to complete a research project on the weather. Include in the project: • Elements of weather; • Weather instruments and how they work; • Units of measurement for each instrument; • Photographs, diagrams or any suitable illustrations that will enhance the presentation. Make presentation in a portfolio. Each group will do a quick review/ critique of what other groups present.	• Researching for information; collaborating; communicating; report writing; labelling	Report or multimedia presentation accurately completed and includes information on all seven elements of weather; diagrams of instruments labelled

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, after doing research (online or offline), create weather instruments from simple material and construct a weather station in a secure location in the school yard. Use a record sheet generated by the teacher to record the daily changes noted on each instrument. Read the instruments daily at an established time. Record the readings and the associated units of measurements on tables. Readings can be recorded using appropriate and available software to produce graphs.	• Creating; recording geographical information; communicating; critical thinking; observing	Instruments created; instruments work; record sheet completed; measurements read and recorded
Based on recordings, write a weather report which should detail the weather the school experiences for a specified time frame. Make a weather report recording (multimedia –video or audio), which can be played to the class. In groups, given weather symbols representing the daily weather patterns noted, make a simple synoptic chart (weather map) to combine with the video recording. Based on the recordings, forecast the weather for the school for a specified time frame.	• Communicating; creating; critical thinking; predicting; collaborating; map reading and interpretation	Weather report accurate; recording done to an established standard; weather map correct; forecast based on noted recordings
Individually, read simple weather maps. These may be obtained from online sources or the daily newspapers. Write a weather report that explains the weather map.	• Reading and interpreting weather maps; critical thinking; communicating	Weather report written detailing the weather indicated by the weather map
View an online video which describes how the Hydrological/Water Cycle operates. Draw and label the Hydrological/Water Cycle or use graphic editing software to draw the hydrological cycle for inclusion in a web quest. In groups, use a web quest to investigate how the Hydrological/Water Cycle works.	• Drawing and labelling; communicating; observing; critical thinking; creating; collaborating	Hydrological Cycle accurately drawn and labelled using conventional terminology
In groups, conduct investigations into how the Hydrological/Water Cycle operates at various sites on the school compound or in the immediate community. Given small buckets of water, select diverse sites and pour the water on the ground. The following types of sites may be selected: 1. Area covered by grass 2. Area covered by concrete 3. Bare area 4. Area under a tree Observe and record what happens to the water after it is poured and the time it takes for the surface to dry completely. Place a second small bucket of water in the same area and measure the rate of evaporation.	• Observing; researching for information; experimenting; creating; communicating; critically thinking; collaborating; drawing	Modification made to the Hydrological/Water Cycle diagram based on environmental conditions of the study sites; record sheets completed

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: Repeat the experiment but create a tent above the wet ground with clear plastic. Explain what happens when the water is evaporated from the ground. Record findings on a log sheet accompanied by a sketch of the study site and draw a modified Hydrological/Water cycle to show local changes based on the observations made.		
In groups, given photographs of different environments which exist globally, create hypothetical Hydrological/Water Cycles for each environment. Write a report to justify the Water Cycle created. Based on the environment noted at school or in photograph given, justify in which environments surface rivers may form. Based on the environment selected, conduct research to verify how rivers form. Write a brief description of how the Hydrological Cycle works.	• Photograph interpretation; collaborating; critical thinking; communicating; observing	Report written; modification made to the Hydrological/Water cycle based on environmental conditions noted; correct environment for the forming of rivers selected; justification given based on research

Learning Outcomes

Students will be able to:

- ✔ Write correct definitions for the term weather; Hydrological/Water Cycle
- ✔ Describe the elements of weather
- ✔ Draw and label simple diagrams of weather instruments
- ✔ Build simple weather instruments
- ✔ Read weather instruments
- ✔ Write clear notes on the weather instruments
- ✔ Compile a weather report for a day or a week
- ✔ Construct simple weather maps/synoptic charts
- ✔ Draw and label the Hydrological/Water Cycle
- ✔ Use conventional terms when describing the Hydrological/Water Cycle
- ✔ Modify the Hydrological/Water Cycle for diverse environments
- ✔ Use selected ICT tools to investigate how the Hydrological/Water Cycle works
- ✔ Plan and conduct research about the weather using textbooks or online/offline electronic media

Points to Note

- Weather stations should be constructed in an open but secure area, to ensure accurate measurement of each weather element. Materials that are used to construct weather stations should be able to withstand exposure to the weather elements for an extended period of time.
- When students present their hydrological cycle, they should be reminded to give their descriptions in a cyclic manner. In order to ensure this happens, the teacher should ask guiding questions where necessary.
- The Gleaner newspaper publishes weather maps of daily atmospheric conditions in the Caribbean. These may be collected and used to support lessons.
- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

Students should be reminded to:
- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials
- Follow guidelines to promote healthy use of ICT tools

Extended Learning

Gather information online or from the meteorological office for the following weather elements for at least two weather stations in the parish - temperature, wind direction, rainfall, humidity, pressure and cloud cover. Compile a weather report for a day.

Gather average temperature and rainfall data for a selected location for a thirty year period. Analyse the trends noted. Explain how weather determines the climate of an area.

RESOURCES

Computer; Internet; Multimedia Projector; Newspaper weather clippings; Photographs; Speakers; Textbooks

https://pmm.nasa.gov/education/water-cycle

https://pmm.nasa.gov/education/videos/tour-water-cycle

KEY VOCABULARY

Anemometer; Aquifer; Cloud Cover; Condensation; Degrees Celsius; Evaporation; Groundwater; Groundwater Flow; Humidity; Hydrological Cycle; Hygrometer; Infiltration; Millibars; Millimetres; Mouth; Oktas; Precipitation; Rain Gauge; Rainfall; River; Source; Stevenson Screen; Sunshine Amount; Sunshine Recorder; Surface Runoff/Overland Flow; Synoptic Chart; Temperature; Thermometer; Transpiration; Weather; Weather Forecast; Wind; Wind Direction; Wind Rose; Wind Sock; Wind Speed; Wind Vane

LINKS TO OTHER SUBJECTS

English Language; Information Technology; Mathematics; Physics; Social Studies

About the Unit

Case Studies – Extreme Weather

In this Unit, students will learn about weather conditions that are considered extreme. They will understand how to prepare for, and respond to, these extreme scenarios. Extreme weather events which are of focus include droughts, hurricanes and floods. With Jamaica's increasing population, more people live in high risk areas and are, therefore, vulnerable to the effects of extreme weather events. Also, with the reality of changes in climate, weather events are expected to increase in both frequency and magnitude. Understanding of these events and how to mitigate their effects are important.

RANGE OF CONTENT

Knowledge Students should acquire information and develop an understanding of:

- Examples of physical environmental phenomena and processes relating to Jamaica and the rest of the World
- How physical environmental phenomena interact and the effects of such interaction
- Key concepts of location, spatial distribution and interaction, interrelationship and pattern

Skills Students should have the opportunity to develop and practise the following skills:

- Using and interpreting a variety of information sources for example photographs, diagrams, cartoons and textual sources
- Presenting and communicating information in a variety of ways including diagrams and models
- Social skills (for example, working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)

Attitude Students should develop:

- Positive attitudes towards themselves, others and their environment
- Self-confidence, self-esteem and a simple understanding of some of their perceptions
- Appreciation of social, cultural and environmental diversity

GUIDANCE TO THE TEACHER

- Exercise sensitivity in the discussion of extreme events. Students in the class may have been adversely affected by an event that comes up for discussion.

Prior Learning

Check that students can:

- Identify weather elements and instruments used to measure each element
- Read weather maps/synoptic charts

CASE STUDIES – EXTREME WEATHER

ATTAINMENT TARGET(S):
Recognise the interdependent relationship between humans and the natural environment.

Standard(s): Students should develop an understanding of the environment as a system of interdependent components affected by human activity and natural phenomena. They should also recognise the significance of using past and present events to make predictions for the future and apply sustainable practices in preserving the environment for future generations.

Theme: Environmental Awareness, Change and Sustainability

OBJECTIVES

Students should be able to:

- Describe the concept of 'extreme weather' event
- Differentiate between normal atmospheric events and 'extreme' weather events
- Describe the following 'extreme' weather events: storms and hurricanes, floods and droughts
- Formulate a definition for the term 'flash flood'
- Differentiate between a flood/storm/hurricane 'watch' and 'warning'
- Determine the main reasons for the increase in the occurrence of 'extreme' weather events
- Create a simple description of the concept of Global Warming
- Determine whether a relationship exists between changes in atmospheric temperatures and the occurrence of 'extreme' weather events
- Investigate an extreme weather event in a selected Caribbean country and evaluate its effects on selected community
- Propose plans to prepare adequately for droughts, floods, storms and hurricanes
- Plot the track of a tropical atmospheric system and discuss reasons it developed into an 'extreme' event
- Describe the preparation made by Government Agencies or Non-Governmental Organisations (NGOs) in Jamaica for storms, hurricanes, droughts or floods
- Categorise activities undertaken by individuals or agencies for selected hazardous events into the following groups: Before the Event, During the Event, and After the Event
- Propose ways improvements may be made in national plans for storms, hurricanes, droughts or floods prevention and mitigation
- Recognise the importance of individual and group participation and planning to prepare for extreme weather events
- Appreciate the importance of avoiding hazardous locations

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
View music video 'WILD GILBERT' or any other available video about extreme weather then brainstorm about normal and extreme weather events. Identify the differences between normal and extreme events. Give personal accounts of extreme events they have experienced. Formulate a definition for the term extreme event and identify examples of extreme events.	• Observing, communicating, critical thinking	Definition for extreme weather events formulated; at least two differences between normal events and extreme events identified; at least two extreme events identified
In groups, study media reports and those given by the Office of Disaster Preparedness and Emergency Management (ODPEM) of an impending extreme weather phenomenon to describe the weather patterns associated with the event. Discuss if the reports match their own experiences of the extreme events. Use satellite imagery to show the weather events where possible.	• Photograph interpretation; critical thinking; communicating; collaborating	Weather patterns described
Discuss the type of preparations people make for the extreme weather and make a list or conduct a vox–pop (record using available emerging technology) to get comments on preparations made by students and their parents for extreme weather. Play back recordings for class discussions. Create a list of the measures used to prepare for extreme weather events. Discuss as a class activity.	• Researching for information; communicating; critical thinking	List with at least ten ways to prepare for an extreme weather event created

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
Work in groups to study photographs showing damage from wind, rain, storm surge and drought. Suggest what happened. Describe the effects of each event.	• Photograph interpretation; communicating; critical thinking; collaborating	List of effects for each extreme event gleaned from photograph
Continue to work in groups and recall what members of their communities did after an extreme event. Describe responses to the event by individuals and Government Agencies using various creative forms, for example: story, poem, poster or dub poetry. A video may be viewed of an extreme event and proposals made as to what the affected persons will have to do to recover and mitigate effects from similar future events.	• Collaborating; communicating; critical thinking	At least three responses and three mitigation measures proposed
In groups, discuss what Governments can do at different time periods – before, during and in the days immediately following the event. Type a letter to the relevant Government Office making suggestions as to what can be done at each stage. Upload to the class-created wiki, sharing with other Grade 7 students for editing and additional suggestions.	• Critical thinking; creating; collaborating	Letter written containing at least two suggestions of measures to employ before, during and after an extreme weather event
Design an advertisement, using appropriate software where available, to inform your community of ways to care for the vulnerable (elderly, children, differently-abled, animals) before, during and after an extreme weather event.	• Critical thinking, creating; communicating	Posters or any other appropriate advertisement created
In groups, for a selected extreme weather event, design a flow chart to show the activities an individual or Government Agency would undertake before, during and after the event.	• Critical thinking; creating; communicating; collaborating	Flow chart created with activities classified as BEFORE, DURING and AFTER.

Learning Outcomes

Students will be able to:

- ✔ Describe extreme weather events
- ✔ Identify differences between normal atmospheric events and extreme weather events
- ✔ Write descriptions of the characteristics of floods, hurricanes and drought
- ✔ Present findings on an extreme weather event in a selected Caribbean country
- ✔ Identify effects of a selected extreme weather event on a community in a named Caribbean country
- ✔ Write an individual plan to prepare adequately for droughts, floods or hurricanes
- ✔ Describe the preparation made by Government Agencies or Non-Governmental Organisations (NGOs) for hurricane, drought or flooding
- ✔ Create a list to categorise activities undertaken by the individual or agencies into: Before the Event, During the Event, and After the Event
- ✔ Write a proposal of ways improvements may be made in national plans for hurricane, drought or flooding
- ✔ Willingly participate in and complete learning activities

Points to Note

- Remember that not all weather phenomena that cause extensive damage are extreme events. For example, tropical storms are not classified as extreme events, but can cause extensive damage to property and loss of lives.
- While there is a scale for the wind speed for wind systems, no scale exists for the amount of rainfall that these systems carry. Extensive damage typically results from heavy intense rainfall.
- Ensure students understand that flooding from storm surges are related to storms and hurricanes, but tsunamis are related to geological events.
- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

Students should be reminded to:

- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials and encourage others to do so
- Follow guidelines to promote healthy use of ICT tools

Extended Learning

Design a disaster plan for the school, home or community

Create a scale to indicate the amount of rainfall that accompanies tropical storms and hurricanes

RESOURCES

Computer; Multimedia Projector; Photographs; Video Recorder; Videos; Voice Recorder
http://www.fao.org/3/a-i5695e.pdf
http://www.metservice.gov.jm/

KEY VOCABULARY

Disaster; Drought; Extreme Weather; Flooding; Flood Warning; Flood Watch; Hazard; Hazardous; Hurricane; Hurricane Warning; Hurricane Watch; Natural Disaster; Natural Event; Plan; Saffir-Simpson Scale; Storm; Storm Surge

LINKS TO OTHER SUBJECTS

English Language; History; Mathematics; Physics; Social Studies

About the Unit

Introduction to Rocks and Soils

In this Unit, students are introduced to the study of rocks. Basic Geology techniques such as observing the characteristics of rocks using hand-held magnifiers will be employed by students. The characteristics of a variety of rock types will be determined and rocks classified into igneous, metamorphic or sedimentary. Students will learn about the relationship which exists between rock types and be able to make a model of the rock cycle. The various uses of rocks will be determined, including their economic value. The connection between rocks and soils will also be established, and the nature of various types of soils determined. The value of specific combinations of soils to agriculture will also be investigated.

RANGE OF CONTENT

Knowledge Students should acquire information and develop an understanding of:

- Examples of physical environmental phenomena and processes relating to Jamaica and the rest of the World
- How physical environmental phenomena interact and the effects of such interaction
- Key concepts of location, spatial distribution and interaction, interrelationship and pattern
- The practical aspects of the above as they relate to the learner's environment

Skills Students should have the opportunity to develop and practise the following skills:

- Using and interpreting a variety of information sources for example photographs, diagrams and textual sources
- Presenting and communicating information in a variety of ways including diagrams and models
- Social skills (for example, working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)

Attitude Students should develop:

- Positive attitudes towards themselves, others and their environment
- Self-confidence, self-esteem and a simple understanding of some of their perceptions
- Appreciation of social, cultural and environmental diversity

GUIDANCE TO THE TEACHER

- Authentic rock samples should be obtained for the lessons. These may be procured from the Geology Museum of the University of the West Indies or the Mines and Geology Division of the Ministry of Science, Technology, Energy and Mining.
- Ensure students understand the concept 'cycle' and can describe how the rocks are related within a cycle.
- Students should be advised of the appropriate protective gear when working outside the classroom on field trips.

Prior Learning

Check that students can:

- Understand that there are various types of rocks and that each has some use to human beings
- Distinguish between rock and soil

INTRODUCTION TO ROCKS AND SOILS

ATTAINMENT TARGET(S):
Gain knowledge and understanding of the physical and human processes and forces that shape the patterns of the Earth's surface and influence the distribution of people.

Standard(s): Students should acquire knowledge of different places on Earth and in the Solar System and an understanding of the spatial distribution of processes occurring within the Earth, on the Earth's surface, within the atmosphere and in the Solar System. They should also recognise that human and natural environments of the Earth consist of systems that are interdependent and understand the processes and forces that shape the patterns of the Earth's surface. They should understand the environment in which they live but also appreciate the diversity of other habitats and cultures globally.

Theme: The Human Habitat: Processes and Change

OBJECTIVES

Students should be able to:

- Formulate definitions for the terms rock and soil
- Examine rock and soil samples to determine their characteristics
- Describe the characteristics of a variety of rock and soil types
- Classify rocks as igneous, metamorphic or sedimentary
- Determine how soils form
- Classify soils by grain size
- Explain how each rock type forms
- Differentiate between intrusive and extrusive volcanic rocks
- Recognise the importance of rocks and soils in cleaning (filtering) water in the environment
- Use a simple Geology Map of Jamaica to identify areas where various rock types are found
- Show the relationship among the three types of rocks
- Design a model to show the rock cycle
- Give at least three examples of each rock type
- List the uses of rocks and soils found in Jamaica.
- Propose new ways different types of rocks and soils may be used
- Define the terms erosion and weathering
- Determine how erosion and weathering of rocks and soils occur in various environments
- Analyse the value of rocks and soils as economic resources
- Determine the characteristics of various types of soils

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, given unknown samples from the three types of rocks, observe the samples using magnifying glasses and record the characteristics of each rock sample on a teacher-generated record sheet. Based on the common characteristics noted, formulate a working definition of the term 'rock'. Use a Geography dictionary or textbook to revise their definition, if needed, or use various dictionary/encyclopaedia online to compare definitions of the term 'rocks'.	• Observing; critical thinking; collaborating; using a magnifier; communicating	At least three characteristics of each rock identified; definition formulated
In groups, given known rock samples, observe and record the characteristics. Following this activity, compare these known characteristics with the unknown samples previously received. Classify the rock types as igneous, metamorphic and sedimentary after group discussion.	• Observing; collaborating; critical thinking; communicating	Characteristics of rocks recorded; all unknown rock samples correctly classified
After viewing an online video which explains how each group of rocks form or reading about rocks in texts, in groups, design a rock cycle model, using cut-out pieces of the cycle. To further demonstrate their understanding, modify each cycle to create different versions or create a song/poem or board game which details how rocks form and re-form.	• Critical thinking; collaborating; creating; observing;	At least two versions of the rock cycle created; rock formation process explained

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: Explain the uses of each rock type from class discussion. Conduct online or offline research to identify the categories of rocks found in each parish. Find out how rocks are used in selected parishes in Jamaica. Use a Geological map of Jamaica to support findings. Based on the characteristics of the samples they were given in previous activity; suggest possible uses of each rock type. Do an inventory of their household to see what types of rocks are used in the home and what are their uses. Create a list to show each type of rock and its uses.	• Map reading; observing; critical thinking; communicating	A list showing each rock and at least two uses of each identified.
Read a handout or view a video and complete the following : 1. Outline the natural forces that cause weathering and erosion 2. Based on the rock cycle, explain the effects of weathering and erosion on rocks and soils Given a petri dish (to represent the Earth's surface), a dripper and a cup of water (to represent raindrops), coloured M&Ms (to represent rock particle) and a ruler, conduct an experiment to determine the difference between weathering and erosion. Place the M&M in the petri dish and using the dropper, drip a determined volume of water at intervals on the M&M from a height of 12 cm. Observe what occurs and record the findings. Based on the definitions of weathering and erosion gathered from the reading or video, indicate at what point during the experiment these processes would be occurring. Explain the findings.	• Experimenting; observing; critical thinking; communicating	Points at which weathering and erosion occur identified; explanation of how the erosion and weathering occur given
Observe samples of soil (with all its components) and their associated parent rocks. For example: sand and sandstone. After observation, determine the relationship between the soil and the rock. In groups, formulate a definition for the concept soil. Refine the definition formulated after unscrambling a given definition. Recheck the soil sample to ensure that all the components in the definition unscrambled are contained within.	• Observing; critical thinking; communicating	Definition includes humus/organic matter, air, water, inorganic matter
Given a list of soils, conduct research to determine the types of rocks that may be their parent material	• Researching for information; critical thinking; communicating	At least two rocks identified for each soil type

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: In groups, given three soil samples, conduct experiments to determine the characteristics of the samples. Note the characteristics on a record sheet. **The Squeeze Test to Determine Soil Type** Take a handful of each sample soil type. Moisten each sample with water. Attempt to roll each of the three soil samples into a ball. If the sample holds its shape when rolled into a ball, and when prodded with a finger, still holds its shape, then the sample is clay. If the sample holds its ball shape, but falls apart or crumbles when prodded with a finger, then the sample is silt. If the sample falls apart as soon as the student's hand is opened, then the sample is sand. **The Texture Test to Determine Physical Characteristics** Rub a dry and wet sample of each soil type between the thumb and forefinger. Make notes of the characteristics – sand will appear gritty, while silt and clay will be smooth; clay will feel sticky when wet. **The Percolation Test** Fill three glass jars, one with each sample. Press the soil samples into the glass jars making them as compact as possible. Slowly pour equal amounts of water onto the surface of each of the samples. Measure how quickly the water moves through each of the samples. Write a paragraph describing the porosity of each soil type. **Dry- Sieving** Given a mixed soil sample containing pebbles (small rocks) sand, clay and silt, use sieves of varying mesh-diameters to separate the sample. Following separation, describe the characteristics of each sub-set. **Separation Test** Fill a clear glass jar half way up with a mixed soil sample (sample may be obtained from the school compound). Fill the jar almost to the top with water. Tightly screw the jar lid on and shake the jar's contents for a few minutes. Place the jar on a counter for several hours and allow the contents to settle. Measure the percentage of sand (and possible rocks), clay and silt. Explain the settling pattern of the soil types. Measure the thickness of the sand, silt, and clay layers. a. Thickness of sand deposit ____ b. Thickness of silt deposit ____ a. Thickness of clay deposit ____ b. Thickness of total deposit ____	• Collaborating; experimenting; critical thinking; communicating; observing; measuring; calculating	Tests carried out according to methodology; soil samples identified; calculations completed; characteristics of soil samples identified

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: Calculate the percentage of sand, silt, and clay. a. [clay thickness] / total thickness] = ___ percent clay b. [silt thickness] / total thickness] = ___ percent silt c. [sand thickness] / [total thickness] = ___ percent sand		
In groups, select a plot of land in the school appropriate for a small farm. Conduct soil tests to determine the characteristics of the soils in the area selected. Identify a crop or crops suitable for the soil type found on the plot selected. Plant the crop and monitor its growth. Reap and eat the crop when it matures.	• Researching for information; communicating; critical thinking; collaborating; experimenting	Soil testing done; appropriate crop identified
In groups, research ways in which water is filtered in the natural environment. Set up an experiment using soil and rock (and dyed water) to show how soils naturally filter water in the environment. Record and explain the findings and determine how the process may be refined and used in industry.	• Researching for information; communicating; critical thinking; collaborating; experimenting	At least one way water is filtered in the natural environment identified; findings recorded and explained; one suggestion made on the usefulness of the process

Learning Outcomes

Students will be able to:

- ✔ Write definitions for the terms 'rock' and 'soil'
- ✔ Use a checklist to classify rocks covering the earth's surface as igneous, metamorphic and sedimentary
- ✔ Explain how rocks and soils form and the characteristics of each type
- ✔ Describe the characteristics of each rock type
- ✔ Identify rock types covering Jamaica as well as specifically within parishes
- ✔ Read a Geology Map
- ✔ Explain the causes of erosion of these rock types and the resulting product of erosion
- ✔ Identify soils suitable for agricultural production

Points to Note

- Rock samples should be very distinct at this level. For example, the sample of sedimentary rock obtained should have visible fossils.
- Use of Google Earth software to see the places where some rock types occur in Jamaica. This will also give some indication of the economic uses of the rocks.
- The colour of a rock does not necessarily indicate its type. Ensure that samples are observed carefully before they are used in class.
- Rock samples should be collected locally, but samples which are not found in Jamaica, for example, pumice, should be made available.
- Ensure students are not simply replicating the rock cycle model shown in textbooks. They should demonstrate understanding by being able to modify the cycle in at least two ways.
- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

Students should be reminded to:

- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials and encourage others to do so
- Follow guidelines to promote healthy use of ICT tools

Extended Learning

Collect rock samples from a river channel and classify each into the three rock types - igneous, sedimentary or metamorphic.

Plant a selected crop on different mixtures of soils (crops may be planted in containers – each with a particular soil mixture). Note the differences in growth patterns and yields of the plants in each of the soil types. Determine the best soil types for the crop selected.

RESOURCES

Computer; Geology Map; Glass Jar; Internet; Magnifier; Multimedia Projector; Record Sheet; Rock Kit; Sieves; Soil Samples; Videos
http://www.doctordirt.org/teachingresources/soilfilter

KEY VOCABULARY

Basalt; Cementation; Chalk; Clay; Compaction; Cooling; Crystals; Erosion; Fossils; Geology; Grains; Granite; Heating; Igneous Rock; Lava; Layers; Limestone; Loam; Magma; Marble; Metamorphic Rock; Pressure; Pumice; Rock Colour; Rock Hardness; Rock Texture; Sand; Sedimentary Rock; Sediments; Weathering

LINKS TO OTHER SUBJECTS

Agricultural Science; English Language; Chemistry; Mathematics; Social Studies; Visual Arts

About the Unit

Field Work and Investigation 1

In this Unit, students will be introduced to field investigations and data gathering techniques. They will come to understand how fieldwork supports the content learnt in the classrooms. The importance of primary and secondary sources of data will be discussed. Students will understand how to write a simple report to explain the findings of fieldwork conducted.

RANGE OF CONTENT

Knowledge Students should acquire information and develop an understanding of:

- Examples of human and physical environmental phenomena and processes relating to Jamaica and the rest of the World
- How physical environmental phenomena interact and the effects of such interaction
- Key concepts of location, spatial distribution and interaction, interrelationship and pattern
- The practical aspects of the above as they relate to the learner's environment

Skills Students should have the opportunity to develop and practise the following skills:

- Using and interpreting a variety of information sources for example photographs, diagrams and textual sources.
- Presenting and communicating information in a variety of ways including diagrams and models.
- Selecting and using of a variety of modes of enquiry and the proper use of equipment and techniques
- Distinguishing facts from opinions, proving simple hypotheses, and suggesting sensible solutions to problems.
- Social skills (for example, working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)

Attitude Students should develop:

- Positive attitudes towards themselves, others and their environment
- Self-confidence, self-esteem and a simple understanding of some of their perceptions
- Appreciation of social, cultural and environmental diversity

GUIDANCE TO THE TEACHER

- A field guide must always be provided before fieldwork is carried out. The guide should provide some information on the study area, including a map pinpointing the study area. The guide should outline the methodologies being used, including diagrams and photographs to show how various types of data are collected. The field guide must also have tables to be filled in and the research questions to be answered.
- The field study should ideally be based on a topic that has been taught in the year or experiments done to support the teaching and learning activities. This will ensure students are familiar with the basic concepts and terminology that will be used during the study.
- The study should utilise grade–level appropriate geographical methodology, be scientifically sound and culminate with a short-written report.

Prior Learning

Check that students can:

- Understand that there are various types of rocks and that each has some use to human beings
- Distinguish between primary and secondary sources of information

FIELD WORK AND INVESTIGATION 1

ATTAINMENT TARGET(S):
Apply geographical knowledge and skills in understanding and solving real world problems.

Standard(s): Students should develop problem-solving, decision-making and inquiry skills through identifying problems; formulating hypotheses; planning investigations; recording; interpreting and analysing data; communicating results and drawing conclusions.

Theme: Geographical Investigation, Methods and Project Design

OBJECTIVES

Students should be able to:

- Define the concept of fieldwork
- Identify the purposes of carrying out fieldwork
- Outline the general steps in carrying out fieldwork
- Use simple fieldwork techniques to gather and record data on a selected problem
- Record primary data correctly
- Identify the types of secondary information that would be obtained from maps, textual and online sources to support the primary data collected
- Present information gathered in written project format
- Draw conclusion about study area/problem
- Create a simple bibliography using a given template
- Demonstrate ethical behaviours when conducting research
- Ask precise questions, listen attentively to answers and make accurate recordings

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
Derive a meaning of the term fieldwork based on their previous knowledge of the terms "field" and "work". Following class discussion, use a jumbled or scrambled statement to arrive at a clear definition for the term 'fieldwork'.	• Critical thinking; communicating; collaborating	Definition of fieldwork formulated
In groups, engage in discussion to arrive at the purpose of fieldwork.	• Communicating; critical thinking; collaborating	At least three reasons for conducting fieldwork identified
In groups, given a problem to solve or an issue to study, discuss the steps they would use to collect data. Create a list of reasons for each step. Steps include: 1. Determine the topic for study 2. Conduct background research –create Reference List or Bibliography 3. Select location for study 4. Carry out reconnaissance/ preliminary site visit 5. Identify and discuss simple fieldwork techniques that can be used: Observation, field sketches, field notes, photographs 6. Design field guide 7. Gather equipment needed 8. Plan and embark on trip 9. Write report	• Collaborating; critical thinking; researching for information; creating/ designing	Steps to collect data outlined in logical sequence

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, discuss secondary sources and types of information that can be obtained from them. Give reasons for using secondary sources. Write a simple bibliography using a given template.	• Collaborating; critical thinking; creating; communicating	Bibliography written using specific format
In groups, given a problem or a question, carry out a field study (based on topics already learnt) using appropriate but simple fieldwork techniques. It is recommended that focus is placed on Human Geography topics, such as migration, where students can design: • Simple questionnaires with close-ended questions • Using simple random sampling (drawing names or numbers assigned to each member of the population from a bag) • Simple systematic sampling and systematic random sampling • Flow Line Maps • Bar graphs • Interpret photographs showing changes due to population growth or decline	• Collaborating; critical thinking; creating/ designing; conducting fieldwork; researching for information; communicating	Data on selected problem accurately gathered using appropriate methodology
In groups, present information using multimedia presentations and/or in written and tabular form, and draw conclusions based on the data gathered	• Critical thinking; collaborating; photograph interpretation; data analysis	Presentation of data meets pre-determined criteria

Learning Outcomes

Students will be able to:

- ✔ Define the term 'fieldwork'
- ✔ Outline the purpose of fieldwork
- ✔ Use geographical terms and concepts correctly
- ✔ Collect data using appropriate geographical methodology
- ✔ Present information using appropriate graphical methods
- ✔ Create multimedia presentations

Points to Note

- Field sites that are in other Caribbean countries may be accessed by the use of internet through Skype or Google Earth.
- Fieldwork that takes students outside should be carefully planned as most environments present some risk. Instructions should be made available as to how to keep safe.
- The requisite permissions should be sought before students are taken off the school compound for field trips.
- If field studies involve the use of questionnaires, the questions should be vetted by the teacher to ensure they are properly structured and relevant to the study.
- Keep the style used for a Bibliography consistent. The style utilised by the Caribbean Examination Council for Geography may be used.
- Flow Maps showing internal migration patterns may be created from data gathered.
- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

Students should be reminded to:

- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials and encourage others to do so
- Follow guidelines to promote healthy use of ICT tools

Extended Learning

Conduct research on other field techniques or methods that could be used to gather information on the selected topic.

RESOURCES

Calculator; Camera; Computer; Dictionary; Graph Sheets; Internet; Maps of Jamaica; Measuring Tape; Multimedia Projector; Photographs; Ruler; Speakers; Text books; Videos; World Map

http://www.geogspace.edu.au/support-units/fieldwork/fi-overview.html

KEY VOCABULARY

Analysis; Bibliography; Equipment; Field Guide; Field Notes; Field Sketches; Field Trip; Field Work; Methodology; Photographs; Reconnaissance; Report; Site Visit

LINKS TO OTHER SUBJECTS

English Language; Information Technology; Mathematics; Social Studies

GRADE 7

GEOGRAPHY

TERM 3 UNITS

TERM 1

Unit 1: 2 weeks
Introduction to Geography

Definition of Geography
Branches and Sub-branches of Geography
The Five Themes of Geography
Statistical Diagrams – Flow Charts and Tables

Unit 2: 2 Weeks
Planetary Science

Components of the Solar System
Comets, Meteors and Asteroids

Unit 3: 5 weeks
Introduction to Map Reading and Photograph Interpretation 1

Features of Maps, Photographs and Plans
Types of Maps, Photographs and Plans
Importance of Maps, Photographs and Plans
Simple Map Symbols
Simple Map and Photograph Interpretation
Direction, Bearings and Straight Line Distance
Latitude and Longitude – Location
Interpreting Simple Contour Patterns

Unit 4: 3 weeks
Jamaica: Population, Migration and Settlement

Population Size and Distribution in Jamaica
Migration Types
Migration in Jamaica
Settlement Types in Jamaica
Simple Dot Maps and Flow Line Maps
Statistical Diagrams – Simple Bar Graphs

TERM 2

Unit 1: 4 weeks
Weather and the Hydrological Cycle

Definition of Weather
Weather Elements and Instruments
Weather Symbols/Simple Weather Maps
The Hydrological/Water Cycle

Unit 2: 2 weeks
Case Studies: Extreme Weather

Define the Concept 'Extreme Weather'
Case Study of a Hurricane, Flood or Drought in the Caribbean: Preparation and Effects
Tracking Storms and Hurricanes
Global Warming and Extreme Weather Systems

Unit 3: 3 weeks
Introduction to Rocks and Soils

Definition of Rocks and Soils
Formation of Rocks and Soils
Rock Types in Jamaica
Uses of Rocks
Soil Types in Jamaica
Uses of Soils
Weathering and Erosion
Simple Geology Maps

Unit 4: 3 weeks
Fieldwork and Investigation 1

Simple Fieldwork Techniques
Conducting Fieldwork
Drawing Conclusions
Ethics in Research

TERM 3

Unit 1: 2 weeks
Resources and Primary Economic Activities

Definition of Resources
Types of Resources used in Primary Economic Activities
Types of Primary Economic Activities in Jamaica
Statistical Diagrams – Pie Charts

Unit 2: 4 weeks
Jamaica: Agriculture

Types of Resources used in Agriculture
Location of Agriculture in Jamaica
Types and Characteristics of Agriculture in Jamaica
Deforestation in Jamaica
Deforestation and Global Warming
Agricultural Sustainability
Economic and Land – Use Maps

Unit 3: 4 weeks
Management of Food in Jamaica: Food Safety and Security

Food Production and Distribution – Food Safety and Security
Impact of Climate Change on Agriculture
Changes in Technology in Agriculture

About the Unit

Resources and Primary Economic Activities

In this Unit, students will learn about the types of resources that are available in Jamaica and how resources may be broadly classified. Primary economic activities will be researched and an understanding of Jamaica's dependence on such activities examined. Appropriate statistical diagrams will be utilised to represent relevant data obtained to support the teaching of the Unit.

RANGE OF CONTENT

Knowledge Students should acquire information and develop an understanding of:
- Examples of physical environmental phenomena and processes relating to Jamaica and the rest of the World
- Key concepts of location, spatial distribution and interaction, interrelationship and pattern

Skills Students should have the opportunity to develop and practise the following skills:
- Using and interpreting a variety of information sources for example statistics, graphs and maps
- Presenting and communicating information in a variety of ways including diagrams and models
- Social skills (for example, working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)

Attitude Students should develop:
- Willingness to perceive and evaluate natural and cultural phenomena
- A responsible attitude towards the exploitation and conservation of resources
- Appreciation of social, cultural and environmental diversity

GUIDANCE TO THE TEACHER

- Local resources that the students are familiar with should be used in the lessons for this introductory Unit.
- Data on types of economic activities that contribute to Jamaica's economy should be obtained for The Statistical Institute of Jamaica (STATIN).
- Ensure that the linkages between industries, including those which exist at the community level, are established.

Prior Learning

Check that students can:

- Define simply the term 'resource'
- Identify various economic activities carried out in Jamaica

RESOURCES AND PRIMARY ECONOMIC ACTIVITIES

ATTAINMENT TARGET(S):

Gain knowledge and understanding of the physical and human processes and forces that shape the patterns of the Earth's surface and influence the distribution of people.

Standard(s): Students should acquire knowledge of different places on Earth and in the Solar System and an understanding of the spatial distribution of processes occurring within the Earth, on the Earth's surface, within the atmosphere and in the Solar System. They should also recognise that human and natural environments of the Earth consist of systems that are interdependent and understand the processes and forces that shape the patterns of the Earth's surface. They should understand the environment in which they live but also appreciate the diversity of other habitats and cultures globally.

Theme: The Human Habitat: Processes and Change

OBJECTIVES

Students should be able to:

- Formulate a definition for the term 'resource'
- Identify at least four uses of selected resources
- Classify resources found in Jamaica as human or natural
- Categorise natural resources as renewable or non-renewable
- Identify resources in their immediate environment as renewable or non-renewable
- Locate various types of natural resources on a map of Jamaica
- Give examples of human resources
- Recognise that human and natural resources have economic value
- Formulate a definition of the concept of economic activity
- Categorise economic activities as primary, secondary and tertiary
- Identify the types of resources used in primary economic activities
- Graphically represent the contribution of the various types of primary economic activities to Jamaica's economy
- Appreciate the importance of physical resources in their daily lives

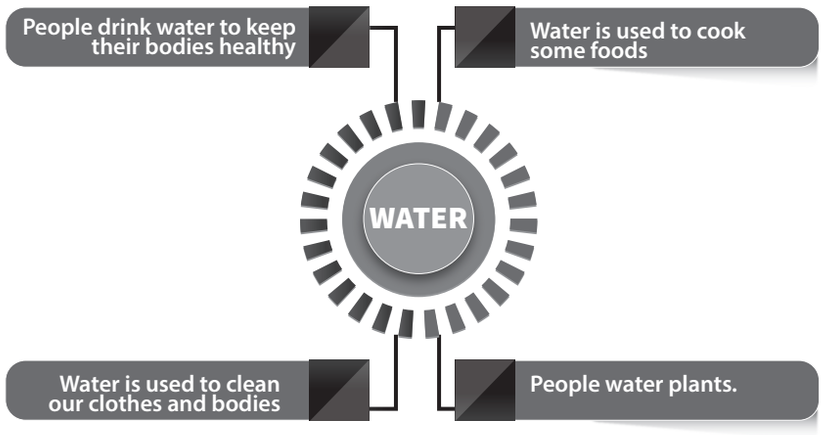
ICT ATTAINMENT TARGETS:

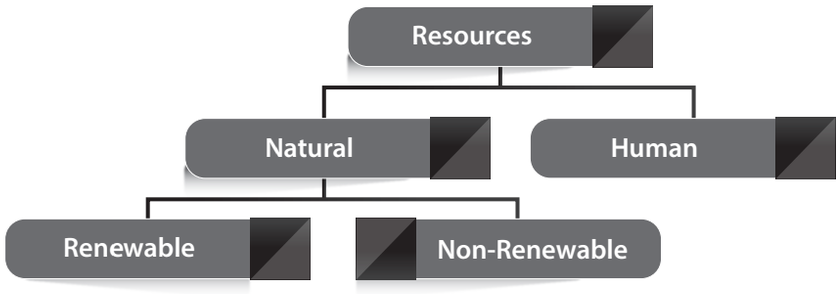
COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: In groups, be given the following items: cup of water, bag of air (students should focus on what is in the bag and not the bag itself), tray of soil, a rock, an edible plant they know, photograph of an animal, and photographs of institutions and humans carrying out various types of work. These items will be observed. Discuss and record at least four possible uses of the various items given.  	• Photograph interpretation; communicating; creating; collaborating; critical thinking; observing	At least four uses identified for each of the items given; resources classified as natural or human; definition should indicate something that has value and from which a benefit may be derived

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: Classify each item as a human or natural resource. Based on the classification and the uses of each item formulate a definition of the term 'resource' as well as determine why they are considered 'natural' versus 'human'.		
View an online video or do research in textbooks on the natural and human resources in Jamaica. From the video write a list of resources seen and suggest how these resources are being used.	• Observing; communicating; critical thinking	List of resources compiled and their uses identified
In groups, conduct research online or use textbooks to find definitions for the terms 'natural resource' and 'human resource'. The resources identified from the video should be classified into natural or human. Do further research to classify resources according to the following flow chart:  Justify, in no more than two sentences, why they placed each resource into a specific category. In groups, conduct a 'walk though' of the school and/or the community in which they live. As with the activities above, identify resources in the environment that are renewable and non-renewable.	• Communicating; critical thinking; creating; collaborating; researching for information	Classification of resources as human or natural; flow chart completed
In groups, brainstorm the ways the various resources identified can be used to generate revenue for the country. Make a list showing at least four ways each resource can be used to generate revenue.	• Critical thinking; collaborating; communicating	At least four ways each resource may be used to generate income listed

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
In groups, given various scenarios outlining ways a country generates revenue; unscramble a set of words to arrive at a definition of the concept 'economic activity'. Compare their definition to the definitions found in textbooks or online sources. Do further research in textbooks or online to find definitions for primary, secondary and tertiary economic activities.	• Collaboration; critical thinking; communication; researching for information	Definition for economic activity formulated
In groups, from a set of resources given, identify those resources which are used for primary economic activities, secondary economic activities and tertiary economic activities.	• Critical thinking; collaboration; communication	Resources classified – some may be used in more than one type of economic activity

Learning Outcomes

Students will be able to:

- ✔ Write a definition for the term 'resource'
- ✔ Identify uses of resources
- ✔ Classify resources found in Jamaica into groups
- ✔ Locate various types of natural resources on a map of Jamaica
- ✔ Give examples of human resources
- ✔ Recognise that human and natural resources have economic value
- ✔ Formulate a definition of the concept 'economic activity'
- ✔ Categorise economic activities as primary, secondary and tertiary
- ✔ Identify types of resources used in primary economic activities
- ✔ Willingly participate in class activities

Points to Note

- Everything in the environment is a resource as long as it can be used to help people to function effectively.
- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

Students should be reminded to:
- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials
- Follow guidelines to promote healthy use of ICT tools

Extended Learning

Students can identify resources in Jamaica they believe are under-utilised. Suggest ways in which the resources may be used to generate revenue.

RESOURCES

Computer; Multimedia Projector; Photographs; Plastic Bags; Plastic Cups; Rock Samples; Soil Samples; Text books; Videos

KEY VOCABULARY

Economic Activity; Economy; Human Resource; Natural Resource; Non-Renewable; Primary Economic Activity; Renewable; Resources; Secondary Economic Activity; Tertiary Economic Activity

LINKS TO OTHER SUBJECTS

English Language; Information Technology; Mathematics; Social Studies

About the Unit

Jamaica: Agriculture

In this Unit, students will learn about agricultural production in Jamaica. They will investigate the types of resources used in agriculture and the conflicts that exist with the use of those resources. Students will also explore ways in which agriculture can be made sustainable. These activities in the Unit will be supported by the use of economic and land use maps.

RANGE OF CONTENT

Knowledge Students should acquire information and develop an understanding of:
- Examples of physical environmental phenomena and processes relating to Jamaica and the rest of the World
- Key concepts of location, spatial distribution and interaction, interrelationship and pattern

Skills Students should have the opportunity to develop and practise the following skills:
- Using and interpreting a variety of information sources for example statistics, photographs, graphs and maps
- Presenting and communicating information in a variety of ways, including diagrams and models
- Social skills (for example, working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)
- Selecting and using of a variety of modes of enquiry, both geographical and general in nature
- Using proper equipment and technique in field investigations
- Synthesising and evaluating information to make informed judgements and suggesting adequate solutions to problems

Attitude Students should develop:
- A responsible attitude towards the exploitation and conservation of resources
- Appreciation of social, cultural and environmental diversity

GUIDANCE TO THE TEACHER

- Use relevant, local examples of agricultural production to support these lessons.
- Where possible, simple field trips should be planned to nearby farms so students may observe the farming practices which are used in Jamaica.

Prior Learning

Check that students can:

- Recall the definition of resources
- Identify conventional map symbols for types of agricultural production
- Recall information about container gardening

JAMAICA: AGRICULTURE

ATTAINMENT TARGET(S):
Gain knowledge and understanding of the physical and human processes and forces that shape the patterns of the Earth's surface and influence the distribution of people.

Standard(s): Students should acquire knowledge of different places on Earth and in the Solar System and an understanding of the spatial distribution of processes occurring within the Earth, on the Earth's surface, within the atmosphere and in the Solar System. They should also recognise that human and natural environments of the Earth consist of systems that are interdependent and understand the processes and forces that shape the patterns of the Earth's surface. They should understand the environment in which they live but also appreciate the diversity of other habitats and cultures globally.

Theme: The Human Habitat: Processes and Change

OBJECTIVES

Students should be able to:

- Recall the types of resources needed for agriculture – human and natural
- Formulate a definition for the term 'agriculture'
- Outline the characteristics of various types of agricultural activity in Jamaica
- Differentiate among commercial arable farming, peasant farming, mixed farming, mixed cropping, market gardening, commercial pastoral farming
- Develop a logical argument to explain the location of various types of agricultural activity
- Identify on a blank map the major agricultural areas in Jamaica
- Justify the pattern of major types of crops cultivated in Jamaica
- Suggest reasons why particular types of crops are planted in the major agricultural areas in Jamaica
- Make a list of activities practised by farmers that may encourage the removal of trees in Jamaica
- Formulate a definition of the term 'deforestation'
- Explain how plants may contribute to an increase or reduction in atmospheric temperatures
- Formulate a simple definition for the term 'sustainable'
- Compare two farms which plant the same crop, but use different techniques, to determine which is more sustainable
- Discuss innovative techniques that may be used to increase production of crops in Jamaica
- Propose methods farmers may use to make agriculture sustainable

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria

Students will:

In groups, examine a set of pictures, each showing a type of agriculture. Make lists of the activities being carried out as well as the items each farm will produce. Unscramble a set of given words to formulate a simple definition for agriculture/farming. Use the photographs given to write a paragraph outlining the characteristics of each type of farm. Present the characteristics of each farm on a table.

Characteristics of Various Types of Agriculture

Type of Farm	Characteristics	Location
Peasant Farming	Small plot of land	Hillside
	Simple equipment used – e.g. Machete	

Information from the paragraph and table will be used to discuss the similarities and differences noted among the types of farming.

- Observing; photograph interpretation; critical thinking; communicating; collaborating

List of the activities on each farm created; agricultural produce identified; definition formulated; at least two characteristics of each type of farm identified; similarities and differences between each farm identified

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After consulting atlases, in groups, use conventional map symbols to show where specific crops are planted on a blank map of Jamaica. Use the map to write a paragraph describing the general pattern of crop cultivation noted in Jamaica.

- Map reading; creating; collaborating; critical thinking; communicating

Conventional symbols for specific crops placed in correct locations; pattern of crop location and spread described

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: Given two additional maps – one showing the temperature variations and the other showing the rainfall pattern across Jamaica - complete a checklist which will indicate the temperature and rainfall pattern of each parish. Discuss the association of the temperature and rainfall pattern of each parish with major crops produced in that parish. Write a paragraph explaining why specific crops are grown in specific places.	• Map reading; observing; critical thinking; communicating	Crop location based on temperature and moisture needs
After viewing a video, or embarking on a field trip to a farming community, or to the school farm, make a list of all the activities practised by farmers that lead to the cutting down of trees. Determine why these activities are necessary and suggest alternatives that could reduce deforestation. Examples: Clearing land, yam sticks, for firewood/coal	• Observing; critical thinking; communicating	List of at least five activities compiled; feasible alternatives suggested for each activity that lead to the loss of trees
In groups, discuss how farmers may contribute to or prevent deforestation given possible scenarios such as: There are thirty trees in the forest. Farmer needs to cut down one tree per year for yam sticks. He will replant the tree he cuts down, but it will take twenty five years to reach maturity so he can use it again. What will happen to the forest and when will it be completely be cut down? Unscramble a given set of words to arrive at a definition of deforestation.	• Observing; critical thinking; collaborating; communicating	At least 3 ways farmers contribute to or prevent deforestation described; definition for deforestation
In groups, using photographs, compare two situations: 1. A farmer who farms on a hillside and uses techniques such as terracing; irrigation ditches, fallow periods and planting tree crops to hold the soil in place. 2. A farmer who farms on the hillside but has removed the vegetation cover, does not practise terracing, and plants on the land all year. Outline what will happen over time to the soil and soil nutrients on each farm. Determine which farm will be able to produce food for a longer period of time. Offer a justification for the answers given.	• Photograph interpretation; critical thinking; creating; collaborating	At least three effects of each type of farm activity on the environment described; effects on the soil given; justification reasonable

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: Following the activity, formulate a definition of the term 'sustainable'. Compare this definition to definitions found in textbooks or online sources. Refine definition as necessary.	• Critical thinking; communicating	Definition of sustainable formulated

Learning Outcomes

Students will be able to:

- ✔ Determine the human and natural resources needed for agriculture
- ✔ Write a definition for the terms 'agriculture', 'sustainable' and 'deforestation'
- ✔ List the characteristics of selected types of agricultural activity in Jamaica
- ✔ Identify similarities and differences among commercial arable farming, peasant farming, mixed farming, mixed cropping, market gardening, commercial pastoral farming
- ✔ Explain the location of selected types of agricultural activity in Jamaica
- ✔ Map the location of the major agricultural areas in Jamaica
- ✔ Describe the pattern of types of crops cultivated in the major agricultural areas in Jamaica
- ✔ Give reasons for the types of crops that are planted in the major agricultural areas in Jamaica
- ✔ List the activities practised by farmers that cause deforestation
- ✔ Make informed judgements

Points to Note

- Agriculture employs a large percentage of the labour force in Jamaica and, therefore, still remains an important economic activity.
- The requisite permissions should be sought before students are taken off the school compound for field trips.
- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

Students should be reminded to:

- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials and encourage others to do so
- Follow guidelines to promote healthy use of ICT tools

Extended Learning

Conduct research to explore other ways crops are used besides for human consumption.

Conduct research to determine how a particular crop is grown or how a selected animal is reared. Suggest ways the methods used to produce these crops or animals may be made more efficient or propose the use of new sustainable methods.

RESOURCES

Cartridge Paper; Computer; Economic Land Use Maps; Multimedia Projector; Photographs; Videos
https://www.mona.uwi.edu/physics/csgm/climate-resources
https://www.climate.gov/teaching

KEY VOCABULARY

Agriculture; Commercial Arable Farming; Crop Rotation; Deforestation; Environment; Fertilizer; Market Gardening; Mixed Cropping; Mixed Farming; Mulching; Peasant Farming; Sustainability; Terracing

LINKS TO OTHER SUBJECTS

Agricultural Science; English Language; Biology; Social Studies; Visual Arts

About the Unit

Management of Food in Jamaica: Food Safety and Security

In this Unit, students will continue the study of agriculture to examine how food produced in Jamaica is managed. Students will argue the benefits of eating locally produced food, and propose ways of ensuring food is safe for consumption as well as ways to make Jamaica food secure. The impact of climate change on agricultural production will be examined and solutions to the forecasted problems designed.

RANGE OF CONTENT

Knowledge Students should acquire information and develop an understanding of:
- Examples of physical environmental phenomena and processes relating to Jamaica and the rest of the World
- How physical, social and economic phenomena interact
- Key concepts of location, spatial distribution and interaction, interrelationship, pattern and change over time

Skills Students should have the opportunity to develop and practise the following skills:
- Using and interpreting a variety of information sources for example statistics, photographs, graphs and maps
- Presenting and communicating information in a variety of ways including diagrams and models
- Social skills (for example, working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)

Attitude Students should develop:
- Willingness to perceive and evaluate natural phenomena
- Sensitivity towards the interplay of conflicting needs involved in environmental planning
- A responsible attitude towards the exploitation and conservation of resources
- Readiness for personal commitment and involvement

GUIDANCE TO THE TEACHER

- The level of food security in Jamaica should be linked to the various countries from which imports originate.

Prior Learning

Check that students can:

- Identify some of the countries which export food to Jamaica
- List agricultural products which are sometimes used to make animal feed or fuel

MANAGEMENT OF FOOD IN JAMAICA: FOOD SAFETY AND SECURITY

ATTAINMENT TARGET(S):
Recognise the interdependent relationship between humans and the natural environment.

Standard(s): Students should develop an understanding of the environment as a system of interdependent components affected by human activity and natural phenomena. They should also recognise the significance of using past and present events to make predictions for the future and apply sustainable practices in preserving the environment for future generations.

Theme: Environmental Awareness, Change and Sustainability

OBJECTIVES

Students should be able to:

- Investigate the benefits of 'growing what you eat and eating what you grow'
- Discuss measures used by the Government to make food safe for consumption in Jamaica
- Determine the place of origin of the food they consume
- Formulate a definition for the terms 'food security' and 'food safety'
- Construct pie charts to show the country of origin of major food items consumed in Jamaica and use the pie chart to discuss implications for Jamaica's food security and safety
- Appreciate why food safety and security are important
- Design a method to increase the production of selected crops in Jamaica
- Propose ways to increase food security and safety in Jamaica
- Implement a plan to make the home or school community more food secure
- Simply explain the concepts 'climate change' and 'global warming'
- Using Jamaica as a case study, cite evidence to prove that climate change is occurring in the Caribbean
- Determine how changes in climate may affect weather patterns in Jamaica
- Conduct a case study of a selected crop to investigate how climate change will affect agriculture
- Outline methods which may be used to combat the effects of climate change on agriculture

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: In groups, read articles centred around the theme 'eat what you grow and grow what you eat' and extract the following information: 1. Which countries adopted the strategy? 2. What are the benefits? 3. What are the challenges?	• Critical thinking; collaborating; communicating	At least two countries identified; two benefits and two challenges listed
Conduct research at the Rural Agricultural Development Authority (RADA) or the Bureau of Standards or at a large commercial farm to obtain information on safety standards used for agricultural produce. Write a short report of the findings.	• Investigating; critical thinking; communicating	At least three safety standards described
In groups, select a parish in Jamaica and prepare a food basket with food items produced in that parish. Using the basket prepared, determine: 1. If the foods represented are sufficient for a balanced diet 2. If the foods are produced in amounts to feed the population of the parish in which it is produced as well as people in other parishes 3. The challenges to food security and safety in the selected parish Based on the answers, determine if the parish is food secure. Label food secure parishes on a map. In guided class discussion, determine if Jamaica is food secure. Formulate a definition of food security	• Researching for information; critical thinking; map reading; collaborating; communicating	Food basket contained major food items produced in each parish; definition of food security formulated

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: After viewing online videos focussing on climate change or reading comics on the topic, write a definition of the terms 'climate change' and 'global warming'. Record on a worksheet provided any evidence shown that indicate human-induced global warming is occurring as well as the impact it will have globally, especially on farming. Explore where coffee is grown in Jamaica and determine the impact climate change will have on its location.	• Observing; collaborating; critical thinking; communicating	Definitions correct; at least four indicators of climate change identified
Design simple methods for increasing food availability. Methods should either: 1. Increase crop yield or 2. Decrease crop loss Methods should be environmentally friendly. After watching short online videos, identify ways used globally to increase crop production and decrease crop loss. Indicate which of the methods noted would be suitable for Jamaican farms. Examine a photo gallery of agricultural change over a specified time. Identify the changes noted in the use of technology and explain how these changes have resulted in higher yields.	• Critical thinking; collaborating; creating; observing;	Methods proposed feasible; at least five methods to increase crop yields described; evolution of agricultural technology described and accurately related to increasing yields

Learning Outcomes

Students will be able to:

- ✔ Write a list of benefits of 'growing what you eat and eating what you grow'
- ✔ Identify measures used by the Government to make food safe in Jamaica
- ✔ Make a list of the countries which export food to Jamaica
- ✔ Define the terms 'food security' and 'food safety'
- ✔ Design a method to increase the production of selected crops in Jamaica
- ✔ Propose ways to ensure food security and safety in Jamaica
- ✔ Define the terms 'climate change' and 'global warming'
- ✔ Cite evidence to prove that climate change is occurring
- ✔ Explain how climate change will affect weather patterns in Jamaica
- ✔ Conduct a case study of a selected crop to investigate how climate change will affect agriculture
- ✔ Identify ways to combat the effects of climate change on agriculture

Points to Note

- Food security includes food safety
- Food supply is sometimes lessened because of the high levels of spoilage that occurs between point of production (farm) and the market
- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

Students should be reminded to:

- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials and encourage others to do so
- Follow guidelines to promote healthy use of ICT tools

Extended Learning

Examine the food bought at home for a week and make a record of the country of origin. If Jamaica should stop importing all food products, how would you and your family be affected by the change? Create a chart to represent findings.

RESOURCES

Climate Data – Meteorological Services of Jamaica; Photographs; Videos

KEY VOCABULARY

Agriculture; Agricultural Technology; Climate Change; Food Safety; Food Security; Glacier; Global Warming; Sea Level Rise; Spoilage; Standards; Temperature

LINKS TO OTHER SUBJECTS

Agricultural Science; English Language; Biology; Chemistry; Mathematics; Social Studies; Visual Arts

GRADE 8

GEOGRAPHY

TERM 1 UNITS

TERM 1

Unit 1: 5 Weeks

Interpreting Maps and Photographs 2

Map Symbols
Direction and Bearings
Measuring Curved Distances
Four-Figure Grid References
Reproducing Map Sections

Representing Height - Simple Cross-Sections

Unit 2: 2 Weeks
Movements of the Earth

Rotation and Revolution
Latitude and Longitude - Calculating Time
Eclipses

Evidence of the Earth's Shape

Unit 3 : 3 Weeks
Caribbean: Population, Migration and Settlement

Population Size and Distribution
Regional Migration
Settlement Patterns
Mapping Settlement Patterns
Dot Maps and Flow Line Maps
Statistical Diagrams - Proportional Circles

Unit 4: 2 Weeks
Pollution, Global Warming and Disease Spread

Types of Pollution
Impact of Pollution
Origin and Spread of Diseases
Influence of Climate Change
Green Technology

TERM 2

Unit 1: 4 Weeks
Weather, Climate and Vegetation

Types of Rainfall
Vegetation in Tropical Marine Climate
Statistical Diagrams - Line and Bar Graphs

Unit 2: 2 Weeks
Rivers, Groundwater and Sustainable Use of Water

Major Rivers in Jamaica
Importance of Rivers
Sustainable Use of Water in Jamaica
Influence of Climate Change

Unit 3: 3 Weeks
Limestone Rocks

Characteristics of Limestone Rocks
Weathering of Limestone
Limestone Features
Value of Limestone Landscapes
Geological Maps

Unit 4: 3 Weeks
Fieldwork and Investigation 2

Simple Fieldwork Techniques
Conducting Fieldwork
Drawing Conclusions
Ethics in Research

TERM 3

Unit 1: 3 Weeks
Resources and Secondary Economic Activities

Definition of Resources
Types of Resources Used in Secondary Economic Activities
Types of Secondary Economic Activities in Jamaica

Unit 2: 4 Weeks
Jamaica: Agro-Processing

Importance of Agro-Processing
Methods Used to Process Food
Economic and Land - Use Maps
Statistical Diagrams - Pie Charts

Unit 3: 3 Weeks
Climate Change: Causes, Effects and Conflicts in Small Island Developing States

Conflicts in the Use of Forest Resources
Impact of Manufacturing and Refining Industries
Reducing Jamaica's Carbon Footprints
Indicators of a Warming World
Influence of Climate Change on Jamaica's Resources

About the Unit

Interpreting Maps and Photographs 2

In this Unit, the teacher must seek to develop the learners' map reading skills using the appropriate content while introducing new skills. Greater focus will be placed on a wider range of conventional symbols used in the Legend/Key of maps. Activities will become more complex as the learners' skill level is increased. Learners will be introduced to four-figure grid referencing – a means of identifying location. In addition, learners will be introduced to the skill of reproducing map sections to scale as well as learning how contour lines are used to show landform features.

RANGE OF CONTENT

Knowledge Students should acquire information and develop an understanding of:
- Human and physical environmental phenomena and processes relating to Jamaica and other places

Skills Students should have the opportunity to develop and practise the following skills:
- Using and interpreting a variety of information sources, for example, maps and photographs
- Presenting and communicating information in a variety of ways including sketch maps and photographs
- Social skills (for example, working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)

Attitude Students should develop:
- Positive attitudes towards themselves, others and their environment
- Self-confidence, self-esteem and a simple understanding of some of their perceptions
- Willingness to perceive and evaluate natural phenomena

GUIDANCE TO THE TEACHER

- Give students enough assistance to identify and correct errors and enough opportunities to practise skills across a range of activities, sufficient to obtain mastery.
- It is important that map reading and interpretation combines reading and mathematics skills to help build spatial sense and visual literacy.
- Where possible ensure that maps are reproduced in colour.
- The accurate use of the protractor to determine bearing may pose a problem for some students. The zero on the protractor is always to be placed at North on the Compass Rose.

Prior Learning

Check that students can:

- Locate places on a map using lines of latitude and longitude
- Construct and use a four point Compass Rose to find direction
- Use a protractor to find angular bearing

INTERPRETING MAPS AND PHOTOGRAPHS 2

ATTAINMENT TARGET(S):

Appreciate the importance of maps, photographs and statistical diagrams to the study of Geography and their importance in everyday life.

Standard(s): Students should develop map reading and interpretation skills and the ability to interpret a range of photographs for geographical information. In addition, be able to use mathematical reasoning as a tool for problem–solving and as a means of extracting information from various sources representing geographical data.

Theme: : Spatial Thinking and Analysis: Maps, Photographs and Statistical Diagrams.

OBJECTIVES

Students should be able to:

- Formulate a definition for the terms 'scale', 'height', 'contour', 'vertical interval'
- Recall the definitions for 'angular bearing' and 'direction'
- Use the Cardinal and Primary Inter-cardinal Points to find direction on a map from one place to another
- Use a protractor to calculate angular bearing on a map from one point from another
- Explain why angular bearing is important
- Use the linear scale to measure straight line and simple curved distances between two places.
- Express the scale of a map as a ratio or a statement
- Identify Eastings and Northings on maps
- Find locations using four figure grid references
- Draw simple maps to scale
- Reproduce map sections from a base map
- Identify how height is represented on maps
- Identify simple landform features from contours
- Associate the landforms shown on maps to features shown in photographs, satellite imagery and in the natural environments
- Draw and annotate simple cross-sections from contour lines

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, use a magnetic compass to find North or determine the Cardinal points using the position of the overhead Sun. Use set of labelled arrows, create an eight point Compass Rose at a selected point on the floor/ground to match the readings on the magnetic compass. Find the direction of various things in the surrounding environment. To precisely determine the direction, run a piece to string from the centre of the Compass Rose to the object for which they want to find the direction. Record direction for each object. Create a mnemonic to facilitate easy recollection of the position of each point on the eight point Compass Rose.	• Using a magnetic compass; constructing and using a Compass Rose; observing; communicating; creating; finding direction; collaborating	Compass Rose constructed with Cardinal and Primary Inter-cardinal points at 90^0 and 45^0, respectively; direction accurately given; mnemonic created
Run a piece of string from the centre of the Compass Rose to another point/feature in the surrounding environment. Given a protractor, place it on the Compass Rose, with the zero on the protractor aligned to the North arrow on the Compass Rose. The centre of the protractor also needs to be aligned to the centre of the Compass Rose. Read and record the value read on the protractor, at the point the string passes through the arc of the protractor.	• Using a protractor; reading a protractor; communicating; collaborating	Protractor used accurately; angular bearing found ($\pm 2^0$)
Individually, given topographic sheets, and a worksheet, transfer the skills of finding direction and bearing to the map. Locate the required points on the map. Accurately draw and label an eight – point Compass Rose using a pencil. Draw from the centre of the Compass Rose a line	• Map reading; finding direction; communicating; drawing; labelling	Eight point Compass Rose accurately drawn and labelled on map; protractor correctly positioned; protractor accurately read; direction and bearing accurate within $\pm 2^0$

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: straight to the second point. Read the direction of the second point from the first point. Use the protractor to find angular bearing.		
Write a short paragraph explaining why angular bearings are used with directions. Students can research careers which require the use of a magnetic compass and the ability to read directions and bearings accurately.	• Critical thinking; researching for information; communicating	At least one accurate reason identified
In groups, examine a Google Maps satellite imagery of the National Stadium in Kingston, Jamaica. Comment on the reduction in size of the 100m track. Measure the length in centimetres of sections of the racing track on the image. Record the findings. Determine the actual length of the track using the scale.	• Map reading; measuring; communicating; observing; recording; collaborating	Distance accurately measured and recorded; actual distance determined using the scale
In groups, measure the actual length and width of the classroom/school buildings. Create an appropriate scale and draw a map of the classroom/ school on Cartridge Paper of the area measured.	• Drawing; critical thinking; using mathematical knowledge and concepts accurately; communicating; collaborating	Buildings accurately measured; features scaled; scale drawn; map drawn to scale
In groups write a short paragraph explaining the purpose of a scale on a map.	• Collaborating; critical thinking; communicating	At least two reasons for the scale given
Given a map with a scale, use string and/or paper to measure straight and curved distances between two points. Using the scale, convert these distances to actual representations. Create a table and record the measurements. *Example:* Map Scale: 1: 50, 000 LOCATION / DISTANCE MEASUREMENT ON MAP / MEASURMENT IN REALITY From Church to School / 5 cm / 2.5 km	• Converting; measuring; critical thinking	Measurements on map accurate; conversions accurately calculated
Play a game of snake and ladder where the teacher has simply labelled the grids. Given a record sheet, record each grid in which they fall during the game. Name the grids using a simple L method with the label on the vertical line written first followed by the label on the horizontal line.	• Finding location; observing; collaborating; communicating	Location accurately recorded in keeping with the **L** method

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, observing a projected simple map with grids, brainstorm to determine how the grids are labelled. Given the labels EASTINGS and NORTHINGS, label the vertical and horizontal lines respectively, giving reasons for the labels. Use the established L method to find four figure grid references.	• Observing; labelling; communicating; critical thinking; collaborating	Vertical lines labelled as Eastings because their values increase in an eastward direction; horizontal lines labelled as Northings because their values increase in a northward direction; four figure grid reference determined by reading the Eastings line first and the Northing line second
In groups, use cartridge paper and tape to create two cones that can stand on their own bases. Cut a circle measuring at least 30 centimetres in diameter from the Cartridge Paper. Cut a sector not more than 1100 from the circle. Fold both sectors to make two cones (one cone should be taller than the other as well as steeper). Write a description of the cones. Wrap strips of string around the cones at regular (vertical) height intervals from the base to the top. Record the height on each strip of string. Make notes of what happens to the length of the string from the base of the cone to the apex. Compare the cones with the strings taped on to a map. Determine what the strings represent and what they are being used for. Use a ruler to measure the height of each cone (Note: if students measure the slant height for each cone the value will be the same. Vertical height will be different). Record the values.	• Measuring; creating; critical thinking; observing; collaborating; communicating	Cone created to specifications given; string placed on cones at regular vertical intervals; strings determined to be contours to signify height; vertical height of cones measured
In groups, remove the strings (still taped at the ends) from the apex to the base of each cone and place flat on a Cartridge Paper, one within the other, from the smallest to the largest. Discuss how the strings still represent the characteristics (height and width) of each cone. Write a description of the strings (contours) from the taller cone verses the strings (contours) from the shorter cone.	• Observing; critical thinking; communicating; collaborating	At least two characteristics of contours included in description– they get closer when the slope is steep and further apart when the slope is gentle; they are spaced evenly when the rise of the slope is consistent
In groups, lay a strip of paper flat on the strings dividing them into two equal parts. Mark on the paper, every point the string touches the paper and label each point with the appropriate height. On a graph sheet, draw a graph and label the vertical axis with height readings representing the vertical interval. Place the strip of paper with markings on the horizontal axis. Plot each height marked on the strip of paper. Connect each plotted point. In groups, discuss how the two dimensional drawing plotted, relates to the original three dimensional cones created.	• Drawing; labelling; critical thinking; collaborating; creating; communicating	Cross-section of each cone accurately drawn and labelled

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
Individually, examine a map, showing very simple landform features using contours. Draw simple cross-sections from the contours representing these features. Examine the Legend/Key of the map to determine other ways height is represented.	• Critical thinking; creating; communicating; map reading and interpretation	Cross-sections accurately represents contour outlines; at least two other ways identified
In groups, match photographs of simple landform features to given contour patterns. Write a description of how the configuration of the contours change based on the type, shape and steepness of the landform being represented.	• Critical thinking; communicating; map reading and interpretation; photograph interpretation	Photographs matched accurately to contour outlines; contour patterns described

Learning Outcomes

Students will be able to:

- ✔ Use the eight point Compass Rose to find direction from one place to another
- ✔ Use a protractor correctly to calculate angular bearing of one point from another
- ✔ Explain why angular bearing is important
- ✔ Use the linear scale to measure straight and simple curved distances between two places
- ✔ Identify Eastings and Northings on maps
- ✔ Find locations using four figure grid references
- ✔ Draw simple maps to scale
- ✔ Use the linear and ratio scale on maps
- ✔ Identify the ways height is represented on maps
- ✔ Identify simple landform features from contours
- ✔ Draw simple cross-sections from contours
- ✔ Explain the uses of contours

Points to Note

- A magnetic compass Application may be downloaded on smart phones for use in class activities.
- Magnetic compasses may not work properly when there is interference from metal objects in close proximity.
- Students may initially confuse grid referencing with reading latitude and longitude (global coordinates). They need practise and patience to master the skill.
- While most students will read the forward bearing, some may read the back bearing from the protractor. If this is done, additional calculation is needed to arrive at the conventional forward bearing.
- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

Students should be reminded to:

- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials and encourage others to do so
- Follow guidelines to promote healthy use of ICT tools

Extended Learning

Use Google Earth software to examine a topographic map of their community. Write a description of the landform features that exist based on the contours on the map. Write a description of the topography of the general area of their community.

Design and create a map of their school. This map should indicate to visitors where to find locations on the school compound they wish to visit. The map should be painted and mounted at the front of the school.

RESOURCES

Calculator; Cartridge paper; Coloured Pencils; Computer; Dictionary; Graph Sheets; Internet; Magnetic Compass; Maps; Multimedia Projector; Pencils; Protractor; Ruler; Speakers; String; Textbooks

KEY VOCABULARY

Absolute Position; Angular Bearing; Apex; Back Bearing; Base Maps; Bearing; Circumference; Compass; Contours; Cross-Section; Direction; Eastings; Grid Reference; Landform; Linear Scale; Northings; Position; Protractor; Ratio Scale; Scale; Slope; Spot Height; Trigonometrical Station; Vertical Interval

LINKS TO OTHER SUBJECTS

English Language; Mathematics; Social Studies; Visual Art

About the Unit

Movements of the Earth

In this Unit, students will be introduced to how the Earth moves in Space. Its two main movements, rotation and revolution, will be examined and their effects on the planet determined. Students will also explore how time is calculated mathematically, and will come to recognise that determination of time zones is sometimes based on political and economic factors. Eclipses are also introduced in this Unit. Students will explore how the Sun, Moon and Earth interact to produce these spectacular shows. The evidence to support the shape of the Earth will also be tested.

RANGE OF CONTENT

Knowledge Students should acquire information and develop an understanding of:
- The characteristics of the Earth and its movements in Space
- The effect of gravitational pull on objects in Space and on each planet
- World Time Zones

Skills Students should have the opportunity to develop and practise the following skills:
- Making models to scale
- Using and interpreting information from a variety of sources, for example, videos, photographs, textual sources (reading and understanding simple geographical terminology)
- Social skills (for example, working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)

Attitude Students should develop:
- Positive attitudes towards themselves, others and their environment
- Self-confidence, self-esteem and a simple understanding of some of their perceptions
- Willingness to perceive and evaluate natural phenomena from a scientific point of view

GUIDANCE TO THE TEACHER

- Allow students to replicate the movements of the Earth using models.
- Be tolerant of students' opinions about the formation of the Earth and other objects in Space.

Prior Learning

Check that students can:

- Locate places using lines of latitude and longitude
- Identify how planets in the Solar System move
- Show how the Earth rotates

MOVEMENTS OF THE EARTH

ATTAINMENT TARGET(S):
Gain knowledge and understanding of the physical and human processes and forces that shape the patterns of the Earth's surface and influence the distribution of people.

Standard(s): Students should acquire knowledge of different places on Earth and in the Solar System and an understanding of the spatial distribution of processes occurring within the Earth, on the Earth's surface, within the atmosphere and in the Solar System. They should also recognise that human and natural environments of the Earth consist of systems that are interdependent and understand the processes and forces that shape the patterns of the Earth's surface. They should understand the environment in which they live but also appreciate the diversity of other habitats and cultures globally.

Theme: The Human Habitat: Processes and Change

OBJECTIVES

Students should be able to:

- Demonstrate the terms 'rotation' and 'revolution'
- Identify objects in Space that rotate and revolve
- Describe the effects of rotation and revolution on the Earth
- Differentiate between the terms day and daylight
- Identify the Equator and Prime Meridian
- Calculate changes in time using lines of longitude
- Explain why the International Date Line is not straight
- Explain the effect of the tilt of the Earth on the length of daylight hours
- Recognise that the tilt of the Earth does not change
- Connect the Earth's tilt and revolution to seasonal changes in atmospheric temperature
- Determine how changes in the length of daylight hours and temperature affect the environment and human activities
- Define the term 'eclipse'
- Differentiate between a solar eclipse and a lunar eclipse
- Appreciate the significance of studying eclipses
- Examine and test the evidence used to support the shape of the Earth

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, view online video regarding rotation and revolution. Complete a given worksheet with information extracted from the video. Use moulding clay to create a model of the Earth with a diameter of at least ten centimetres. Use a paper clip or toothpick to show the axis. Mark the Equator and the Prime and Anti Meridians with coloured pens. Identify Jamaica's location in the Northern Hemisphere. Use flash lights (cell phones) or a lantern to demonstrate the occurrence of day and night. Brainstorm to determine the direction in which the Earth rotates. Online videos of Jamaican weather reports may be played to give clues. These videos should indicate the sunrise and sunset times for Kingston and Negril or Kingston and Montego Bay. Based on the direction of rotation derived from the videos or their own experiences of sunrise and sunset, students will darken the room and begin rotating the globe.	• Observing; creating; communicating; critical thinking	Model created to specification; rotation demonstrated; rotation is conducted from West to East; daylight and night identified
In groups, given a globe, a lantern, and a length of string, create a model to demonstrate revolution. Use the string to create the orbital path along which the Earth will revolve. Keep the angle of tilt constant and record the changes in how the globe is lit at select points along the orbit. Demonstrate the combined effect of rotation and revolution on a selected area at various points in the year. Explore and note the effect of the tilt of the Earth at various points in the year in the Northern and Southern Hemispheres. Note how the length of illumination in the Northern and Southern Hemispheres change at selected points of the orbit. Draw diagrams to show the changes in illumination at selected times of the year. Compare drawings to representations in the textbook or online.	• Observing; collaborating; critical thinking; communicating; drawing	At least two effects of revolution listed; at least one effect due to tilt identified; Illumination in each hemisphere at various points correctly described

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
Watch an online video to gather information on how the tilt and revolution of the Earth cause seasonal changes in temperature. List various ways in which these seasonal changes affect the environment and human activity.	• Observing; collaborating; critical thinking; communicating	At least five effects on the environment and on human activity identified
In groups, examine the globe to determine how many lines of longitude exist. Determine what distance (in degrees) the Earth rotates every hour. Make note that the globe is generally divided equally into twenty four segments, each representing fifteen degrees. Relate these segments to a clock to show changes in time as the Earth rotates. Earth/Globe = 360⁰ One day = 24 hours Rotation every hour = 360⁰/24 hour = 15⁰ per hour	• Observing; critical thinking; communicating; collaborating; map reading	Calculation accurate
Mark the location of Jamaica with a push pin and identify the hour of day (no minutes needed at this level). Locate other countries and calculate their time of day.	• Observing; critical thinking; communicating	Hour of day in at least two locations correctly calculated
Conduct research to determine the location of the International Date Line. Offer explanations to the following: 1. Why it is located at that position 2. Why it is not straight	• Critical thinking; communicating	One reason for its location given; one reason it is not straight given
As a class, determine the effects of rotation on wind. Form a circle around the room. Two students will stand in the centre of the circle back to back. Given tennis balls, throw these balls straight ahead. Record the observation of what happens to wind if the Earth did not rotate. Repeat the experiment a second time with the students moving in an anti-clockwise direction around the students in the centre of the room. Observation of what happens when the ball is thrown should be written down. Draw a diagram to show what happens to wind if the Earth did not rotate as well as what happens due to rotation. Compare findings to information in the textbook. Use findings to explain the general deflection of dominant winds in the Northern and Southern Hemispheres.	• Collaborating; observing; critical thinking	Correct direction of deflection of winds in each Hemisphere identified; diagrams drawn showing deflection of North-East and South-East Trade Winds

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
Given sets of jumbled words, unscramble the definition of 'rotation' and 'revolution' .	• Communicating; observing; critical thinking	Appropriate definitions formulated
In groups of three, use their bodies to demonstrate how solar and lunar eclipses occur. One student will be labelled as the Sun and stand in the centre of the room. Second student will be labelled as the Earth and will walk in an elliptical orbit around the first student (the Sun). A third student, labelled the Moon will walk around the second student (the Earth). To make movement easier for the third student (the Moon) in revolving around the second student (the Earth), use a hula hoop to define the Moon's orbit around the Earth. The rest of the class will stand around the room in various locations. As the students revolve, the class should watch and ask for a freeze frame when an eclipse is noted. The type of eclipse should be identified and how it is produced, described. Determine if everyone on Earth will see all the eclipses all the time.	• Collaborating; creating; communicating; observing; describing	Points of eclipses identified; types of eclipses identified; description of how each eclipse is produced correctly written
In groups, given a set of words and phrases, unscramble the definitions for 'lunar eclipse' and 'solar eclipse'.	• Collaborating; communicating; critical thinking	Appropriate definitions derived
In groups, given tape, a flash light, a tennis ball, sturdy wire, a piece of string, foil paper, and a globe, create a model to demonstrate the effects of solar and lunar eclipses. Attach a length of wire to the top of the globe. The wire should extend horizontally and be able to move horizontally to produce an elliptical orbit. Tie a piece of string on one end of the wire. On the other end of the string, attach the tennis ball which should be covered in foil. The tennis ball represents the Moon. The Moon should be positioned right over the Earth's equator. Turn on the flashlight and direct it at the Earth. Rotate the moon around the Earth until it is between the Sun and the Earth. Make notes on what an observer standing on Earth would see. What is the effect of the position of the Moon on the Sun's light? Would everyone see the eclipse? Suggest why everyone on Earth would not see the eclipse in the same way.	• Creating; collaborating; explaining geographical phenomena	Solar eclipse and one of its effects identified

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
Move the moon until it is behind the Earth. Determine the type of eclipse which is produced. Determine how the Moon will look to someone standing on Earth and whether everyone on Earth would see the eclipse.	• Critical thinking; explaining geographical phenomena	Lunar eclipse and one of its effects identified
Through research and experiment, obtain evidence which suggests that the Earth is spherical. Gather these pieces of evidence as the experiments are carried out (for example, if the Earth was flat, all places would experience daylight at the same time).	• Critical thinking; explaining geographical phenomena	At least two pieces of evidence suggested

Learning Outcomes

Students will be able to:

- ✔ Define 'rotation' and 'revolution'
- ✔ Identify the effects of rotation and revolution
- ✔ Calculate changes in time
- ✔ Explain why the length of daylight hours changes throughout the year
- ✔ Recognise that tilt and revolution of the Earth affects atmospheric temperature and human activities
- ✔ Recognise the differences between solar and lunar eclipses
- ✔ Argue confidently that the Earth is spherical

Points to Note

- The absolute angle of tilt of the Earth's axis does not change seasonally.
- Students at this level should only calculate hourly changes in time.
- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

Students should be reminded to:

- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials and encourage others to do so
- Follow guidelines to promote healthy use of ICT tools

Extended Learning

Research 'daylight saving time' and explain how it works. Give advantages and disadvantages of implementing daylight saving time.

Research why some countries have created standard time zones.

The Moon during lunar eclipses sometimes appears to have different colours. Students should conduct research to find out what causes these variations in colour.

RESOURCES

Calculator; Clocks; Computer; Dictionary; Flashlight; Globes; Internet; Multimedia Projector; Photographs; Speakers; Text books; Videos; World Map

KEY VOCABULARY

Annular Solar Eclipse; Ante Meridiem (A.M.); Anti-Meridian; Axis; Coordinates; Corona; Dawn; Degrees; Dusk; Eclipse; Elliptical; Great Circles; Greenwich; Hemispheres; Hours; International Date Line; Location; Lunar Eclipse; Meridians; Minutes; North Pole; Orbit; Partial Eclipse; Penumbra Eclipse; Post Meridiem (P.M.); Prime Meridian; Revolution; Rotation; Solar Eclipse; South Pole; Standard Time Zones; Time; Total Eclipse

LINKS TO OTHER SUBJECTS

English Language; History; Integrated Science; Mathematics; Physical Education; Physics; Social Studies

About the Unit

Caribbean: Population, Migration and Settlement

In this Unit, students will learn about various Caribbean countries with a focus on the population size of each country. They will also learn where most of these populations are distributed and how people move among Caribbean territories. Population size and distribution in selected Caribbean countries will be examined and methods used to compare populations detailed. Students will also learn about simple settlement patterns and the reasons these patterns form.

RANGE OF CONTENT

Knowledge Students should acquire information and develop an understanding of:
- How physical, social, cultural and economic phenomena interact and the effects of such interaction
- Several key concepts, such as location, spatial distribution pattern and change over time

Skills Students should have the opportunity to develop and practise the following skills:
- Using and interpreting a variety of information sources for example, maps, photographs and graphic art
- Presenting and communicating information in a variety of ways including sketch maps and photographs
- Social skills (for example, working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)

Attitude Students should develop:
- Positive attitudes towards themselves, others and their environment
- Self-confidence, self-esteem and a simple understanding of some of their perceptions
- Appreciation of social, cultural and environmental diversity

GUIDANCE TO THE TEACHER

- Updated population data should be obtained from the Statistical Institute of Jamaica (STATIN), the Planning Institute of Jamaica (PIOJ) and CARICOM Regional Statistics.

Prior Learning

Check that students can:

- Differentiate between rural and urban settlements
- List at least four push and pull factors

CARIBBEAN: POPULATION, MIGRATION AND SETTLEMENT

ATTAINMENT TARGET(S):
Gain knowledge and understanding of the physical and human processes and forces that shape the patterns of the Earth's surface and influence the distribution of people.

Standard(s): Students should acquire knowledge of different places on Earth and in the Solar System and an understanding of the spatial distribution of processes occurring within the Earth, on the Earth's surface, within the atmosphere and in the Solar System. They should also recognise that human and natural environments of the Earth consist of systems that are interdependent and understand the processes and forces that shape the patterns of the Earth's surface. They should understand the environment in which they live but also appreciate the diversity of other habitats and cultures globally.

Theme: The Human Habitat: Processes and Change

OBJECTIVES

Students should be able to:

- Compare population size of Caribbean countries
- Explain, using maps, the general distribution of population in Caribbean countries
- Outline reasons for the pattern of population distribution across the Caribbean
- Recall the definitions of the terms 'population', 'migration', 'emigration', 'immigration', 'migrants', 'internal migration', 'external migration', 'settlement'
- Explain why people move within the Caribbean region
- Discuss, with the use of a map, the pattern of migration within the Caribbean
- Extract information from Flow maps
- Investigate the various push and pull factors which cause people to migrate within the Caribbean
- Assess the effects of migration within the Caribbean on both the country of origin and the destination
- Investigate the challenges of Caribbean intra-regional migration
- Identify patterns of settlement which form in the Caribbean
- Cite evidence obtained from maps and photographs to explain reasons for the formation of each settlement pattern
- Draw sketches to show settlement patterns
- Identify settlement patterns on maps
- Use maps to identify the main activities within major settlements in Caribbean countries

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, conduct online research to find out the current populations of selected Caribbean countries. In groups, design a method of visually comparing the population sizes of the selected countries. Represent the method on the blank map of the Caribbean and share with the class. Compare the method used to methods that are typically used. Redesign the map using one of the traditional methods, for example, Dot maps or Proportional Circle maps. Symbols should be placed in locations in each country where the majority of the population is found.	• Researching for information; communicating; collaborating; drawing maps; critical thinking; creating	Map representation accurately scaled to show similarities and differences
Examine Dot maps of selected Caribbean countries and determine the location of the majority of the population in each country. Based on map evidence, describe in simple terms the location of the settlement, for example, coastal, on low lands. Based on map evidence, students should offer possible reasons for the locations of major settlements on the map. Conduct research to determine additional reasons for locations noted, which are not seen on the map.	• Map reading; critical thinking; finding location; communicating; collaborating	Major settlement locations given; At least two characteristics of each location given; at least two additional reasons listed

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
Individually, given definitions, correctly match each to the following words: population, migration, immigration, emigration, immigration, internal migration, external migration, settlement.	• Critical thinking; communicating	Words correctly matched to definitions
In groups, read selected articles from newspapers or from online sources and outline the reasons for intra-Caribbean migration. From the articles, identify the reasons people left their home country and why they chose the destination country.	• Communicating ; critical thinking; collaborating	At least three reasons for the person leaving and three reasons for choosing their destination listed
Given strips of paper with a factor which may cause a person to migrate or stay in their country paste these factors under 'Push' or 'Pull'. Given reasons for their choices.	• Critical thinking; communicating	Push and pull factors correctly identified; reasons for decisions accurate
Write a letter to the editor explaining why they would choose to leave Jamaica upon graduating from high school or why they would stay. Identify the Caribbean country they would migrate to and outline three reasons for their choice.	• Critical thinking; communicating	Letter written outlining push and pull factors influencing Jamaican migration
In groups, given a data set, create a Flow map to show the migration pattern in the Caribbean. Discuss, with the use of the Flow map, the pattern of migration within the Caribbean. Brainstorm to determine the reasons people migrate from Jamaica to the rest of the Caribbean region.	• Map reading and interpretation; calculating; creating; collaborating; communicating	Flow map correctly scaled to show number of migrants, and their country of origin and destination; direction of movement accurately identified; at least three reasons for the movement identified – jobs, education, natural disaster, economic collapse, political persecution

Place of Birth of Non-nationals in Select Caribbean Countries 1990 and 1991

	Antigua		*Bahamas*		*British Virgin Islands*		*US Virgin Islands*		*Trinidad and Tobago*	
Place of Birth	Total	Percent	Total	Percent	Total	Percent	Total	Percent	Total	Percent
Total	13.335	100,0	26754	100	8.035	100,0	30.407	100,0	49.820	95,2
Anguilla	1	0,0	...	...	...	...	899	3,0	...	...
Antigua	N/A	N/A	14	0,1	355	4,4	4.398	14,5	...	...
Bahamas	5	0,0	N/A	N/A	13	0,2	...	...	...	...
Barbados	216	1,8	245	0,9	86	1,1	...	...	2.411	0,0
Belize	8	0,1	33	0,1	3	0,0	...	...	...	...
Bermuda	10	0,1	35	0,1	9	0,1	...	...	...	...
British Virgin Islands	70	0,6	5	0	N/A	N/A	2.665	8,8	...	...
Dominica	2.580	20,9	37	0,1	566	7,0	3.219	10,6	...	...
Grenada	122	1,0	30	0,1	290	3,6	...	...	16.589	33,3
Guyana	1.753	14,2	438	1,6	770	9,6	...	...	5.140	10,3
Jamaica	408	3,3	2.920	10,9	249	3,1	...	...	...	...
Montserrat	892	7,2	2	0	99	1,2	623	2,0	...	...
St. Kitts and Nevis	495	4,0	14	0,1	1.422	17,7	5.828	19,2	...	...
St. Lucia	414	3,4	26	0,1	251	3,1	2.533	8,3	1.306	2,6
St. Vincent	505	4,1	21	0,1	957	11,9	...	...	11.625	23,3
Trinidad	376	3,0	290	1,1	189	2,4	1.837	6,0	N/A	N/A
Turks and Caicos	4	0,0	2.173	8,1	2	0,0	...	...	...	...
Us. Virgin Islands	451	3,7	5	0	565	7,0	N/A	N/A	...	...
All Others	4.025	32,7	20.466	76,5	2.209	27,5	8.405	27,6	12.749	25,5

Source: Caribbean Community Regional Census Office, 1994 cited in Thomas-Hope, E (2004) Trends and Patterns of Migration to and from Caribbean Countries

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, plan and design a settlement with at least fifty houses. Include all the social and economic amenities they would like to have available in their settlement. Share their design with the class and explain reasons for the pattern of settlement drawn.	• Collaborating; drawing; creating; critical thinking; communicating	Settlement designed and at least three reasons for design given
Examine settlement patterns using online photographs or Google Earth Software as well as on Ordnance Survey (OS) maps. From these images, draw and label a sketch of the pattern noted. Write a description of the pattern identified. Based on map evidence, give reasons for the formation of settlement patterns identified.	• Critical thinking; map reading and interpretation; photograph interpretation	Settlement patterns drawn and labelled; description matches settlement pattern observed; two reasons given for pattern observed
Given the names Linear, Dispersed and Nucleated, students should research the meaning of these words. Match each word with the settlement pattern identified from the maps and photographs. Students should also classify the pattern they originally designed.	• Researching for information; classifying; communicating; critical thinking	Names matched correctly to settlement pattern
Select communities shown on the map and using the Legend/Key determine the types of activities that are found in the area. Classify the activities as social, economic or administrative.	• Map reading and interpretation	At least six activities identified and classified

Learning Outcomes

Students will be able to:

- ✔ Compare population size of Caribbean countries
- ✔ Explain the distribution of population in selected Caribbean countries
- ✔ Give reasons for the pattern of population distribution across the Caribbean
- ✔ Define the terms 'population', 'migration', 'emigration', 'immigration', 'migrants', 'internal migration', 'external migration', 'settlement'
- ✔ Offer explanations as to why people move within the Caribbean region
- ✔ Identify push and pull factors which cause people to migrate within the Caribbean
- ✔ Assess the effects of migration within the Caribbean on both the country of origin and the destination
- ✔ Identify patterns of settlements which form in the Caribbean
- ✔ Cite evidence to support the formation of each settlement pattern identified
- ✔ Use maps to identify the main activities within selected settlements in Caribbean countries
- ✔ Create and use Flow maps, Dot maps and Proportional Circles maps

Points to Note

- Proportional circles are sometimes used on maps to show the population sizes of capital cities.
- Not all the symbols in the Legend/Key may appear on the map. A general Legend is sometimes used. Advise students to ensure that features shown in
  the Legend are represented on the map.
- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

Students should be reminded to:

- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials and encourage others to do so
- Follow guidelines to promote healthy use of ICT tools

Extended Learning

Students should conduct a walk-through of their communities as well as view the community using Google Earth to determine its settlement pattern. Suggest reasons their community may have taken the shape they have identified.

RESOURCES

Atlas; Blank Caribbean Maps; Caribbean Map; Cartridge Paper; Computer; Document Camera; Markers; Multimedia Projector; Photographs; Ruler; Scissors; Statistics; Tape Textbooks; Videos

KEY VOCABULARY

Census; Circumference; Demography; Diameter; Dispersed; External Migration; Flow map; International Migration; Linear; Migration; Nucleated; Population; Population Distribution; Pull Factors; Push Factors; Regional Migration; Rural; Settlement; Settlement Pattern; Sparse; Spread; Uneven; Urban

LINKS TO OTHER SUBJECTS

English Language; History; Mathematics; Social Studies

About the Unit

Pollution, Global Warming and Disease Spread

In this Unit, students will be exposed to pollution and its effect on the environment. The link between pollution, global warming and disease spread will be examined. This Unit should form part of the foundation for students to understand natural and human-induced climate change and determine solutions to the increasing challenges faced by these issues.

RANGE OF CONTENT

Knowledge Students should acquire information and an develop understanding of:

- Human and physical environmental phenomena and processes relating to Jamaica and other places
- Social, cultural and economic phenomena and processes relating to Jamaica and the rest of the world
- The effects of the interaction of social and cultural phenomena

Skills Students should have the opportunity to develop and practise the following skills:

- Using and interpreting a variety of information sources, for example, maps, photographs and graphs
- Presenting and communicating information in a variety of ways including sketch maps, photographs and statistics
- Social skills (for example, working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)
- Selecting and using of a variety of modes of enquiry and the proper use of equipment and techniques

Attitude Students should develop:

- Positive attitudes towards themselves, others and their environment
- A responsible attitude towards the exploitation and conservation of resources
- Self-confidence, self-esteem and a simple understanding of some of their perceptions
- Willingness to perceive and evaluate natural phenomena

GUIDANCE TO THE TEACHER

- Ensure that students understand that the Earth's climate has always changed, but in recent times, the increase in global temperatures has accelerated due to human activity.

Prior Learning

Check that students can:

- List at least five environmental pollutants
- Identify communicable diseases that are spread by mosquitoes in Jamaica

POLLUTION, GLOBAL WARMING AND DISEASE SPREAD

ATTAINMENT TARGET(S):
Recognise the interdependent relationship between humans and the natural environment.

Standard(s): Students should develop an understanding of the environment as a system of interdependent components affected by human activity and natural phenomena. They should also recognise the significance of using past and present events to make predictions for the future and apply sustainable practices in preserving the environment for future generations.

Theme: Environmental Awareness, Change and Sustainability

OBJECTIVES

Students should be able to:

- Formulate a definition for the terms 'pollution', 'pollutant', 'greenhouse gas', 'greenhouse effect', 'global warming', 'disease', 'vector', 'communicable diseases', 'green technology'
- Categorise pollution as air, water or land pollution
- Create a list of common natural and anthropogenic pollutants
- Discuss the effects of different types of pollution on the environment
- Establish the link among increasing atmospheric temperatures, increasing spread of vector-borne diseases and pollution
- Associate global travel trends with the spread of diseases and increasing pollution
- Use models to show how diseases are spread
- Investigate and suggest ways of reducing pollution
- Assess maps showing the spread of diseases
- Link changes in global climate to the spread of emerging diseases
- Investigate how green technology may be used to reduce pollution in Jamaica

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
View a series of photographs showing a variety of ways pollution occurs. From the photographs, identify and create a list of the pollutants and the aspect(s) of the environment that is being polluted. From their observation, formulate a definition of the terms 'pollution' and 'pollutant'. Compare their definitions to the definition in their textbook or online.	• Photograph interpretation; critical thinking; communicating	List created identifying pollutants and the type of pollution occurring; accurate definition of pollutant and pollution formulated
From the photographs create a list of natural and man-made pollutants and discuss the visible effects of pollution on the environment. The most common pollutants should be identified from the photo-gallery.	• Photograph interpretation; communicating	Accurate list showing pollutants and their effects
In groups, be given cue cards representing the ingredients, the causes and effects of either air, water or land pollution as well as solutions towards reducing the type of pollution their group was allocated.	• Communicating; critical thinking; collaborating	Ingredients, causes, effects, and solutions accurately classified

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria

Students will:

E.g. GROUP 1 – AIR POLLUTION

SOME INGREDIENTS	SOME SOLUTIONS
Carbon Monoxide	Carpool
Smoke	Take the bus
Sulphur Dioxide	Use non-aerosol products
Dust	Limit Industrial Waste

SOME EFFECTS	SOME CAUSES
Cause Lung Disease	Factories
Reduces Visibility	Cars and Trucks
Causes Eye Irritation	Burning Fossil Fuels
Increases Atmospheris Temperature	Hair Sprays

Sort the cue cards into the groups, and present to the class discussing each classifcation.

Greenhouse Gas Experiment
In groups, conduct an experiment to determine the effects of burning on atmospheric temperatures. Each group will be given 6 match sticks, foil paper, tape and two glass jars with lids. The match sticks should be lit on the foil on a flat surface and covered with one glass jar. Allow the smoke from the burning match to accumulate in the jar which is then covered by the lid. Seal the lid with tape. Close the second jar and seal with tape also. Leave out in the sun for an hour. Measure the temperature of both jars using a thermometer. Explain what a greenhouse gas is and formulate a definition for the greenhouse effect. Compare formulated definitions with the definition in textbook. Suggest ways to stop burning to reduce the greenhouse effect.

- Observing; experimenting; measuring; critical thinking; creating; communicating

Thermometer used correctly; measurement of temperature in jar with smoke noted as higher than that of jar without smoke; correct definition formulated; At least four ways to reduce burning suggested

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
Global Warming Experiment In groups, give students the following equipment: 2 glass containers with lids, 12 cubes of ice; 6 cups of water, 2 thermometers and 1 black plastic bag. Place 6 cubes of ice and 3 cups of water in each jar. Record the temperature of the water and ice in the jar. Cover both jars with the lids. Place the plastic bag over one of the jars. This is the greenhouse jar. Place both jars outside in the bright sunlight for one hour. After the hour, measure the temperature in both jars using a thermometer. Record their findings and discuss which jar has the higher temperature and why. Explain how the black plastic bag acted like extra greenhouse gases. Which jar experienced accelerated heating? How can this experiment be related to the Earth? Following the experiment, watch a video showing the effects of global warming on the Earth's environment (clips of the 2006 documentary, An Inconvenient Truth by Al Gore may be used).	• Observing; experimenting; measuring; critical thinking; creating; communicating	Thermometer used correctly; measurement in the covered jar higher; correctly relate the experiment to melting ice caps and warmer global temperatures
Conduct research to identify diseases that may become more prevalent due to warmer atmospheric temperatures as well as disease that arise when pollution is uncontrolled. Model how some of these diseases are transmitted.	• Researching for information; critical thinking	At least three diseases, each associated with warmer atmospheric temperatures and pollution, identified
Disease Spread by Contact Each be given a cup half-filled with water with one student's water coloured with dye. That person will represent the first person infected with a disease that is transmitted by contact. The dyed water will be shared with two persons. These two persons will each share with two other persons. This will continue until the entire class is 'infected'. A diagram to show the spread should be drawn and measures to prevent the disease or slow and stop its spread devised.	• Modelling; critical thinking; drawing and labelling	Accurate modelling of how disease is spread. Diagram to represent how disease may spread correctly drawn; at least three suggestions to prevent the disease and to stop or slow spread of the disease given
Map the global spread of disease spread by contact or a vector. Suggest reasons the disease spread. Run online disease models which show rate of disease spread under various conditions. Determine the variables affecting disease spread and observe how changes, such as limiting travel, affect spread of the disease.	• Map reading; critical thinking	Reasons for the disease spread determined

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: Conduct research to determine the goals of using green technology. In groups, given a problem which causes pollution or the high use of a non-renewable resource, come up solutions. Solutions must take into consideration: 1. Rethinking how the product is used 2. Recycling opportunities 3. Renewable energy options 4. Reducing the use 5. Responsible actions for the future Consider solutions that utilises green energy, green building or green purchasing.	• Researching for information; critical thinking; collaborating	Feasible and sustainable solutions suggested

Learning Outcomes

Students will be able to:

- ✔ Define the terms 'pollution', 'pollutant', 'greenhouse gas', 'greenhouse effect', 'global warming', 'disease', 'vector', 'communicable diseases', 'green technology'
- ✔ Categorise pollution as air, water or land pollution
- ✔ Identify common natural pollutants
- ✔ Identify common anthropogenic pollutants
- ✔ Identify effects of pollution on the environment
- ✔ Recognise how pollution leads to increasing atmospheric temperatures
- ✔ Identify major diseases affecting Jamaica and the World
- ✔ Explain how pollution contributes to emerging diseases and their spread
- ✔ Model how diseases are spread
- ✔ Assess maps showing the spread of diseases
- ✔ Apply the use of green technology in solving environmental issues

Points to Note

- Not all pollutants are from an anthropogenic source.
- Global Warming occurs naturally. It is accelerated Global Warming that is the challenge.
- To demonstrate disease spread, do not use a sexually transmitted disease.
- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

Students should be reminded to:

- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials and encourage others to do so
- Follow guidelines to promote healthy use of ICT tools

Extended Learning

Examine the school community and identify activities which lead to pollution of the environment. Design a project that provides a possible solution to reduce the levels of a selected pollutant identified at school. Present the proposed project to the principal for implementation through the Environmental Club (or any other relevant club).

RESOURCES

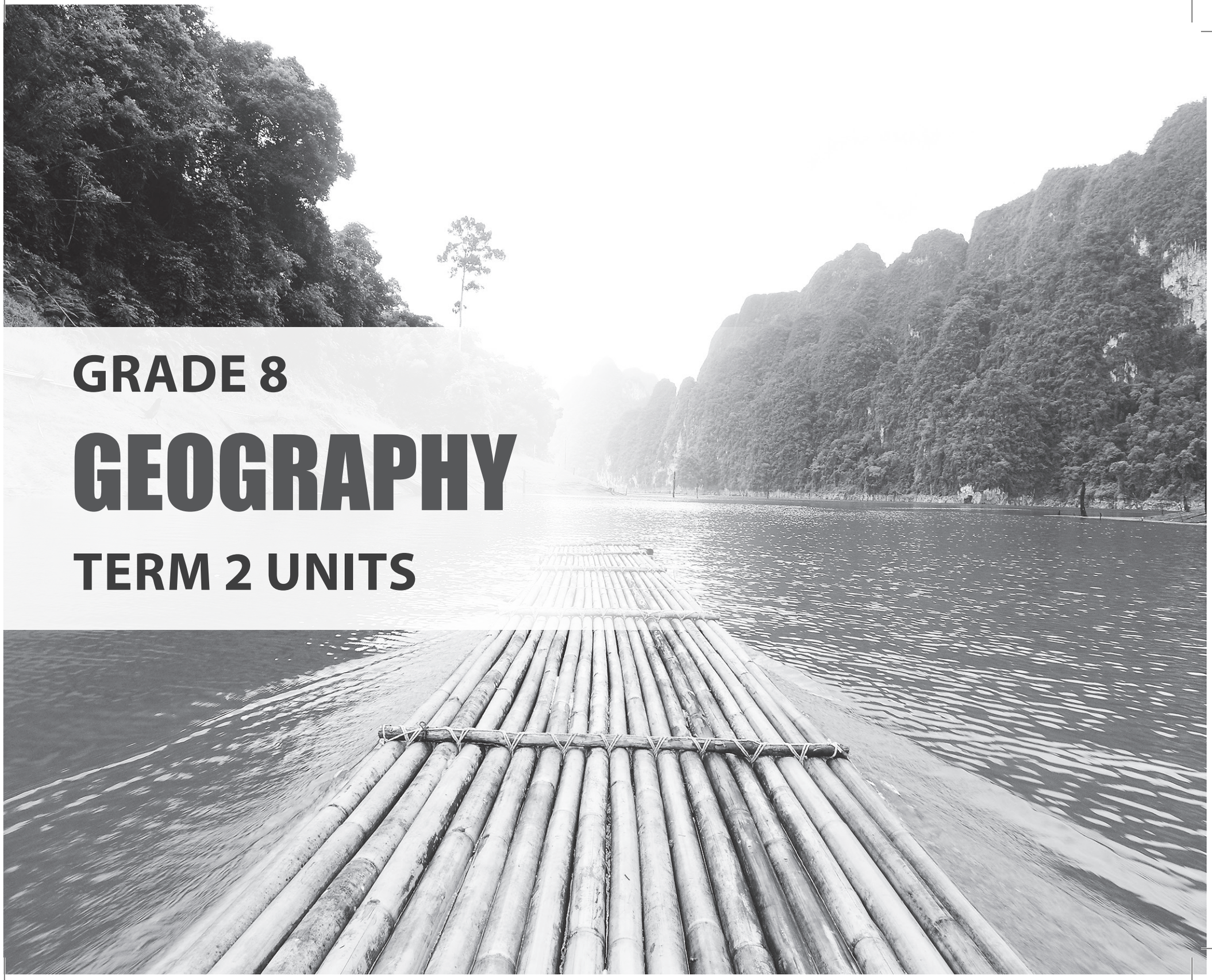
Atlas; Cartridge Paper; Computer; Dye; Markers; Multimedia Projector; Photographs; Plastic cups; Statistics; Tape; Textbooks; Videos; Water

KEY VOCABULARY

Air; Anthropogenic; Atmosphere; Communicable Disease; Emerging; Environment; Infectious; Global Warming; Greenhouse Effect; Land; Mathematical; Model; Mosquito; Natural; Non-Communicable; Pollutant; Pollution; River; Sea; Temperature; Vector; Water

LINKS TO OTHER SUBJECTS

Biology; Chemistry; English Language; History; Mathematics; Social Studies



GRADE 8

GEOGRAPHY

TERM 2 UNITS

TERM 1

Unit 1: 5 Weeks
Interpreting Maps and Photographs 2

Map Symbols
Direction and Bearings
Measuring Curved Distances
Four-Figure Grid References
Reproducing Map Sections
Representing Height - Simple Cross-Sections

Unit 2: 2 Weeks
Movements of the Earth

Rotation and Revolution
Latitude and Longitude - Calculating Time
Eclipses
Evidence of the Earth's Shape

Unit 3 : 3 Weeks
Caribbean: Population, Migration and Settlement

Population Size and Distribution
Regional Migration
Settlement Patterns
Mapping Settlement Patterns
Dot Maps and Flow Line Maps
Statistical Diagrams - Proportional Circles

Unit 4: 2 Weeks
Pollution, Global Warming and Disease Spread

Types of Pollution
Impact of Pollution
Origin and Spread of Diseases
Influence of Climate Change
Green Technology

TERM 2

Unit 1: 4 Weeks
Weather, Climate and Vegetation

Types of Rainfall
Vegetation in Tropical Marine Climate
Statistical Diagrams - Line and Bar Graphs

Unit 2: 2 Weeks
Rivers, Groundwater and Sustainable Use of Water

Major Rivers in Jamaica
Importance of Rivers
Sustainable Use of Water in Jamaica
Influence of Climate Change

Unit 3: 3 Weeks
Limestone Rocks

Characteristics of Limestone Rocks
Weathering of Limestone
Limestone Features
Value of Limestone Landscapes
Geological Maps

Unit 4: 3 Weeks
Fieldwork and Investigation 2

Simple Fieldwork Techniques
Conducting Fieldwork
Drawing Conclusions
Ethics in Research

TERM 3

Unit 1: 3 Weeks

Resources and Secondary Economic Activities

Definition of Resources
Types of Resources Used in Secondary Economic Activities
Types of Secondary Economic Activities in Jamaica

Unit 2: 4 Weeks
Jamaica: Agro-Processing

Importance of Agro-Processing
Methods Used to Process Food
Economic and Land - Use Maps
Statistical Diagrams - Pie Charts

Unit 3: 3 Weeks
Climate Change: Causes, Effects and Conflicts in Small Island Developing States

Conflicts in the Use of Forest Resources
Impact of Manufacturing and Refining Industries
Reducing Jamaica's Carbon Footprints
Indicators of a Warming World
Influence of Climate Change on Jamaica's Resources

About the Unit

Weather, Climate and Vegetation

In this Unit, students will investigate how rain droplets form in the atmosphere. The various types of rainfall that occur in Jamaica will be examined and reasons for their occurrence explored. Vegetation in Tropical Marine Climates such as that found in Jamaica will be examined and described. An association between the pattern of rainfall, temperature variations and types of vegetation found in selected environments will be made. Development of graphical skills will continue with students being introduced to the plotting and interpretation of line graphs and bar charts.

RANGE OF CONTENT

Knowledge Students should acquire information and develop understanding of:

- Examples of human and physical environmental phenomena and processes relating to Jamaica and the rest of the World
- How physical environmental phenomena interact and the effects of such interaction
- Key concepts of location, spatial distribution and interaction, interrelationship and pattern
- The practical aspects of the above as they relate to the learner's environment

Skills Students should have the opportunity to develop and practise the following skills:

- Using and interpreting a variety of information sources, for example, photographs, diagrams and textual sources
- Presenting and communicating information in a variety of ways including diagrams and models
- Selecting and using of a variety of modes of enquiry and the proper use of equipment and techniques
- Social skills (for example working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)

Attitude Students should develop:

- Positive attitudes towards themselves, others and their environment
- Self-confidence, self-esteem and a simple understanding of some of their perceptions
- Appreciation of environmental diversity.
- A positive attitude towards conservation of resources.

GUIDANCE TO THE TEACHER

- Incorporate thematic maps in lessons showing rainfall and temperature variations in Jamaica and the Caribbean.
- It is important that map reading and interpretation combines reading and mathematics skills to help build spatial sense and visual literacy.
- Where possible ensure that maps are reproduced in colour.
- Ensure that the data selected for the plotting of line graphs is appropriate and accurate.
- Allow students to observe and classify clouds noted in their environment.

Prior Learning

Check that students can:

- Formulate a working definition of the term 'weather'
- Identify the elements of weather and use appropriate instruments to measure each

WEATHER, CLIMATE AND VEGETATION

ATTAINMENT TARGET(S):
Gain knowledge and understanding of the physical and human processes and forces that shape the patterns of the Earth's surface and influence the distribution of people.

Standard(s): Students should acquire knowledge of different places on Earth and in the Solar System and an understanding of the spatial distribution of processes occurring within the Earth, on the Earth's surface, within the atmosphere and in the Solar System. They should also recognise that human and natural environments of the Earth consist of systems that are interdependent and understand the processes and forces that shape the patterns of the Earth's surface. They should understand the environment in which they live but also appreciate the diversity of other habitats and cultures globally.

Theme: The Human Habitat: Processes and Change

OBJECTIVES

Students should be able to:

- Recall the elements of weather and their associated instruments
- Differentiate between weather and climate
- Use data obtained from a weather station to plot a line graph to show variation in temperature
- Use data obtained from a weather station to draw a bar graph to show rainfall amounts
- Simply explain the use of line and bar graphs to represent data
- Interpret various climographs from Caribbean countries
- Define the terms 'precipitation', 'rain', 'hail', 'snow', 'sleet'
- Differentiate between the following: dew and mist; fog and cloud
- Investigate the conditions required for clouds to form
- Identify the conditions necessary for rainfall to occur
- Differentiate between the following types of rainfall: Convectional; Relief/ Orographic; Frontal/Cyclonic
- Use thematic maps to describe the variations in weather patterns in Jamaica
- Use maps to analyse the changes in rainfall and temperature patterns in Jamaica
- Calculate the following: range of temperatures; average (mean) temperatures
- Describe the characteristics of the vegetation of the Tropical Marine Climate and explain why these vegetation types are important
- Propose ways to preserve the natural vegetation in vulnerable areas

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
Given photographs of various weather instruments, identify the instruments and match the element of weather each is used to measure. Using the data obtained from the weather station which students would have utilised in Grade 7 or a data set obtained from the Meteorological Office of Jamaica, construct line and bar graphs to show temperature changes and rainfall amounts for a given period (for simplicity, the graphs may be drawn to show changes over the period of a week in the first instance).	• Photograph interpretation; communicating; critical thinking; plotting and drawing graphs; interpreting graphs; labelling graphs	Elements of weather correctly matched with instruments used to measure them; line graph accurately plotted; bar graph accurately drawn; graphs accurately labelled and read
Design an activity to show how one continuous variable changes over time (this activity could be timing how fast a student runs at 10 metre intervals over a 100 metre stretch) to understand how and why line graphs are plotted. Use a thermometer to record the temperature at various points during a day. Use the information to plot a line graph.	• Using a stop watch; measuring; plotting and drawing graphs; interpreting graphs; labelling; communicating; collaborating	Stop watch accurately used; line graph accurately plotted, labelled and read

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
Design an activity to show how simple bar graphs are drawn and why bar graphs are used. Form groups according to average height. Each group will be represented by a bar. From the activity, understand that each bar represents the number of students of an average height.	• Communicating; critical thinking; drawing; labelling; collaborating	Bar graph accurately drawn, labelled and read
In groups, given a climograph obtained online for selected Caribbean countries, from the north western islands to the south eastern islands, write a description of the temperature and rainfall changes that occur in each country throughout the year. Create a wall gallery to show changes in weather patterns across the Caribbean. (This activity may be carried out for the parishes in Jamaica if the data can be obtained, and later associated with the thematic maps showing rainfall and temperature variations across the island.)	• Interpreting graphs; communicating; critical thinking; researching for information; collaborating	Data from the graphs accurately read; changes in weather patterns across an area accurately described
In groups, collect weather data from national newspapers or from the Meteorological Office for a selected time frame (a year is ideal). In groups, plot the daily temperature high and low values on graphs for each month. Display the graphs on the classroom walls. Calculate the daily temperature averages and plot that on a third line on the graph. Calculate the monthly temperature averages and record these at the base of each graph. Observe the graphs and determine which line on the graph is more variable (daily values or average values) and which is more useful in predicting/forecasting the weather. Based on the data collected, groups will determine if there has been changes between that year and as many years before as they can find. From the data, formulate a definition for 'climate'. Compare the definition to the definition formulated in Grade 7 for the term 'weather'. Revise the definitions for weather and climate by comparing formulated definitions to the ones offered in textbooks or online.	• Researching for information; plotting graphs; calculating; critical thinking; communicating; collaborating	Patterns or changes in weather accurately described; Definitions formulated and revised; at least two differences between the terms identified
Using Skype, or other forms of Social Media, communicate with groups from other schools in the area and other parishes in Jamaica. Determine if the weather experienced is similar based on readings obtained from simple weather stations constructed at their schools. In groups, based on the data gathered, design a simple climate map of weather in their parish or in Jamaica.	• Communicating; collaborating; critical thinking; reading weather instruments; gathering data; creating	Weather data accurately gathered; climate map accurately created based on findings

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, observe thematic maps showing weather variations across Jamaica and other Caribbean countries. Also, compare maps across different time periods to determine how the pattern has changed. Simply describe changes in rainfall and temperature across Jamaica and across selected Caribbean countries. Use maps to compare weather patterns to patterns in topography. Note the similarity among the distribution of rainfall for the various countries. Write a paragraph explaining how relief/topography affects rainfall patterns in Caribbean countries.	• Map reading; comparing trends; communicating; observing; collaborating	Map accurately interpreted – areas of high, medium and low rainfall identified; higher rainfall amount associated with higher relief identified and explained; at least two areas which are drier/wetter identified
In groups, view online videos showing various forms of precipitation. Based on the video, write a description of each form of precipitation. Formulate a definition for the terms 'precipitation', 'rain', 'hail', 'sleet', and 'snow'.	• Observing; formulating definitions; communicating; collaborating	At least two characteristics of each precipitation type identified; correct definition formulated
In groups, use a two litre soda bottle, warm water and matches to investigate how clouds form. Put approximately 200 ml of water into the bottle and screw on a squirt or squeeze bottle cap. Close the cap and squeeze and release the bottle. Write a brief explanation of what happens to the (air) pressure in the bottle as it is squeezed and as it is released. Open the cap. Light a match and after blowing it out squeeze the bottle and release it, allowing some of the smoke to be sucked into the bottle. Close the cap and begin squeezing and releasing the bottle again. Watch the formation of the fog/cloud as the bottle is squeezed and released. Discuss the conditions which caused the cloud formation. Formulate a definition for the term 'cloud'. Compare findings to information found in textbooks or online sources.	• Conducting investigations; observing; recording data; formulating definitions; critical thinking; communicating; collaborating	Investigations carried out accurately; data recorded accurately; at least two conditions for cloud formation identified
Gather information on clouds from text books. Using a camera, take photographs over the course of a week of different types of clouds in the sky. Write descriptions of each cloud noting whether the clouds produced rain and whether the cloud looked high in the sky or low (appear closer to the ground). View a presentation on cloud types – their appearance and location. Name the clouds seen over the week of observation. For each day, conduct research to determine how to measure the amount of cloud cover noted. Assign a measurement to the amount of cloud cover each day.	• Taking photographs; observing; recording data; critical thinking; communicating	Clouds accurately described and named; cloud cover accurately measured

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, given photographs showing clouds, fog and mist, describe each and identify the differences among them. Identify each formation in the surrounding environment.	• Observing; photograph interpretation; critical thinking; communicating; collaborating	At least one difference identified among cloud, fog and mist
In groups, given a glass jar, a plate, hot water and ice cubes, conduct an experiment to determine how rain droplets form. Pour approximately 3 cm of hot water carefully into the jar and cover with the plate. Observe and record what happens in the jar for a few minutes. Place the ice cubes on the plate and observe and record what happens in the jar. Discuss conditions required for rain droplets to form and fall, using information from the text book to support and present findings to the class. Prove that water is in the air around them even on hot days, by placing an empty glass bottle in the freezer for an hour. Remove the glass bottle from the freezer, place it on a desk and observe what occurs. Using these two experiments, differentiate between dew and rain.	• Conducting experiments; observing; recording data; critical thinking; communicating; collaborating	At least two conditions for rain drops to form identified; at least one reason why raindrops fall from the atmosphere suggested; the difference between dew and rain identified.
View online videos showing how each type of rainfall occurs, and make notes on each type. Examine a relief map of Jamaica and suggest areas where each type of rainfall might occur as well as the time of year each type is likely to occur. Justify suggested answers.	• Observing; map reading and interpretation; critical thinking; communicating.	At least two areas in Jamaica where each type of rainfall is likely to occur and the time of year each type of rainfall is likely to occur, accurately identified
Examine photographs of different vegetation types found in Jamaica. Label the photograph by identifying the dominant, visible characteristics of the vegetation. Based on the characteristics noted, determine the areas in which the vegetation is likely to be found. Propose ways to preserve the natural vegetation in vulnerable areas.	• Observing; photograph interpretation; critical thinking; communicating; collaborating	At least three characteristics of each vegetation type identified; location of vegetation type identified; solutions to preserving natural vegetation identified

Learning Outcomes

Students will be able to:

- ✔ Match elements of weather with their associated instruments
- ✔ Differentiate between weather and climate
- ✔ Use temperature data obtained from a weather station to plot line graphs
- ✔ Use rainfall data obtained from a weather station to draw bar graphs
- ✔ Interpret climographs
- ✔ Define the following terms 'precipitation', 'rain', 'hail', 'snow', 'sleet'
- ✔ Differentiate between the following: dew; mist; fog; cloud
- ✔ Carry out and deduce information from investigations
- ✔ Extract information from thematic maps
- ✔ Use maps to make associations between relief and rainfall
- ✔ Calculate range of temperature; average (mean) temperature
- ✔ Differentiate between the following types of rainfall: Convectional; Relief/Orographic; Frontal/Cyclonic
- ✔ Identify the characteristics of various tropical vegetation types

Points to Note

- A line graph is used to represent temperature readings while a bar graph (histogram) is used to represent rainfall amounts.
- Line graphs are used to show continuous data. Simple bar graphs are used to show discrete data (data placed in categories). Histograms are used when data is represented in ranges.
- Many of the suggested experiments can be carried out in other ways than those which are suggested in this document. Have students conduct research to come up with other ways of carrying out the suggested experiments.
- Fogs are clouds at ground level. Visibility is greater in a mist than in a fog.
- Ensure students understand the difference between dew and drizzle or a light rain.
- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

Students should be reminded to:

- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials and encourage others to do so
- Follow guidelines to promote healthy use of ICT tools

Extended Learning

Throughout the term, students should create a photo journal of clouds and attempt to capture images of all cloud types – high, medium and low level clouds.

RESOURCES

Atlas; Calculator; Camera; Computer; Dictionary; Glass Jars; Graph Sheets; Internet; Kettle; Matches; Multimedia Projector; Newspaper Clippings; Online Videos; Photographs; Plastic Bottles; Speakers; Textbooks; Thematic Maps

KEY VOCABULARY

Annual Range of Temperature; Average/Mean Temperature; Bar Graph; Climate; Climograph; Cloud; Condensation; Convectional Rainfall; Daily Range of Temperature; Dew; Dry Periods/Seasons; Fog; Frontal Rainfall; Hail; Histogram; Line Graph; Marine; Maximum Temperature; Minimum Temperature; Mist; Precipitation; Rain; Range of Temperature; Relief/ Orographic Rainfall; Sleet; Snow; Thematic Maps; Tropical; Weather; Wet Periods/Seasons

LINKS TO OTHER SUBJECTS

Biology; Chemistry; English Language; Information Technology; Mathematics; Physical Education; Physics; Social Studies

About the Unit

Rivers, Groundwater and Sustainable Use of Water

In this Unit, the students will assess the importance of rivers and groundwater in Jamaica in the provision of fresh water for domestic and industrial uses. Rivers also act as a source for generating clean energy. Major rivers which are tapped for use will be identified as well as those which can potentially be used. Ways to ensure the sustainable use of water will be explored and discussed. Links will be made to localised use of water and the hydrological cycle. Recent trends in rainfall patterns and changes in climate will be explored. Innovations to combat water scarcity in vulnerable communities will also be studied.

RANGE OF CONTENT

Knowledge Students should acquire information and an develop understanding of:

- Examples of physical environmental phenomena and processes relating to Jamaica and the rest of the World
- How physical environmental phenomena interact and the effects of such interaction
- How physical and social and economic phenomena interact with each other
- Key concepts of location, spatial distribution and interaction, interrelationship and pattern

Skills Students should have the opportunity to develop and practise the following skills:

- Using and interpreting a variety of information sources, for example, photographs, diagrams, maps and textual sources
- Presenting and communicating information in a variety of ways including diagrams and models
- Social skills (for example, working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)

Attitude Students should develop:

- Positive attitudes towards themselves, others and their environment
- Self-confidence, self-esteem and a simple understanding of some of their perceptions
- A responsible attitude towards the exploitation and conservation of resources
- A desire to maintain and improve the quality of the physical environment

GUIDANCE TO THE TEACHER

- Observational field trips to note the uses of rivers will offer good support to this Unit.
- Safety of students is of utmost importance, so they should not be allowed to interact inappropriately with water bodies.

Prior Learning

Check that students can:

- Identify at least three major rivers in Jamaica
- Identify where the water they use for domestic purposes originate
- Identify rivers on maps

RIVERS, GROUNDWATER AND SUSTAINABLE USE OF WATER

ATTAINMENT TARGET(S):
Recognise the interdependent relationship between humans and the natural environment.

Standard(s): Students should develop an understanding of the environment as a system of interdependent components affected by human activity and natural phenomena. They should also recognise the significance of using past and present events to make predictions for the future and apply sustainable practices in preserving the environment for future generations.

Theme: Environmental Awareness, Change and Sustainability

OBJECTIVES

Students should be able to:

- Identify major rivers in Jamaica
- Formulate a simple definition for the terms 'aquifer', 'drought', 'river', 'groundwater', 'well'
- Link aquifers and groundwater to the presence of rivers and wells
- Define the terms 'conservation' and 'sustainable'
- Investigate the source of domestic water in the immediate community
- Outline the importance of rivers and wells
- Explain the impact of drought conditions on the physical nature of rivers and wells
- Recognise the impact of drought on the local community
- Design one method to harvest water for domestic or industrial use
- Determine ways water may be conserved at home and school
- Design one method to reduce water loss on farms as well as to obtain water in drought prone areas
- Propose way for treating and reusing waste-water in Jamaica
- Appreciate the importance of recycling water

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
Identify rivers on a map of Jamaica projected on the wall/whiteboard. Note how rivers are represented. Note the characteristics of rivers as represented on maps. Given cue cards with the name of major rivers in Jamaica, label each of the rivers. View photographs downloaded from online sites of some of the rivers identified. Formulate a definition of the term 'river'. Compare definition formulated with definition in textbook or on online sources. Revise definition formulated. Use textbooks or the internet to find a definition of the term 'groundwater'. Suggest ways groundwater is accessed.	• Map reading; critical thinking; collaborating; communicating; labelling	Rivers identified and labelled; At least two characteristics of rivers written; definitions formulated; at least two ways groundwater is accessed identified
Using Google Maps software, view a river located in the local area. Discuss its current use and its potential use and make presentations to the class.	• Finding location; map reading; observing; communicating; critical thinking	River in local area located using Google Map software; at least two uses of the river identified; at least two potential uses of rivers identified
Use a dictionary to find a definition for the term 'sustainable'. In groups, discuss some of the things that they use on a daily basis that needs to be sustainable to ensure the survival of human kind. Discuss ways that the resources identified can be made sustainable in keeping with the definition derived from the dictionary.	• Critical thinking; communicating	At least three resources used identified; practical suggestions to ensure the sustainable use of the resources identified offered

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
Conduct research at the Water Resources Authority to identify the source of water for their community and the uses of the water. Design a schedule to interview relevant personnel from the Water Resources Authority. Invite such relevant personnel to deliver a presentation on where the local water comes from; how it is used; how much is available; and ways to conserve the amount that is left.	• Researching for information; communicating; interviewing;	Source of water identified; at least three ways water is used identified; at least three ways to conserve water identified
In groups, explore the local community or school to determine how water is used and ways water appear to go to waste. Suggest ways water may be conserved or harvested and used. Design posters to inform the local community on how to conserve or harvest water. Research innovative ways water is being conserved or harvested globally. Present findings to the class and discuss which methods may be applied in Jamaica.	• Observing; critical thinking; collaborating; creating; researching for information; communicating	At least two ways water is wasted identified; poster designed showing at least two ways of conserving/harvesting water for use
In groups, conduct virtual fieldtrips, using Google Maps software, of selected sites in Jamaica and examine the various sources of water. Discuss how the population may utilise the sources identified.	• Observing; collaborating; communicating; exploring	Water sources identified; practical uses for sources identified suggested; Google Maps or other relevant software used appropriately
In groups, design one method of monitoring the water levels in dams, reservoirs and wells. Determine various conservation strategies that may be implemented at different critical water levels to conserve the resource.	• Creating; designing; communicating; critical thinking; collaborating	One practical method of monitoring designed; at least one conservation method proposed for each critical water level
Based on news reports, propose ways water may be conserved by the following: 1. The National Water Commission 2. Households 3. Industries	• Creating; designing; communicating; critical thinking; collaborating	At least one proposal for each group suggested
Examine a map showing reduced rainfall amounts during periods of drought. Describe the changes noted when compared to a map showing average rainfall for the same areas. In groups, propose ways of obtaining water for agricultural and domestic use in those areas.	• Creating; designing; communicating; critical thinking; collaborating	One feasible proposal suggested

Learning Outcomes

Students will be able to:

- ✔ Label maps showing major rivers in Jamaica
- ✔ Define the terms 'aquifer', 'drought', 'river', 'groundwater', 'well' and 'sustainable'
- ✔ Conduct investigations and research
- ✔ Engage in discussions about the importance of rivers
- ✔ Design a method to harvest water or conserve water
- ✔ Suggest how water can be used in a sustainable manner
- ✔ Determine how to combat the effects of drought on communities in Jamaica

Points to Note

- In some countries, water is now being harvested from the air using methods that promote condensation.
- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

Students should be reminded to:

- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials and encourage others to do so
- Follow guidelines to promote healthy use of ICT tools

Extended Learning

In groups, design a prototype to show one way water may be harvested for either domestic or industrial use.

RESOURCES

Computer; Internet; Multimedia Projector; Topographic Map

KEY VOCABULARY

Aquifer; Condensation; Desalinisation; Filter; Flood Water Harvesting; Groundwater; Rainwater Harvesting; Recycle; Resource; River; Streams; Sustainable; Well

LINKS TO OTHER SUBJECTS

English Language; History; Information Technology; Physics; Social Studies

About the Unit

Limestone Rocks

In this Unit, students will learn about the distribution of Limestone rocks in Jamaica. Limestone covers approximately seventy percent of the island and is, therefore, a valuable resource, as well as a major determinant of the island's topography. The characteristics of the rock will be examined as well as the way the rock breaks down to form the landscape typically referred to as Karst Scenery. The value of Karst Landscapes will be explored and areas in Jamaica which have these landscapes identified.

RANGE OF CONTENT

Knowledge Students should acquire information and develop an understanding of:

- Examples of physical environmental phenomena and processes relating to Jamaica and the rest of the World
- The nature and diversity of the physical environment in Jamaica
- Key concepts of location, spatial distribution and interaction, interrelationship and pattern
- The practical aspects of the above as they relate to the learner's environment

Skills Students should have the opportunity to develop and practise the following skills:

- Using and interpreting a variety of information sources, for example, photographs, maps and textual sources
- Presenting and communicating information in a variety of ways including diagrams and models
- Social skills (for example working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)

Attitude Students should develop:

- Positive attitudes towards themselves, others and their environment
- Self-confidence, self-esteem and a simple understanding of some of their perceptions
- Appreciation of social, cultural and environmental diversity

GUIDANCE TO THE TEACHER

- Use rock samples to support lessons.
- Limestone landscapes can sometimes be unstable and dangerous. Ensure proper research is conducted and guidance sought from relevant Agencies before a field trip is undertaken.
- Ensure that students are aware of and practise safety measures when carrying out experiments.

Prior Learning

Check that students can:

- Define the terms 'rock' and 'soil'
- Identify the three major rock types and examples of each
- Design a chart showing the rock cycle

LIMESTONE ROCKS

ATTAINMENT TARGET(S):
Gain knowledge and understanding of the physical and human processes and forces that shape the patterns of the Earth's surface and influence the distribution of people.

Standard(s): Students should acquire knowledge of different places on Earth and in the Solar System and an understanding of the spatial distribution of processes occurring within the Earth, on the Earth's surface, within the atmosphere and in the Solar System. They should also recognise that human and natural environments of the Earth consist of systems that are interdependent and understand the processes and forces that shape the patterns of the Earth's surface. They should understand the environment in which they live but also appreciate the diversity of other habitats and cultures globally.

Theme: The Human Habitat: Processes and Change

OBJECTIVES

Students should be able to:

- Formulate definitions for the terms 'weathering' and 'erosion'
- Describe the main characteristics of limestone rocks
- Identify the chemical composition of limestone rocks
- List the main types of limestone rocks
- Investigate how limestone rocks are formed
- Conduct experiments to show how limestone rocks are weathered
- Link the formation of surface and underground features to the characteristics of limestone rocks
- Identify limestone features on Geological maps
- Describe surface and underground limestone features
- Citing evidence, explain the value of limestone landscapes
- Determine the environmental consequence of mining in limestone areas
- Propose reasons for the barren nature of some limestone landscapes
- Simply explain the formation of Cockpit Country in Jamaica
- Propose how resources found in the Cockpit Country area of Jamaica may be used sustainably

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

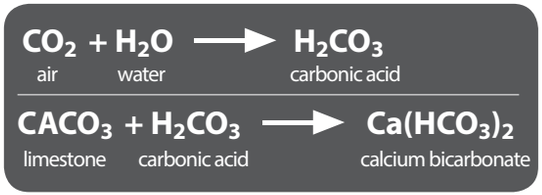
DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: In groups, given a rock kit containing various types of limestone rocks and magnifiers, examine each rock and make a list of their physical characteristics in a table. E.g. Characteristics of Limestone Rocks Given a list of selected types of limestone and a description of their characteristics, classify each limestone appropriately. Note: Rock kit may contain common types of limestone found in Jamaica – Chalk and Coral.	• Using a magnifier; observing; communicating; critical thinking; collaborating	At least three characteristics of each limestone rock identified; each rock classified

ROCK	CHARACTERISTICS	
A	*contains fossils*	*cracks*
B		
C		
D		

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, given two plastic cups, sand, gravel, sugar, water, spoons, magnifying glass, conduct an experiment to see how sedimentary rocks are made. Sand and gravel will be poured into one cup. In the second cup, mix water with sugar to form a thin syrup mix. This forms the cementing agent that exists in nature in the form of dissolved minerals. Pour this mixture into the cup of sand and gravel, and pour off excess water. Allow the 'rock' to dry and harden for about 2 days; then using a pair of scissors, remove the cup. Use a magnifying glass to observe the rock. Make notes of what is observed. Write a paragraph explaining one way in which sedimentary rocks may be formed. View online videos of sedimentary rock formation in nature. Relate the experiment to how rock formation occurs in nature.	• Observing; collaborating; critical thinking; researching for information; using magnifier; recording data	Paragraph written with accurate information
In groups, given limestone fragments and vinegar or diluted hydrochloric acid, apply the acid to the rock and examine the reaction using a magnifier. Write a description of the reaction and conduct research to determine the reason for the reaction. Discuss what solution in nature can produce a similar reaction over a longer timeframe. Experiment with Hydrochloric Acid $CaCO_3 + 2HCl \longrightarrow CO_2 + H_2O + Ca^{++} + 2Cl^{--}$ On the left side of this reaction, the mineral calcite (CaCO3) is in contact with hydrochloric acid (HCl). These react to form carbon dioxide gas (CO2), water (H2O), dissolved calcium (Ca++) and dissolved chlorine (Cl--). The carbon dioxide bubbles that will be observed are evidence that the reaction is taking place. When that occurs, calcite or another carbonate mineral is present.	• Conducting investigations; observing; using a magnifier; collaborating; critical thinking; experimenting	Investigation accurately carried out; correct reason for the reaction of the limestone to the hydrochloric acid identified
In groups, discuss how limestone may be broken down in nature. Given the individual components of the chemical reaction below, allow students to derive (unscramble) the process which would occur. Write a paragraph explaining the process -	• Critical thinking; collaborating; communicating	Chemical equation accurate; process correctly described in paragraph

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:  Given a set of words, unscramble the words to arrive at definitions for the terms 'weathering' and 'erosion'. Discuss whether the process by which limestone is broken down is erosion or weathering. Justify their decision. Review the decision arrived at by consulting information in textbooks.	• Critical thinking; communicating; collaborating	Definition accurate; process determined to be weathering
Examine both surface and underground features found in limestone landscapes. Given cue cards with the name and descriptions of features, label each limestone feature on a diagram. After viewing PowerPoint presentation showing limestone landforms, created by the teacher or downloaded from an online source, in groups, discuss ways a selected feature may have formed. Determine how the characteristics of the limestone lead to the formation of each feature. Write short paragraphs detailing formation of each feature.	• Labelling; critical thinking; collaborating	Diagram correctly labelled; process by which feature forms outlined
In groups, given a simple Geological map of a limestone region, compare with a Topographical map of the same area. Identify limestone features. View aerial photographs or use Google Maps software to examine surface limestone features in the Caribbean (Jamaica and Barbados). View photographs of Harrison's Cave in Barbados and limestone caves (for example, Cockpit Country) in Jamaica. Write descriptions of the limestone features noted.	• Map reading and interpretation; critical thinking; communicating; photograph interpretation	Limestone features correctly identified on maps; characteristics of features identified
In groups, discuss reasons karst landscapes have sparse vegetation and limited economic activities. Examine case studies of mining in the Rockfort area of Jamaica. Determine the environmental consequences of the mining activity.	• Researching for information; collaborating; critical thinking	At least one reason for the sparse vegetation and one reason for limited economic activities identified; at least two environmental consequences of mining identified
Explore the use of limestone in the home. Record their daily activities and the items used to carry out those activities. Determine the use of limestone to manufacture those products. Create a list.	• Critical thinking; researching for information	At least five items in the home which are made using limestone identified

Learning Outcomes

Students will be able to:

- ✔ Formulate definitions for the terms 'weathering' and 'erosion'
- ✔ Describe characteristics of limestone rocks
- ✔ List the types of limestone rocks
- ✔ Explain how limestone rocks are formed and weathered
- ✔ Read and interpret Geological maps
- ✔ List the value of limestone landscapes
- ✔ Appreciate the environmental consequences of mining in limestone areas
- ✔ Simply explain the formation of Cockpit Country in Jamaica
- ✔ Determine ways resources found in the Cockpit Country area of Jamaica may be used sustainably

Points to Note

- Note that there are other ways to conduct the suggested experiments. Allow students to research the various methods and select the one they would like to try.
- Calcium bicarbonate is also called calcium hydrogen-carbonate.
- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

Students should be reminded to:

- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials and encourage others to do so
- Follow guidelines to promote healthy use of ICT tools

Extended Learning

Explore areas in the home where limescale is deposited. Examine the deposits and write a short description of its appearance. Attempt to offer reasons for its formation. Does the deposit of limescale resemble the process which leads to the formation of any of the limestone features examined in class?

RESOURCES

Chalk; Computer; Coral Limestone; Diluted Hydrochloric Acid; Geology Map; Gravel; Internet; Limestone Rocks; Magnifiers; Multimedia Projector; Sand; Sugar; Topographic Map; Videos; Vinegar; Water

http://geology.com/rocks/limestone.shtml
http://www.rsc.org/Education/Teachers/Resources/jesei/limeston/teachers.pdf
http://www.cockpitcountry.com/

KEY VOCABULARY

Acid Rain; Alluvium; Calcium Carbonate; Carbonation; Cave; Chalk; Clints; Cockpit Country; Cockpits; Corrosion; Doline; Drip Features; Dry Valley; Erosion; Feature; Flow Stones; Geology; Grikes/Grykes; Harrison's Cave; Karst; Karst Scenery; Landscape; Limestone; Limestone Pillars/Limestone Columns; Mogote/Hum; Polje; Rock; Rounded Hill; Sinkhole/Swallow Hole; Solution; Speleothems; Stalactite; Stalagmite; Topography; Uvala; Water Table; Weathering

LINKS TO OTHER SUBJECTS

Agriculture; Chemistry; English Language; Information Technology; Mathematics; Social Studies

About the Unit

Fieldwork and Investigation 2

In this Unit, students will increase their knowledge of fieldwork techniques and methods of investigation. Continuous exposure will ensure that students are au fait with the sequence of activities that must be undertaken to carry out field research and present credible findings. Research methodologies and activities should be more complex and offer an opportunity for learners to build on their prior learning.

RANGE OF CONTENT

Knowledge Students should acquire information and develop an understanding of:

- Examples of human and physical environmental phenomena and processes relating to Jamaica and the rest of the World
- How physical environmental phenomena interact and the effects of such interaction
- Key concepts of location, spatial distribution and interaction, interrelationship and pattern
- The practical aspects of the above as they relate to the learner's environment

Skills Students should have the opportunity to develop and practise the following skills:

- Using and interpreting a variety of information sources, for example, photographs, diagrams and textual sources
- Presenting and communicating information in a variety of ways including diagrams and models
- Selecting and using of a variety of modes of enquiry and the proper use of equipment and techniques
- Distinguishing facts from opinions, prove simple hypotheses, and suggest sensible solutions to problems
- Social skills (for example, working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)

Attitude Students should develop:

- Positive attitudes towards themselves, others and their environment
- Self-confidence, self-esteem and a simple understanding of some of their perceptions
- Appreciation of social, cultural and environmental diversity

GUIDANCE TO THE TEACHER

- A field guide must always be provided before fieldwork is carried out. The guide should provide some information on the study area, including a map pinpointing the study area. The guide should outline the methodologies being used, including diagrams and photographs to show how various types of data are collected. The field guide must also have tables to be filled in and the research questions to be answered.
- The field study should ideally be based on a topic that has been taught in the year. This will ensure students are familiar with the basic concepts and terminology that will be used during the study. The study should utilise Grade-appropriate geographical methodology, be scientifically sound and culminate with a short written report

Prior Learning

Check that students can:

- Define the concept fieldwork
- Identify the purposes for conducting fieldwork
- Carry out simple fieldwork exercises
- Write a simple report of findings

FIELDWORK AND INVESTIGATION 2

ATTAINMENT TARGET(S):
Apply geographical knowledge and skills in understanding and solving real world problems.

Standard(s): Students should develop problem-solving, decision-making and inquiry skills through identifying problems; formulating hypotheses; planning investigations; recording; interpreting and analysing data; communicating results and drawing conclusions.

Theme: Geographical Investigation, Methods and Project Design

OBJECTIVES

Students should be able to:

- Generate a series of steps to study a selected problem/topic
- Design a simple data collection instrument
- Use an appropriate method to determine sample size or area
- Recall the definition of the terms 'population' and 'sample size'
- Collect and record data using appropriate techniques
- Summarise data using appropriate statistical diagrams
- Analyse data collected using appropriate methodologies
- Produce a report of findings
- Show willingness to ask precise questions, listen attentively to answers and precisely record the answers

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: In groups, select a topic for study and write an outline of the procedure to be followed. Identify the area and/or population to be studied. Discuss questions to be posed to persons in the sample population or questions to be answered in study area. Focus should be placed on • Stratified sampling • Field sketching and photography • Labelling of sketches and photographs and using them appropriately in report	• Critical thinking; collaborating; researching for information; observing; taking photographs; drawing; labelling	Procedure for selected study accurately outlined; data accurately gathered using the selected techniques; report written

Learning Outcomes

Students will be able to:

- ✔ Outline steps to study a selected problem/topic
- ✔ Design and use questionnaires
- ✔ Calculate sample size
- ✔ Use simple fieldwork techniques to gather data
- ✔ Ask precise questions and listen attentively
- ✔ Collect and record data using a questionnaire
- ✔ Analyse data collected
- ✔ Write a report of findings

Points to Note

- Fieldwork that takes students outside should be carefully planned as most environments present some risk. Instructions should be made available as to how to keep safe.
- The requisite permissions should be sought before students are taken off the school compound for field trips.
- If field studies involve the use of questionnaires, the questions should be vetted by the teacher to ensure they are properly structured and relevant to the study.
- A sample size of thirty persons is appropriate at this level for each group.
- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

Students should be reminded to:

- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials and encourage others to do so
- Follow guidelines to promote healthy use of ICT tools

Extended Learning

Use a Table of Random Numbers to select which persons will comprise the random sample for study.

RESOURCES

Field Guide; Questionnaire; Table of Random Numbers; Videos
Fieldwork Techniques
https://www.rgs.org/OurWork/Schools/Fieldwork+and+local+learning/Fieldwork+techniques/Fieldwork+techniques.htm

KEY VOCABULARY

Analysis; Bibliography; Equipment; Field Guide; Fieldwork; Field Notes; Methodology; Photographs; Population; Primary Data; Questionnaire; Random Sampling; Report; Sample Size; Sampling; Secondary Data; Site Visit

LINKS TO OTHER SUBJECTS

Biology; English Language; Information Technology; Mathematics; Social Studies

GRADE 8

GEOGRAPHY

TERM 3 UNITS

TERM 1

Unit 1: 5 Weeks
Interpreting Maps and Photographs 2

Map Symbols
Direction and Bearings
Measuring Curved Distances
Four-Figure Grid References
Reproducing Map Sections
Representing Height - Simple Cross-Sections

Unit 2: 2 Weeks
Movements of the Earth

Rotation and Revolution
Latitude and Longitude - Calculating Time
Eclipses
Evidence of the Earth's Shape

Unit 3 : 3 Weeks
Caribbean: Population, Migration and Settlement

Population Size and Distribution
Regional Migration
Settlement Patterns
Mapping Settlement Patterns
Dot Maps and Flow Line Maps
Statistical Diagrams - Proportional Circles

Unit 4: 2 Weeks
Pollution, Global Warming and Disease Spread

Types of Pollution
Impact of Pollution
Origin and Spread of Diseases
Influence of Climate Change
Green Technology

TERM 2

Unit 1: 4 Weeks
Weather, Climate and Vegetation

Types of Rainfall
Vegetation in Tropical Marine Climate
Statistical Diagrams - Line and Bar Graphs

Unit 2: 2 Weeks
Rivers, Groundwater and Sustainable Use of Water

Major Rivers in Jamaica
Importance of Rivers
Sustainable Use of Water in Jamaica
Influence of Climate Change

Unit 3: 3 Weeks
Limestone Rocks

Characteristics of Limestone Rocks
Weathering of Limestone
Limestone Features
Value of Limestone Landscapes
Geological Maps

Unit 4: 3 Weeks
Fieldwork and Investigation 2

Simple Fieldwork Techniques
Conducting Fieldwork
Drawing Conclusions
Ethics in Research

TERM 3

Unit 1: 3 Weeks

Resources and Secondary Economic Activities

Definition of Resources
Types of Resources Used in Secondary Economic Activities
Types of Secondary Economic Activities in Jamaica

Unit 2: 4 Weeks
Jamaica: Agro-Processing

Importance of Agro-Processing
Methods Used to Process Food
Economic and Land - Use Maps
Statistical Diagrams - Pie Charts

Unit 3: 3 Weeks
Climate Change: Causes, Effects and Conflicts in Small Island Developing States

Conflicts in the Use of Forest Resources
Impact of Manufacturing and Refining Industries
Reducing Jamaica's Carbon Footprints
Indicators of a Warming World
Influence of Climate Change on Jamaica's Resources

About the Unit

Resources and Secondary Economic Activities
In this Unit, students will expand on their knowledge of how resources are further utilised and how value is added through processing in secondary industries. Students will explore secondary industries in Jamaica and determine the main sources of the materials they use.

RANGE OF CONTENT

Knowledge Students should acquire information and develop an understanding of:
- Examples of physical environmental phenomena and processes relating to Jamaica and the rest of the World
- Key concepts of location, spatial distribution and interaction, interrelationship and pattern

Skills Students should have the opportunity to develop and practise the following skills:
- Using and interpreting a variety of information sources, for example, statistics, graphs and maps
- Presenting and communicating information in a variety of ways including diagrams and models
- Social skills (for example, working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)

Attitude Students should develop:
- Willingness to perceive and evaluate natural and cultural phenomena
- A responsible attitude towards the exploitation and conservation of resources
- Appreciation of social, cultural and environmental diversity

GUIDANCE TO THE TEACHER

- Use local resources to support the teaching of these lessons.

Prior Learning

Check that students can:

- Define the terms 'resource' and 'economic activity'
- Identify primary, secondary and tertiary economic activities

RESOURCES AND SECONDARY ECONOMIC ACTIVITIES

ATTAINMENT TARGET(S):
Gain knowledge and understanding of the physical and human processes and forces that shape the patterns of the Earth's surface and influence the distribution of people.

Standard(s): Students should acquire knowledge of different places on Earth and in the Solar System and an understanding of the spatial distribution of processes occurring within the Earth, on the Earth's surface, within the atmosphere and in the Solar System. They should also recognise that human and natural environments of the Earth consist of systems that are interdependent and understand the processes and forces that shape the patterns of the Earth's surface. They should understand the environment in which they live but also appreciate the diversity of other habitats and cultures globally.

Theme: The Human Habitat: Processes and Change

OBJECTIVES

Students should be able to:

- Recall the definition of the terms 'resources', 'renewable', 'non-renewable', 'economic activity'
- Define the concept value-added
- Define the term 'secondary economic activity'
- Identify the types of secondary economic activities in Jamaica
- Outline the types of resources used in secondary economic activities
- Establish the relationship between primary and secondary economic activities
- Assess how value is added to products as they move from a primary industry to a secondary industry
- Formulate a definition the concept economic linkage
- Explain simply the importance of establishing economic linkages

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, unscramble jumbled sentences to arrive at definitions for the terms 'resources', 'renewable', 'non-renewable' and 'economic activities'.	• Collaborating; critical thinking; communicating	Definitions formulated
In groups, given samples or pictures of products from primary economic activities and products from secondary economic activities, match the secondary product to the primary product it was made from. Example: PRIMARY PRODUCT: Milk, Bauxite Ore, Banana, Grape SECONDARY PRODUCT: Cheese, Aluminium metal, Banana Chips, Raisin SECONDARY PRODUCT: Cheese Sticks, Spoons	• Collaborating; critical thinking; photograph interpretation; creating; communicating	Secondary products correctly matched to primary products
In groups, conduct research to determine the various processes that may be used to create each product. Discuss the importance of the economic linkages that are created when products are refined several times before the final product. Given a set of raw materials that are used to make a particular product, as well as the value of each raw material and that of the finished product, discuss and formulate definitions for the terms 'economic linkages' and 'value-added'.	• Collaborating; critical thinking; researching for information; communicating	Processes for creating each product identified; definitions for 'economic linkage' and 'value added' formulated

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
Conduct research to determine the secondary economic activities which are carried out in Jamaica and the materials used in each. Create a list of secondary economic activities undertaken in Jamaica. Explain why some activities are carried out in Jamaica but others are not.	• Critical thinking; researching for information; communicating	A list of at least five secondary activities created; explanation containing at least three reasons why some activities are not carried out in Jamaica written
View video clips or do fieldwork to determine the manufacturing processes used in any local industry. In groups, create a Flow chart to show the processes.	• Collaborating; creating; communicating	Flow chart accurately created
In groups, discuss how more than one product is created from a single raw material. Design a Concept map to show each product and the processes which are used to refine the raw material.  	• Collaborating; critical thinking; creating; communicating	Concept map accurately created; at least four products identified from the raw material given
In groups, expand on the Concept map to show how the products may be used in other economic sectors. Based on the expanded map, in groups, formulate a definition of 'economic linkages' and create a list outlining the importance of economic linkages.	• Creating; collaborating; critical thinking; communicating	Expanded Concept map created; definition of 'economic linkages' revised; list outlining the importance of economic linkages created

Learning Outcomes

Students will be able to:

- ✔ Write definitions for the terms 'resources', 'renewable', 'non-renewable', 'economic activity', 'secondary economic activity'
- ✔ Identify types of secondary economic activities
- ✔ Outline the types of resources used in secondary economic activities
- ✔ Link primary and secondary economic activities
- ✔ Explain the value-added process
- ✔ Explain the concept of economic linkage

Points to Note

- One primary product may produce several secondary products and by-products.
- Some secondary industries may further refine materials from other secondary industries.
- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

Students should be reminded to:

- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials and encourage others to do so
- Follow guidelines to promote healthy use of ICT tools

Extended Learning

Select a primary or secondary product that you think may be used to make something else. Describe the process that would be used to refine the product selected.

RESOURCES

Computer; Internet; Multimedia Projector; Photograph
https://www.saisd.net/admin/curric/sstudies/resources/teacher_zone/Hands_On/geo_culture/pdf/ho_wg_4econ_activi.pdf

KEY VOCABULARY

Economic; Economic Activity; Economic Linkages; Economy; Human Resource; Natural Resource; Non-Renewable; Primary Economic Activity; Products; Raw material; Renewable; Resources; Secondary Economic Activity; Tertiary Economic Activity; Value-Added

LINKS TO OTHER SUBJECTS

Agricultural Science; English Language; Chemistry; Mathematics; Social Studies; Visual Art

About the Unit

Jamaica: Agro-Processing
In this Unit, students will be introduced to a set of secondary industries which forms an important part of Jamaica's economy. The various ways raw materials from agriculture, forestry and fishery are processed will be explored, and the potential which resides in these types of industries deliberated. Students will be required to use appropriate statistical diagrams to represent data which is used in this Unit.

RANGE OF CONTENT

Knowledge Students should acquire information and develop an understanding of:
- Examples of physical environmental phenomena and processes relating to Jamaica and the rest of the World
- Key concepts of location, spatial distribution and interaction, interrelationship and pattern

Skills Students should have the opportunity to develop and practise the following skills:
- Using and interpreting a variety of information sources, for example, statistics, photographs, graphs and maps
- Presenting and communicating information in a variety of ways including diagrams and models
- Social skills (for example working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)
- Selecting and using of a variety of modes of enquiry, both geographical and general in nature
- Using proper equipment and technique in field investigations
- Synthesising and evaluating information to make informed judgements and suggest adequate solutions to problems

Attitude Students should develop:
- A responsible attitude towards the exploitation and conservation of resources
- Appreciation of social, cultural and environmental diversity

GUIDANCE TO THE TEACHER

- Invite Junior Achievement Jamaica to engage students in matters concerning financial literacy and entrepreneurship.
- Ensure that all students possess the requisite permissions from parents and guardians before they are allowed to participate in field excursions.

Prior Learning

Check that students can:

- Define the terms 'primary economic activity' and 'secondary economic activity'
- Identify manufactured products they consume

JAMAICA: AGRO-PROCESSING

ATTAINMENT TARGET(S):
Gain knowledge and understanding of the physical and human processes and forces that shape the patterns of the Earth's surface and influence the distribution of people.

Standard(s): Students should acquire knowledge of different places on Earth and in the Solar System and an understanding of the spatial distribution of processes occurring within the Earth, on the Earth's surface, within the atmosphere and in the Solar System. They should also recognise that human and natural environments of the Earth consist of systems that are interdependent and understand the processes and forces that shape the patterns of the Earth's surface. They should understand the environment in which they live but also appreciate the diversity of other habitats and cultures globally.

Theme: The Human Habitat: Processes and Change

OBJECTIVES

Students should be able to:

- Formulate a definition for the concept of agro-processing
- Outline the various types of agro-processing
- Discuss the importance of agro-processing
- Develop logical arguments to explain the location of agro-processing plants
- Investigate the various ways food and other products are processed from agricultural items in Jamaica
- Differentiate between food preservation and processing
- Explain the importance of food processing
- Suggest new ways agricultural items may be processed
- Suggest environmentally friendly ways of processing agricultural products
- Conduct a case study of an agro-processing plant in Jamaica

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, unscramble a set of words/phrases to arrive at a definition for the term 'processing'. Compare definition to that in textbook or an online source. Revise definition if required.	• Critical thinking; collaborating; communicating	Words unscrambled to arrive at a correct definition; definition reformulated based on textbook or online source
In groups, given material which originate from forestry, fishing or farming, brainstorm the various ways the material may be processed and used. Create a diagram to show the ways identified. Discuss each method with the class. Suggest new ways crops may be processed and used. From the activity, formulate a definition for the concept of agro-processing. Conduct research online to refine the definition formulated.	• Critical thinking; creating; drawing; collaborating; communicating; researching for information	At least three ways each material given may be processed and used identified; at least one 'new' method suggested for one or a combination of the materials given; correct definition found from research conducted
In groups, conduct research to determine the ways/methods material from agriculture, forestry and fishing activities in Jamaica are processed and used. Create a photo-gallery or another appropriate form of presentation to show the various types of agro-processing activities in Jamaica and the methods used for processing.	• Researching for information; collaborating; creating; communicating	At least five ways/methods are processed and used; photo-gallery showing the processes accurately sequenced

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: Conduct an experiment to show how processing increases shelf life. Record data accurately and use data to determine the benefits and disadvantages of food processing. Example: 1) Using pickling to preserve foods such as pepper versus leaving a pepper in its natural state 2) Drying fruits versus leaving them in their natural state Each group should take pictures daily to show the changes noted. Create a photo-gallery showing the changes over time.	• Experimenting; recording data; creating; communicating	Experiment correctly carried out; data from experiment accurately recorded; list of benefits and disadvantages of processing proposed
In groups, locate on a map various types of agro-processing plants in Jamaica. Examine the area, around each agro-processing plant. Based on the maps, make a list of the possible reasons for the location of the plant. Share and discuss list with the class.	• Map reading and interpretation; critical thinking; collaborating creating; communicating	Agro-processing plants accurately located on a map; maps accurately read for relevant information; list created based on information gathered from map; at least two reasons for the location of each agro-processing plant given
Select one agro-processing plant and investigate the method of processing that takes place in that plant. Represent the sequence of activities on a diagram. Present the diagram to the class and explain the processes.	• Critical thinking; investigating; recording data; drawing; creating; communicating	Data from investigation accurately recorded; accurate sequencing of activities undertaken during processing.

Learning Outcomes

Students will be able to:

- ✔ Formulate a definition for the concept of agro-processing
- ✔ Logically explain why a site is selected for a particular activity
- ✔ Design a diagram to show the sequences in a process
- ✔ Explain the importance of various types of agro-processing activities
- ✔ Understand the various ways food and other products are processed from agricultural items in Jamaica
- ✔ Differentiate between food preservation and processing
- ✔ Explain the importance of food processing
- ✔ Suggest new ways agricultural items may be processed
- ✔ Suggest environmentally friendly ways of processing agricultural products
- ✔ Conduct a case study of an agro-processing plant in Jamaica

Points to Note

- Ensure students realise that processing does not necessarily mean that the material has been converted to something new with no resemblance to the original product. Processing may involve very simple methods that barely change the original product to very complex methods that results in greater changes.
- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

Students should be reminded to:

- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials and encourage others to do so
- Follow guidelines to promote healthy use of ICT tools

Extended Learning

Propose a new way of processing a selected raw material from either agriculture; fishery or forestry. Record the steps in the method of processing and explain what the end product would be. List the industries from which materials would be needed.

RESOURCES

www.fao.org/home/

KEY VOCABULARY

Agriculture; Agro–Processing; By-Products; Cottage Industry; Downstream Industries; Drying; Fishery; Food Processing; Forestry; Harvesting; Industrial Linkages; Industrial Location; Perishable; Preserving; Processing; Raw Materials; Sector; Transformation; Value-Added

LINKS TO OTHER SUBJECTS

English Language; History; Home Economics; Integrated Science; Mathematics; Physical Education; Physics; Social Studies

About the Unit

Climate Change: Causes and Effects and Conflicts in Small Island Developing States

In this Unit, students will learn about the causes of climate change and consequences for Small Island Developing States like Jamaica. The nature and origins of greenhouse gasses will be explored. The impact of these gases on the atmosphere and consequently, global temperatures, will be explored. The conflicts which arise from the utilisation of forest resources will be discussed. As students are immersed in the activities, they are expected to develop innovative ways of reducing their carbon footprints as part of the global initiative to reduce human-induced global warming.

RANGE OF CONTENT

Knowledge Students should acquire information and develop an understanding of:

- Examples of human and physical environmental phenomena and processes relating to Jamaica and the rest of the World
- How physical environmental phenomena interact and the effects of such interaction
- Key concepts of location, spatial distribution and interaction, interrelationship and pattern
- The practical aspects of the above as they relate to the learner's environment

Skills Students should have the opportunity to develop and practise the following skills:

- Using and interpreting a variety of information sources, for example, photographs, diagrams and textual sources
- Presenting and communicating information in a variety of ways including diagrams and models
- Selecting and using of a variety of modes of enquiry, and using equipment and implementing techniques properly
- Distinguishing facts from opinions, proving simple hypotheses, and suggesting feasible solutions to problems
- Social skills (for example, working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)

Attitude Students should develop:

- Positive attitudes towards themselves, others and their environment
- Sensitive awareness of the aesthetic quality of the natural environment and a desire to maintain their quality
- Sensitivity towards the interplay of conflicting needs involved in environmental planning
- A responsible attitude towards the exploitation and conservation of resources
- Self-confidence, self-esteem and a simple understanding of some of their perceptions

GUIDANCE TO THE TEACHER

- The opinions as to whether the climate is changing are wide and varied. Allow students to explore all arguments and evidence and draw their own conclusions.

Prior Learning

Check that students can:

- Explain what is meant by global warming
- Define the terms 'weather' and 'climate'
- Suggest reasons for increasing atmospheric temperatures

CLIMATE CHANGE: CAUSES, EFFECTS AND CONFLICTS IN SMALL ISLAND DEVELOPING STATES

AT3

ATTAINMENT TARGET(S):
Recognise the interdependent relationship between humans and the natural environment.

Standard(s): Students should develop an understanding of the environment as a system of interdependent components affected by human activity and natural phenomena. They should also recognise the significance of using past and present events to make predictions for the future and apply sustainable practices in preserving the environment for future generations.

Theme: Environmental Awareness, Change and Sustainability

OBJECTIVES

Students should be able to:

- Simply explain how the Earth's atmosphere is heated
- Formulate a definition for the concept of climate change
- Outline the concept of climate change
- Identify the most common greenhouse gases and generate a list of their possible natural and anthropogenic/human origins
- Define the terms 'greenhouse gas', 'greenhouse effect', 'carbon credit', 'carbon footprint'
- Identify indicators of a warming world and determine which indicators apply to Jamaica
- Outline the various activities in Jamaica which may contribute to climate change
- Assess the benefits and challenges of preserving and using forest resources
- Connect changes in vegetation to temperature changes on Earth
- Propose possible changes to weather elements and weather systems in the Caribbean due to increases in greenhouse gases in the atmosphere
- Suggest how changes in climate will affect the natural and human environments in the Jamaica
- Discuss the impact that human-induced climate change will have on the coastal resources in Jamaica
- Suggest possible benefits of climate change
- Interpret maps which forecast changes to the physical landscape in Jamaica due to sea-level rise
- Calculate the carbon footprints generated from various human activities
- Implement measures to reduce the carbon footprint of the school or household
- Propose ways in which the negative effects of climate change may be reduced or prevented
- Recognise the possible impact of climate change on the global community

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria

Students will:

In groups, use thermometers to measure the temperature of the air over different surfaces at selected points during the day. Measure temperature readings at 2 cm above the surface. Record on a data sheet

E.g.

Daily Atmospheric Temperature Changes at Selected Locations

SURFACE TYPE	TEMPERATURE		
	9 a.m.	12 a.m.	2 p.m.
Tarmac/Asphalt			
Bare Soil			
Grass			
Under Trees			

Record the temperature of the atmosphere of each location in a table. Draw Line graphs to show the temperature changes for each location during the course of the day. Relate the temperatures recorded to the surface type of the area. Explain findings to the class.

- Using weather instruments; collaborating; recording data; critical thinking; communicating

Thermometer accurately held/ used; temperature accurately measured and recorded; graph axes correctly scaled; lines accurately plotted on graph

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, conduct research, using online and offline sources, on the concept of climate change. Based on their research construct a definition of 'global climate change'.	• Researching for information; collaborating; critical thinking; communicating	Definition formulated
Download timeline photographs from online sources showing evidence that the Earth's climate may be changing. Create a photo-gallery and explain the images to the class. Identify the characteristics from the pictures which indicate that the climate may be changing. Groups may examine photographs showing: 1. The changing extent of Arctic ice 2. The changing water levels in major rivers and lakes 3. Longer and more extensive droughts 4. More destructive wet seasons	• Researching for information; critical thinking; creating; photograph interpretation; labelling photographs	At least three sets of before and after pictures of a selected place presented in a photo-gallery; at least three characteristics indicating changing climate labelled; list of at least five factors which indicate a warming world created
View video on greenhouse gases and create a list of the most common gases and their sources. Formulate a definition of the term 'greenhouse gas'. Compare the definition formulated to the definition in an online or offline source. Revise definition accordingly.	• Observing; critical thinking; researching for information.	List of at least five common greenhouse gases created; definition formulated and revised
In groups, conduct an experiment to show the greenhouse effect. Fill two 2 litre soda bottles with water to the halfway mark. In one bottle place several antacid tablets (these contain carbon) and allow to dissolve. Insert a thermometer in both bottles and seal with a cap. Record the temperature readings of both thermometers. Shine a lamp capable of heating the water in the bottle or place outside in direct sunlight for an hour. Leave the second bottle indoors. Record the reading of the thermometers after an hour. Explain findings to the class.	• Experimenting; recording data; critical thinking; creating; collaborating; communicating; accurately using and reading a thermometer	Thermometers accurately used; thermometers accurately read and values recorded; accurate explanation for temperature differences given

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: In groups, conduct research online to determine the meaning of the terms 'carbon credit' and 'carbon footprint'. Using an online calculator, determine the carbon footprints from domestic energy use. Each group may use the electricity bill of households of members of the group. Determine ways to reduce the carbon footprints of households, and make a list and present to the class.	• Collaborating; critical thinking; communicating	Carbon footprints accurately calculated; list of at least five ways to reduce carbon footprints produced
View photographs of seasonal changes in vegetation in the Northern and Southern Hemispheres. Describe the changes. Examine graphs showing changes in the level of carbon gases in the atmosphere seasonally and the temperature changes. Describe the changes. In groups, discuss and explain the possible linkages between vegetation changes, and levels of carbon gases and temperature of the atmosphere.	• Photograph interpretation; interpreting graphs; critical thinking; collaborating; communicating	Changes in vegetation accurately described; changes in temperatures and carbon levels described; accurate linkage between vegetation change and carbon levels suggested; link made to increase/decrease in temperature
In groups, examine photographs of coastal zones and resources in Jamaica which have shown changes attributed to climate change. Identify the changes noted and explain how climate change contributed to the changes. Discuss and suggest ways to mitigate the effects noted.	• Photograph interpretation; interpreting graphs; critical thinking; collaborating; communicating	At least five changes noted on the maps and one way to mitigate each proposed
In groups, brainstorm the benefits and disadvantages of living in a warmer world. Propose the changes that would need to be made to different aspects of life. Determine what kind of business you and your group could start to provide some of the goods and services that would be needed (each group should suggest a business from the primary, secondary and tertiary sectors).	• Critical thinking; collaborating; creating	At least three benefits and three disadvantages of global warming identified
In groups, interpret maps which show predicted changes to the physical landscape in Jamaica due to sea-level rise. Identify the effects of sea-level rise on the physical landscape. Relate the changes to the photographs studied before.	• Map reading and interpretation; critical thinking; communicating; collaborating	At least five changes to the physical landscape identified; accurate link made to photographs

Learning Outcomes

Students will be able to:

- ✔ Define the terms 'greenhouse gases', 'greenhouse effect', 'carbon credit', 'carbon footprint'
- ✔ Write a definition for the concept of climate change
- ✔ List the most common greenhouse gases
- ✔ List the possible natural and anthropogenic origins of selected greenhouse gases
- ✔ Outline the ways in which deforestation leads to climate change
- ✔ Explain the benefits of preserving and using forest resources
- ✔ Explain the possible changes to each weather elements and weather systems in the Caribbean due to increases in greenhouse gases in the atmosphere
- ✔ Suggest at least five ways in which changes in climate will affect the natural and human environments in the Caribbean
- ✔ Calculate the carbon footprint of their school or household
- ✔ Implement measures to reduce the carbon footprint of the school or community
- ✔ Describe ways in which the effects of climate change may be reduced or prevented
- ✔ Show the possible impact of climate change on the immediate community

Points to Note

- Drought conditions may last for several years. Changes in weather patterns associated with drought should not be confused with climate change.
- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

Students should be reminded to:

- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials and encourage others to do so
- Follow guidelines to promote healthy use of ICT tools

Extended Learning

Interview elders in your community. Inquire about changes in the environment which they may relate to changes in the climate of the area. Collect photographic evidence of the physical changes of your community over the last ten years. Can any of the changes be related to climate change?

RESOURCES

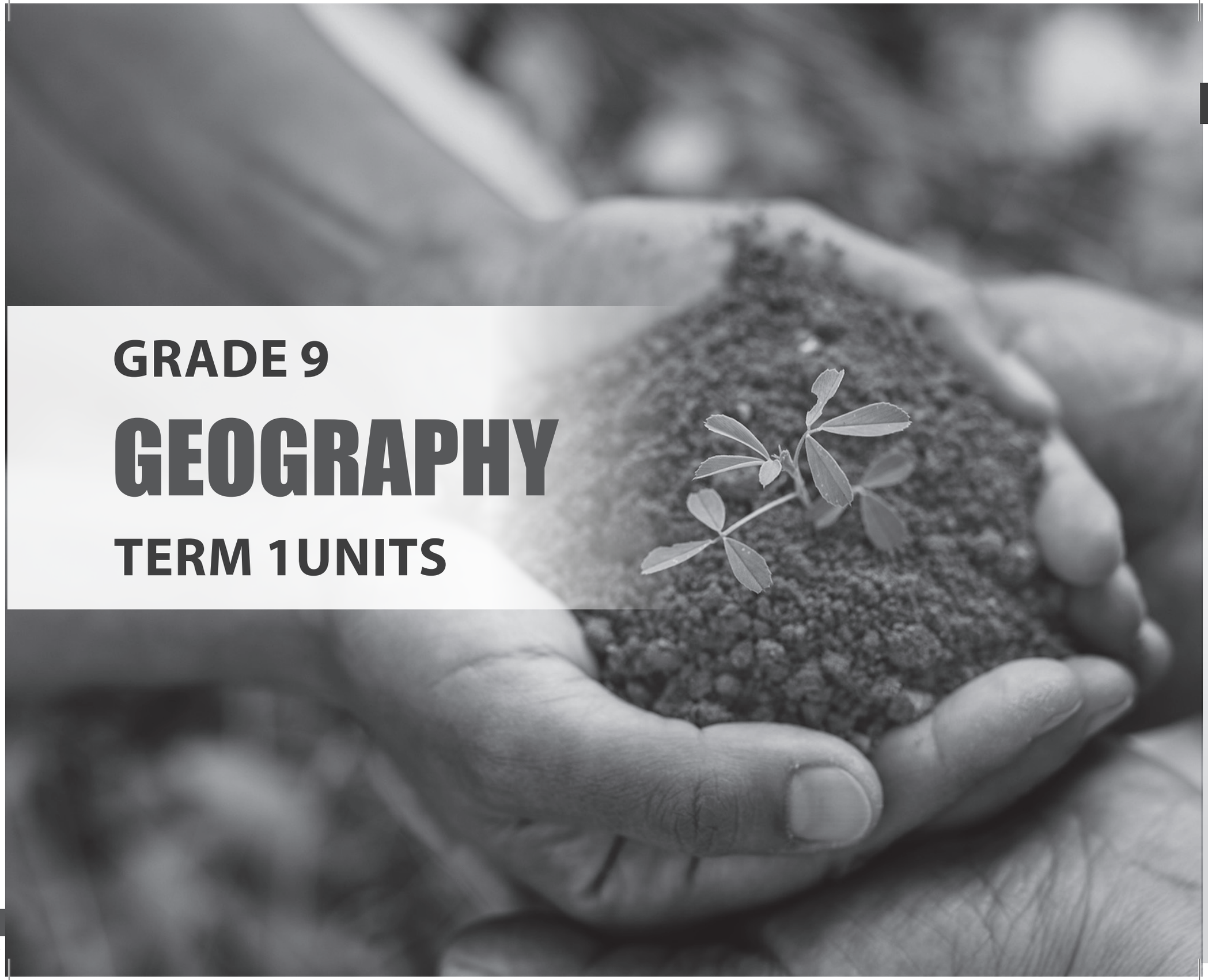
Carbon Footprint Calculator; Photographs; Thermometers
http://climate.nasa.gov/
http://climatekids.nasa.gov/greenhouse-effect/

KEY VOCABULARY

Anthropogenic; Atmosphere; Carbon; Carbon Credit; Carbon Footprint; Carbon Sink; Carbon Store; Climate; Climate Change; Climate Variability; Conservation; Deforestation; Disaster; Forest; Glacier; Global Warming; Greenhouse Effect; Greenhouse Gases; Human; Mitigation; Natural; Pollution; Preservation; Reduction; Resources; Sea-level Rise; Temperature; Weather

LINKS TO OTHER SUBJECTS

Biology; Chemistry; English Language; History; Mathematics; Physics; Social Studies



GRADE 9

GEOGRAPHY

TERM 1UNITS

TERM 1

Unit 1: 3 weeks
Earth System Science

The Atmosphere, Hydrosphere, Biosphere and Lithosphere
Caring for the Earth – Green Technology

Unit 2: 5 Weeks
Interpreting Maps and Photographs 3

Map Symbols
Direction and Bearings
Measuring Curved Distances
Six-Figure Grid References
Contour Patterns: Landform Types and Shapes
Cross-Sections and Intervisibility
Gradient
Sketch Maps
Analysing Maps
Reproducing Map Sections

Unit 3: 3 weeks
World: Population, Migration and Settlement

International Migration
Human Trafficking
Settlement Distribution
Global Security and Safety
Flow Maps
Statistical Diagrams

Unit 4: 1 week
Careers in Geography

TERM 2

Unit 1: 4 weeks
Weather, Climate and Vegetation

Types of Biomes
Characteristics of Tropical Biomes
Influence of Climate Change on Biomes

Unit 2: 6 weeks
Internal Forces and Processes of the Earth

Structure of the Earth
Plate Tectonics
Natural Hazards
Evacuation Planning

Unit 3: 2 weeks Fieldwork and Investigation 3

Fieldwork Techniques
Conducting Fieldwork
Drawing Conclusions
Ethics in Research

TERM 3

Unit 1: 1 week
Resources and Tertiary Economic Activities

Types of Resources Used in Tertiary Economic Activities
Types of Tertiary Economic Activities

Unit 2: 3 weeks
Jamaica: Tourism

Types of Resources Used in Tourism
Location of Tourism in Jamaica
Types and Characteristics of Tourism in Jamaica
Importance of Tourism
Impact of Climate Change on Tourism in Jamaica
Coral Reefs

Unit 3: 5 weeks
Caribbean Weather Systems

Depressions, Tropical Storms and Hurricanes
Cold Fronts
Impact of Climate Change on Caribbean – El Nino Southern Oscillation
Weather Maps and Symbols
Managing Hazards/Disasters

About the Unit

Earth System Science
In this Unit, students will learn about the interactions and connections between the four spheres which make up the Earth's System. Students will learn to determine how activity in one sphere causes a domino effect that affects the other spheres. By recognising and understanding the interactions between the spheres, students will be better equipped to care for the Earth.

RANGE OF CONTENT

Knowledge Students should acquire information and develop an understanding of:
- The characteristics of the Earth the interactions of its spheres
- The interaction of physical and human phenomena
- Spatial interaction and change over time

Skills Students should have the opportunity to develop and practise the following skills:
- Using and interpreting information from a variety of sources–videos, photographs, textual sources
- Reading and understanding simple geographical terminology
- Synthesising and evaluating information
- Social skills (for example, working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)

Attitude Students should develop:
- Positive attitudes towards themselves, others and their environment
- Self-confidence, self-esteem and a simple understanding of some of their perceptions
- Willingness to perceive and evaluate natural phenomena from a scientific point of view

GUIDANCE TO THE TEACHER

- This introduction to Earth System Science demands some basic knowledge of the sciences as well as Mathematics.
- Remember that some students may be adversely affected by some of the events that are selected for discussion. Ensure that fellow students demonstrate an appropriate level of sensitivity.

Prior Learning

Check that students can:

- Explain why Earth is the only habitable planet in the Solar System
- Describe the components of the Solar System

EARTH SYSTEM SCIENCE

ATTAINMENT TARGET(S):
Recognise the interdependent relationship between humans and the natural environment.

Standard(s): Students should develop an understanding of the environment as a system of interdependent components affected by human activity and natural phenomena. They should also recognise the significance of using past and present events to make predictions for the future and apply sustainable practices in preserving the environment for future generations.

Theme: Environmental Awareness, Change and Sustainability

OBJECTIVES

Students should be able to:

- Identify the components of Earth's System
- Formulate definitions for lithosphere, hydrosphere, biosphere, atmosphere, system, open system, closed system
- Describe the characteristics of each of the Earth's spheres and explain the importance of each
- Differentiate between open systems and closed systems, using examples of each
- Given specific scenarios, explain the interactions between a natural or human induced event and each of the four components of the Earth's System
- Given specific natural or human induced events, explain the cause and effect relationships which exists among the four components of the Earth
- Show how some events which lead to interactions between components of Earth's systems may contribute to global warming
- Describe the effects of increasing temperature of the atmosphere on the other components of the Earth's System
- Conduct Earth System Science Analyses for local and global events
- Explain the importance of understanding the interactions between the various components of the Earth
- Identify the components of Green Technology and explain how Green Technology may be used to care for the Earth
- Demonstrate ways to care for the Earth

ICT ATTAINMENT TARGETS:

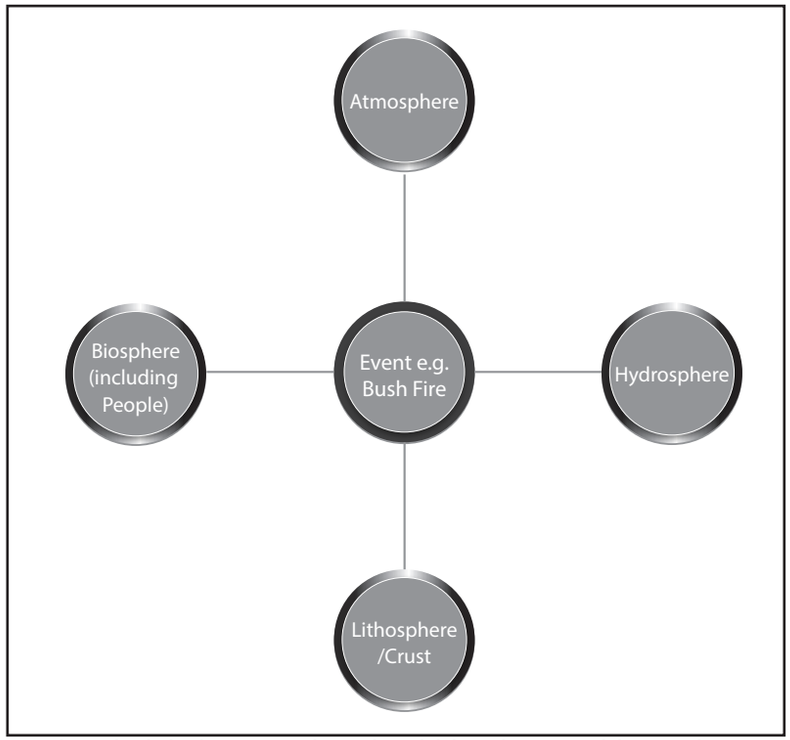
COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

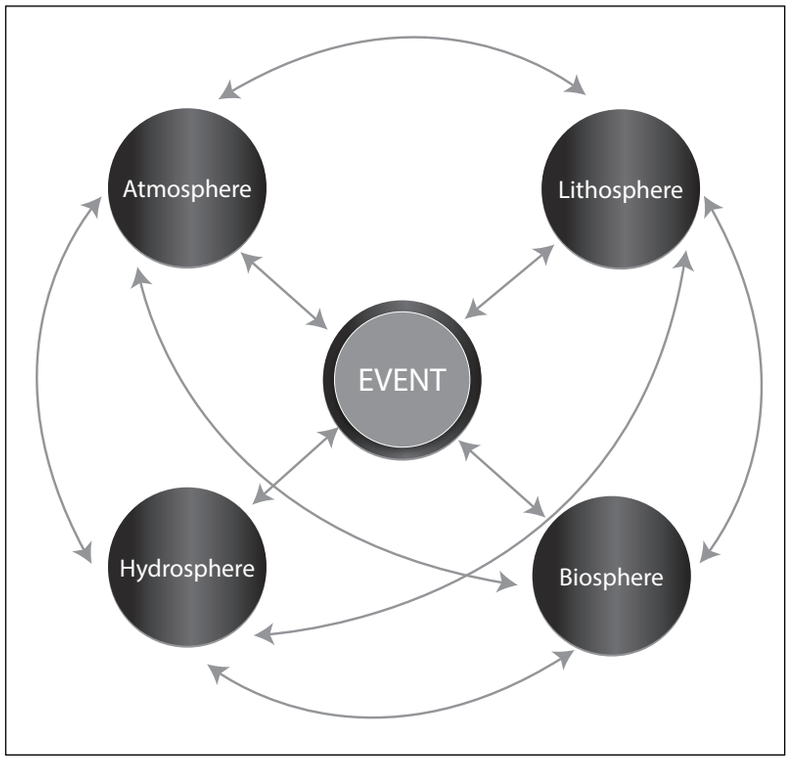
RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
Using a Geography dictionary or credible online sources, research the definition for the term 'system' as used in Geography. Write the definitions discovered. In groups, given photographs or diagrams or models of various systems (for example – the Solar System; the human body; the rock cycle; the global hydrological cycle; an ecosystem), create a simple outline of how the system works in a sequence. Based on the sequence, determine whether the system may be considered 'open' or 'closed' and formulate definitions for 'open system' and 'closed system'. Compare definitions to online definition.	• Researching for information; interpreting photographs; collaborating; critical thinking; communicating	Definition for system written; sequence of how each system works correct; At least one closed system and two open systems identified; working definition for open and closed systems formulated
Select a natural area in the parish or community. This natural area may contain a river or pond, or be beside the sea. Observe and make notes of the various spheres of the Earth that are present in this natural area. When each sphere is identified, name the elements in each sphere. Use all the information gathered to generate a definition and description for each sphere. Photograph the site and label each photograph for reference in later lessons.	• Observing; taking photographs; communicating	All three or four spheres at the site selected identified- the atmosphere, biosphere, lithosphere and hydrosphere; at least five elements in each sphere identified; definition and descriptions generated for each sphere; photograph taken and labelled

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: In groups, given a photograph, identify the components/ spheres of the Earth's System seen. Based on the aspects noted generate their own definitions of each sphere. Share these definitions, compare to the definitions online or in textbooks, and modify accordingly.	• Observing; collaborating; critical thinking; defining geographical concepts; communicating	Elements within the spheres identified; definitions of each spheres correctly formulated
In groups, use paper arrows and paper circles to create graphic organisers or use digital graphic organisers to create a chart to show the effects of a given event on each of the four spheres. Example: **List of effects of a Bush Fire on the Atmosphere, Biosphere, Hydrosphere and Lithosphere**  Local and global events that should be discussed by each group include: bush fires; dump fires; African dust; floods; drought; pollution from domestic and industrial waste (specify), burning of trees to produce charcoal, volcanic eruption; deforestation. Create a graphic organiser for presentation to the class.	• Collaborating; critical thinking; communicating; creating	Graphic organiser created; at least one effect of the event on each sphere identified

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: In groups, given a set of arrows (each arrow should be wide enough for students to write on), brainstorm and discuss how a given event impacts each of Earth's spheres and the cause and effect relationships which will in-turn occur between spheres. Write a brief explanation on the cause and effect interactions on each arrow, and create a graphic organiser model. Present and explain model to the entire class. **Graphic Organiser Showing the Cause and Effect Relationships Among the Spheres and the Event being Studied.**  	• Collaborating; critical thinking; communicating; creating	Graphic organiser created; at least one effect of event on each sphere identified; at least one effect of each sphere on the other three spheres identified
View a video which details an event and its effects. Extract the cause and effects of the event from the video and create a table. In groups, use the following steps to conduct simple Earth System Science analyses to determine the positive and negative effects of the event. Brainstorm and conduct research to determine measures that may be used to combat and reverse the negative effects.	• Collaborating; critical thinking; communicating; creating	List includes at least one cause and two effects of the event; Earth System Science Analysis correctly conducted; graphic organiser includes the three steps

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: **Step 1: Event to Sphere Interaction** How would the event affect each sphere? **Step 2: Sphere to Event Interaction** How would each sphere affect the event? **Step 3: Sphere to Sphere Interaction** How would the impact on one sphere affect the other spheres? If certain changes occurred in one sphere because of the event, how will those changes cause change in other spheres? Offer scientific explanations as to why the interactions occur.		
In groups, recall or formulate a definition of the term global warming. Identify the causes of global warming and determine the various ways global warming may occur from the various events for which Earth System Science Analyses were carried out.	• Critical thinking; communicating; analysing geographic information; collaborating	Comprehensive definition of global warming given; at least two causes global warming identified; at least one way the events analysed contributes to global warming identified
Individually, write a paragraph which identifies at least three reasons why it is important to study and understand the interactions between the Earth's components.	• Critical thinking; communicating	Three reasons suggested; feasible justifications provided
Identify how some of their daily activities impact the components of the Earth's System. Write daily reflections on changes they are making to reduce any negative impact the activities identified may be causing.	• Communicating; critical thinking	Negative impacts of activity identified; reflection written

Learning Outcomes

Students will be able to:

- ✔ List the components of Earth's System
- ✔ Formulate definitions for lithosphere, hydrosphere, biosphere, atmosphere, system, open system, closed system
- ✔ Describe the hydrosphere, atmosphere, lithosphere and biosphere
- ✔ Identify at least five elements of each of Earth's spheres
- ✔ Explain the interactions between a natural or human induced event and the four components of the Earth's System
- ✔ Explain the cause and effect relationships which exist between the four components of the Earth
- ✔ Show how some events which lead to interactions between the systems may contribute to global warming
- ✔ Identify the effects of global warming of the atmosphere on the other components of the Earth's System
- ✔ Conduct Earth System Science Analyses for local and global events
- ✔ Explain the importance of understanding the interactions between the various components of the Earth
- ✔ Demonstrate ways to care for the Earth

Points to Note

- The events that are used in the initial phase should be localised events to which the students can relate. Gradually move students to analysing regional and global events.
- Each sphere is a component of the Earth's System
- Within each sphere are many elements – for example, within the Hydrosphere, a fish is an element.
- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

Students should be reminded to:

- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials and encourage others to do so
- Follow guidelines to promote healthy use of ICT tools

Extended Learning

Conduct an Earth System Science Analysis for the last major volcanic eruption in the Caribbean. Explain the regional and global impact of the selected volcanic eruption.

RESOURCES

Cartridge Paper; Clipboard; Computer; Google Earth Software; Machines; Media Articles; Models of the Earth; Multimedia Projector; Photographs; Videos
https://www.classzone.com/books/earth_science/terc/content/investigations/es0103/es0103page08.cfm
http://www.gma.org/ESSEA/K-4/outline/week03_1.asp
http://www.cotf.edu/ete/ess/essmain.html

KEY VOCABULARY

Atmosphere; Biosphere; Cause; Closed System; Crust; Earth; Effect; Event; Human-Induced; Hydrosphere; Interactions; Lithosphere; Natural; Open System; Relationship; System

LINKS TO OTHER SUBJECTS

Biology; Chemistry; English Language; History; Mathematics; Physics; Social Studies

About the Unit

Interpreting Maps and Photographs 3

In this Unit, the students' map reading and interpretation skills will be further developed through practise and the introduction of more advanced skills. It is expected that the learners will have achieved mastery with their basic map reading skills. Students' spatial thinking abilities will be further developed. These skills will be advantageous in an increasingly global and technological society.

This Unit places increased emphasis on photograph interpretation. Photographs allow for changes in time to be documented more readily than through the use of maps. Students will use photographs to make observations about the past and compare it to the present. Photographs will also be compared to maps to show changes in space over time, which is also an important tool in geographical analysis.

RANGE OF CONTENT

Knowledge Students should acquire information and develop an understanding of:
- Human and physical environmental phenomena and processes relating to Jamaica and other places.

Skills Students should have the opportunity to develop and practise the following skills:
- Extracting information from maps and photographs and establishing simple geographical relationships
- Drawing sketch maps and relating maps to photographs and other sources of information
- Social skills (for example working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)

Attitude Students should develop:
- Positive attitudes towards themselves, others and their environment
- Self-confidence, self-esteem and a simple understanding of some of their perceptions
- Willingness to perceive and evaluate natural phenomena

GUIDANCE TO THE TEACHER

- Review and revise the skills students were introduced to at the previous Grade levels before proceeding to more complex tasks.
- Maps should be reproduced in colour where possible – simple maps may be obtained from online sources.
- For outdoor activities, ensure students are properly hydrated and are protected from heat stress and sunburn.

Prior Learning

Check that students can:

- Identify different types of maps
- Find location using four figure grid references
- Use an eight point compass
- Identify simple landforms from contour patterns

INTERPRETING MAPS AND PHOTOGRAPHS 3

ATTAINMENT TARGET(S):

Appreciate the importance of maps, photographs and statistical diagrams to the study of Geography and their importance in everyday life.

Standard(s): Students should develop map reading and interpretation skills and the ability to interpret a range of photographs for geographical information. In addition, be able to use mathematical reasoning as a tool for problem–solving and as a means of extracting information from various sources representing geographical data.

Theme: Spatial Thinking and Analysis: Maps, Photographs and Statistical Diagrams.

OBJECTIVES

Students should be able to:

- Construct and use a sixteen point Compass Rose
- Use a protractor to measure angular bearing from one point to another
- Establish the direction and bearing of one point from another point on a map and use that process to explain the relationship between compass direction and angular bearing
- State the absolute location of places using four and six figure grid references
- Identity the ways in which a map scale may be represented and convert the scale from one form to another
- Measure curved and straight line distances between points on maps
- Calculate distances using map scales
- Enlarge and reduce map sections to scale
- Calculate the new scale for enlarged or reduced sections of maps
- Identify and differentiate between small scale and large scale maps
- Identify, describe and annotate types of landforms represented by contours patterns on maps
- Describe in simple terms the types of slopes that are represented by contour patterns on maps
- Calculate the gradient of slopes in straight lines and along curved paths
- Construct and annotate cross-sections and determine intervisibility between points on each cross-section
- Use the Legend/Key to identify the human activities that are undertaken in a given area
- Suggest reasons for the distribution of specific natural features and human activities over an area represented on a map or photograph
- Sketch and label a base map from an aerial photograph or satellite imagery
- Compare maps and photographs of the same place at different points in time and from different perspectives to determine changes, identify trends and generalise about human activities
- Use global coordinates to find location

ICT ATTAINMENT TARGETS:

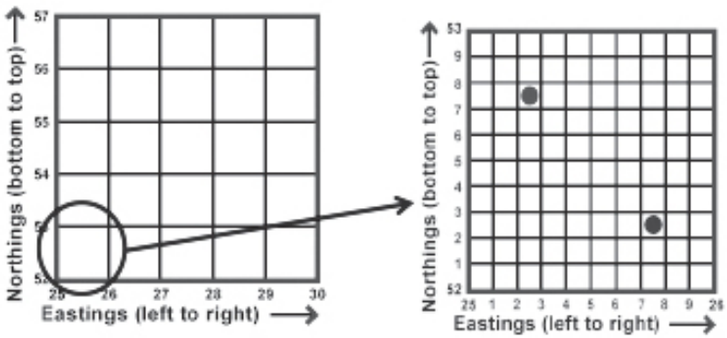
COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

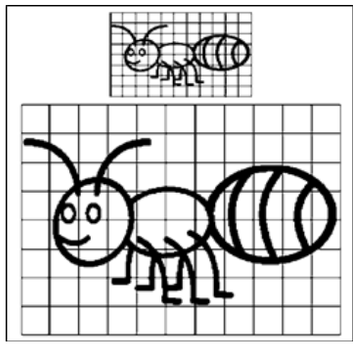
RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In small groups, use a protractor and paper arrows to construct a sixteen point Compass Rose. Use a magnetic compass to properly align the sixteen point Compass Rose based on their location. Compare the compass constructed to other groups' compasses which should all be aligned the same way.	• Using magnetic compass; Constructing Compass Rose; communicating information; collaborating; using a protractor	Sixteen point Compass Rose accurately constructed – each point 22.5º apart; magnetic compass used accurately and Compass Rose accurately aligned
In groups, create a sketch map of the classroom/school yard. Use the Compass Rose created to find direction from one selected point in the class room/school yard to another point. In groups, use a protractor along with the sixteen point Compass Rose to measure direction and bearing from the one point selected by the group in relation to other determined points in the environment. Individually, draw Compass Roses on a given map and use the same process to find direction and bearing from one given point to another.	• Using a protractor; drawing sketch maps; map reading; collaborating; drawing sketch maps	Compass Rose used accurately; protractor accurately used; direction correctly determined; bearing measured accurately (±2º)
In groups, at an appropriate site in the school yard, measure an area measuring 10 metres by 10 metres. Using chalk or string, divide the area measured into equal squares or grids measuring 1 metre by 1 metre. Label the grids after recalling how it is done on maps. Place a student or an object in the grids and determine location using four figure grid referencing. Place more than one student or object in the same grid, and in groups determine a method for differentiating the locations of the objects/students. Apply method designed to a map to find location of various features.	• Using tape measure; observing pattern; collaborating with peers; reading maps; communicating geographic information	Each grid equally divided into one hundred even squares/grids; location accurately determined using six figure grid referencing

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: Conduct research to determine the method used to find six figure grid references. Apply method to finding six figure grid referencing to the outdoor activity and on maps. Determine the usefulness of the method in finding specific location Using Six Figure Grid Referencing to Find Locations on Map  		
In groups, examine various maps and record the ways in which the scale is represented. Most maps will show the linear and ratio scales. Brainstorm to determine other ways the scale may be represented. Given string or paper, measure the distance in centimetres between two given points on a map. These distances should be curved as well as straight. Determine the precise distance in reality by measuring the distance on the linear scale or by using the ratio scale.	• Map reading and interpretation; measuring distance on maps; critical thinking; communicating geographic information; converting scales	At least three ways of representing maps scales determined; distance accurately measured; distance on the ground accurately calculated
In groups, given a copy of a simple topographic map (photocopied), use cardboard, a pair of scissors, glue and one copy of the topographic map to create three dimensional models of simple landforms. Place the topographic map on the cardboard sheet and cut out the shape of each contour. When finished, stack the cut-out pieces on top of each other. Compare the landform to a second copy of the same topographic sheet. Determine how the shape and nearness of the contours. Examine the model(s) created by all groups and describe the landforms presented, using simple terms to describe the slopes of the landforms. Compare models to differentiate between landforms. Using the model and the map scale, determine gradient of slopes of the landform modelled. Using string and the model created, determine the intervisibility between selected points. Construct cross-sections from the copy of the map and draw a line to represent the line of sight. Compare findings of intervisibility from the cross-section to intervisibility on the model.	• Map interpretation; creating; Communicating; Critical thinking	Model accurately created; landform accurately described using simple terms; gradient accurately calculated; intervisibility accurately determined; cross-section accurately drawn; slopes described as steep/gentle, concave/convex, even/uneven

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: In groups, carry out a walk-through of a predetermined area of the school community. Record a list of the features seen. Using pencil and pencil crayons, assign a symbol or colour to each feature thereby generating a Key/Legend. Using Google Earth software, capture a snapshot showing the aerial view of the school area examined. Using the snapshot, draw a sketch map of the area. Ensure that all the main elements of a map are included. Examine the sketch and describe the distribution of activities or features. Suggest reasons for the distribution seen.	• Observing; recording; drawing; collaborating; analysing	List of features noted accurate; sketch map drawn; like features assigned the same symbol or colour; map contains all five features – Border, Legend/Key, Arrow (North), Scale, Title; suggested reasons for distribution given
Individually, given grids of the same size, twice as large and half the size, copy a simple drawing either the same size, twice as large or half the size of the original. Repeat the procedure with small sections of a map ensuring that features in each grid are replicated accurately. Present drawings to the class and peer review other drawings offering constructive criticisms.  **Enlargement/Reduction of a Drawing**	• Observing; reproducing drawings to scale; creating; communicating; calculating	Drawings accurately reproduced at the same size, twice as large and half the size of the original
In groups, given a map image and blank grids of the same size, twice the size and half the size of the map image grids, projected on a white board, use dry erase markers to replicate an area at the same scale, larger scale and smaller scale. Using the known ratio and the size of the original grid and new grid, mathematically recalculate the scale according to the size map reproduced.	• Observing; reproducing maps to scale; creating; communicating; calculating	Maps accurately reproduced to scale; map scale correctly recalculated

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, examine a globe or World Map (on a scale of 1:42,000,000) and a map sheet (on a scale of 1:100,000 or 1:50,000 or 1:25,000). Compare the two with a focus on the area that is represented on the map sheet. Identify natural and man-made features that can be seen clearly in the area identified on the map sheet and on the Globe/World Map. Determine which map is small scale and which map is large scale. Brainstorm in groups to determine how the characteristics of the data represented on the map change as the scale changes from small scale to large scale. Compile a table outlining the advantages and disadvantages of maps drawn at different scales.	• Observing; critical thinking; communicating;	Features that can be seen at different scales identified; maps/globe correctly identified as small or large scale; at least two differences in the map data characteristics noted as map scale changes; at least one advantage and disadvantage identified
In groups, given a map without a Key/Legend, name and label the features on the map. Discuss the difficulties encountered carrying out the activity. Given the same map with its associated Key/ Legend, compare the one labelled to the Key given and discuss reasons for the discrepancies. Using the Key/Legend, describe the features and activities found in the map area.	• Observing; reading and labelling maps; creating; communicating; collaborating	At least two challenges of interpreting a map without a Key/ Legend identified; features and activities in the map extract identified and described
In groups, observe the satellite imagery and photographs taken of the surrounding community on Google Maps. Compare the photographs to the map and determine the changes noted. Present findings to the class. Compare historical maps of Jamaica to present day maps. Present findings of similarities and differences to the class. Take pictures of the school community from different angles and at different points over the course of the year. Compare these to satellite imagery and maps of the same area. Note the similarities and differences and present findings to class.	• Observing; map reading and interpretation; photograph interpretation; communicating; comparing; collaborating	At least three differences and one similarity noted with each comparison made

Learning Outcomes

Students will be able to:

- ✔ Draw and use a sixteen point Compass Rose
- ✔ Use a protractor to measure angular bearing from one point to another
- ✔ Explain the relationship between compass direction and angular bearing
- ✔ Establish the direction and bearing of one point from another point on a map
- ✔ State the absolute location of places using six figure grid references
- ✔ Identity the ways in which a map scale may be represented
- ✔ State map scales as statements
- ✔ Measure curved and straight line distances between points on maps
- ✔ Calculate distances using map scales
- ✔ Identify and use large and small scale maps
- ✔ Recalculate map scales
- ✔ Describe simple landforms represented by contours on maps
- ✔ Describe in simple terms the types of slopes that are represented by contours
- ✔ Calculate the gradient of slopes
- ✔ Construct cross-sections and determine intervisibility between points
- ✔ Use the Legend/Key to identify the human activities that are undertaken in a given area
- ✔ Suggest reasons for the distribution of specific activities over an area
- ✔ Draw sketch maps
- ✔ Reproduce map sections to scale
- ✔ Interpret maps and photographs

Points to Note

- The linear scale on maps can sometimes be used to help divide grids into ten equal sections along the Eastings line and the Northings line, as the length of the first segment is sometimes the same length as the length/width of the map grids. This section of the linear scale (used to find fractional distances) is often divided into ten equal segments.
- Six figure grid references are not given using decimal points or spaces
- Simple topographic maps may be obtained from online sources or the teacher/ student may draw contours representing a selected landform, then use the drawing to create a three- dimensional model.
- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

Students should be reminded to:

- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials and encourage others to do so
- Follow guidelines to promote healthy use of ICT tools

Extended Learning

Study before and after photographs or satellite imagery of areas impacted by hurricane; drought; deforestation or tsunami. Identify and describe the damage caused by the impact of the event. Evaluate the impact of the event on the Earth's spheres.

RESOURCES

Calculator; Cardboard Sheets; Cartridge Paper; Compass Rose; Computer; Divider; Globe Glue; Graph Sheets; Magnetic Compass; Maps; Multimedia Projector; Photographs; Protractor; Ruler; Scissors; String/Wire; Tape; Videos

*http://groundwater.fullerton.edu/Maps,_Scale,_GIS_and_GPS/Guide_to_Map_*
Scale.html

KEY VOCABULARY

Absolute Location; Angular Bearing; Border; Compass Rose; Concave Slope; Contours; Convex Slope; Cross-Section; Direction; Even Slope; Gentle Slope; Gradient; Height; Horizontal Distance; Even Slope; Intervisibility; Key/ Legend; Linear Scale; North Arrow; Ratio Scale; Relative Location; Representative Fraction; Rise; Run; Scales; Slopes; Statement Scale; Steep Slope; Title; Undulating; Uneven Slope; Vertical Height; Vertical Interval

LINKS TO OTHER SUBJECTS

English Language; Mathematics; Social Studies; Visual Arts

About the Unit

World: Population, Migration and Settlement

In this Unit, students will understand the causes and consequences of population change at a global, regional and local level. Students will learn to calculate basic population statistics and determine in simple terms the consequences of the values derived. The security and safety of nations, in light of a mobile global population, will be examined. Present security measures will be discussed, and proposals made to increase security while facilitating easy movement across borders.

RANGE OF CONTENT

Knowledge Students should acquire information and develop an understanding of:
- How physical, social, cultural and economic phenomena interact and the effects of such interaction
- Several key concepts, such as location, spatial distribution, pattern and change over time

Skills Students should have the opportunity to develop and practise the following skills:
- Using and interpreting a variety of information sources for example, maps, photographs and cartoons
- Presenting and communicating information in a variety of ways including sketch maps and photographs
- Social skills (for example, working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)

Attitude Students should develop:
- Positive attitudes towards themselves, others and their environment
- Self-confidence, self-esteem and a simple understanding of some of their perceptions
- Appreciation of social, cultural and environmental diversity

GUIDANCE TO THE TEACHER

- Updated population data should be obtained from the Statistical Institute of Jamaica (STATIN) or the Planning Institute of Jamaica (PIOJ).

Prior Learning

Check that students can:

- Interpret a Dot map
- Identify the ways in which the population of a country change
- Draw simple Flow maps

WORLD: POPULATION, MIGRATION AND SETTLEMENT

ATTAINMENT TARGET(S):

Gain knowledge and understanding of the physical and human processes and forces that shape the patterns of the Earth's surface and influence the distribution of people.

Standard(s): Students should acquire knowledge of different places on Earth and in the Solar System and an understanding of the spatial distribution of processes occurring within the Earth, on the Earth's surface, within the atmosphere and in the Solar System. They should also recognise that human and natural environments of the Earth consist of systems that are interdependent and understand the processes and forces that shape the patterns of the Earth's surface. They should understand the environment in which they live but also appreciate the diversity of other habitats and cultures globally.

Theme: The Human Habitat: Processes and Change

OBJECTIVES

Students should be able to:

- Explain how world population changes
- Calculate population change for selected Caribbean countries
- Formulate definitions for international migration, migrant, immigration, immigrant, emigration, emigrant, population growth/decline
- Outline reasons Jamaicans migrate internationally and evaluate reasons for the selection of destinations
- Create and explain a Flow map showing movement of people internationally from Jamaica
- Use Jamaica as a case study, to evaluate the impact of international migration on the source and destination countries
- Recognise the importance of remittances to the Jamaican economy
- Examine how migration influences the nature and amount of trade (imports and exports) between countries
- Recognise and critically examine the impact of migration on social structures in Jamaica
- Describe and critically examine the following aspects of global security and safety systems - border security; immigration laws and controls; passports and visas
- Propose a new method to increase the security of a country's borders and explain how the measure will work
- Define and outline the elements of the concept human trafficking
- Recognise and describe ways in which people are trafficked
- Propose and discuss ways in which human trafficking may be reduced nationally, regionally and internationally
- Develop and present a comprehensive strategy to prevent human trafficking, protect victims of trafficking and prosecute trafficking offenders
- Explain how settlement patterns and distribution are affected by human and natural factors
- Assess how settlements may change over time due to migration

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, given the estimated world population, brainstorm to determine the ways in which the world population may change. Given annual global population births and deaths, calculate the annual changes in world population. After examining a global population clock online, identify at least three countries, in at least two regions, where the number of births are high.	• Calculating; critical thinking; communicating	Births and deaths correctly identified as the only factors leading to global population change; global population change correctly calculated; at least six countries with high number of births identified
In groups, design a creative piece to show the various ways in which a country's population could change. From the skit/play, formulate definitions for a migrant, immigrant and emigrant, population change, population growth/decline. Given statistics of births, deaths, immigration and emigration, calculate the population change for selected countries in the Caribbean.	• Calculating; critical thinking; communicating; creating	Population change calculated correctly; definitions correctly formulated; population change correctly calculated

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In small groups, using local cartoons downloaded from online sources, extract information on the various reasons people migrate from Jamaica to other countries. Conduct interviews of persons who have a family member living abroad to determine the variety of reasons these migrations occurred. In groups, after reading story of a Jamaican 'barrel child' outline the impact of international migration on the family, community and the nation. At least five effects should be outlined. View online videos which show some of the effects of migration on destination countries. At least five effects should be extracted.	• Critical thinking; communicating	At least five reasons for international migration identified; at least five impacts on the source areas identified; at least five effects on the destination identified
Given statistics obtained from the Statistical Institute of Jamaica or other sources, a World map and paper arrows, in small groups, create a Flow map showing migration flows. The width of the arrow should be scaled to show numbers of migrants.	• Creating; communicating; critical thinking; measuring	Flow map accurately created showing source and destination countries; arrows accurately scaled to show numbers of migrants
In groups, given a Flow map showing global tourism flows, deduce the numbers of people that travel to various countries annually.	• Map reading and interpretation; measuring	Numbers of migrants accurately calculated
In groups, examine the advertisements placed in the classifieds sections of the various local newspapers. Select specific advertisements and suggest how they could lead to people being trafficked. Discuss ways in which due diligence may be carried out by persons seeking employment or other opportunities in order to stay safe. Design a poster or audio-visual advertisement to inform the public on ways to stay safe.	• Collaborating; creating; critical thinking; communicating	At least three ways in which advertisements for employment may lead to persons being trafficked identified; At least three ways to avoid being trafficked suggested; poster or advertisement designed according to standards determined by teacher and students
Using case studies and photographs, in groups, determine how some settlements change as people migrate. Changes in size, infrastructure and services offered are some examples of the changes that should be pointed out.	• Critical thinking; communicating; analysing; photograph interpretation	At least five changes identified
In groups, study a graph or table showing the contributions remittances make to the Jamaican economy. Comment on the trend of the contributions. Identify and outline the advantages and the disadvantages of these contributions and threats to this source of income. Make a comparison to the contributions made by other sectors such as Tourism, Agriculture, Mining, Wholesaling and Retailing.	• Observing; critical thinking; communicating; analysing statistical diagrams	A general upward trend in remittances noted; at least three advantages and two disadvantages identified; at least one threat to this source of income outlined

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: In groups, select a major company which operate in the international market for study. Conduct research to determine the reasons for the location of their subsidiaries internationally and the products they manufacture and distribute to the international market. Write a report and present findings to the class. In groups, determine how tourism in Jamaica has influenced the amount and type of imports of food items. Write a report and present findings to the class.	• Researching for information; collaborating; communicating; critical thinking	Reports accurately written
Invite a representative from the Passport and Immigration and Citizenship Agency (PICA) and Jamaica Customs Agency to give information on the various types of documentation needed to cross international borders, and the various measures used to ensure border security. The importance of a passport and visas should be emphasised. Ask questions about required vaccines to prevent the transmission and spread of diseases across borders of some countries. A list of countries where visas are not needed for entry should be compiled. In groups, conduct research on the application process for passports. Individually, in class, complete and submit an application for a passport.	• Researching for information; collaborating; communicating; critical thinking	Information on the importance of passports and visas obtained; at least one vaccine to enter a named country listed; at least 10 countries where visas are not required for entry listed
In groups, examine maps showing settlements in rural and urban areas in Jamaica. Determine the settlement patterns and spread in rural and urban areas. Identify and describe the natural and man-made features/services in each area. Brainstorm the effect each feature may have on the pattern and size of settlement that developed. Conduct research in textbook to determine how natural and man-made features influence the distribution of settlements in Caribbean countries.	• Collaborating; critical thinking; map reading and interpretation	Settlement patterns identified; at least two natural and mad-made features identified and described accurately; at least one effect each feature has on the settlement pattern and spread suggested

Learning Outcomes

Students will be able to:

- ✔ Calculate population change for the world and selected Caribbean countries
- ✔ Formulate definitions for international migration, migrant, immigration, immigrant, emigration, emigrant, population growth/decline
- ✔ Outline reasons Jamaicans migrate internationally
- ✔ Create and read Flow maps
- ✔ Evaluate the impact of international migration on the source and destination countries
- ✔ Assess how settlements may change due to migration
- ✔ Interpret photographs showing a variety of information
- ✔ Read and analyse statistical diagrams
- ✔ Recognise human trafficking and employ strategies to prevent it
- ✔ Understand the importance of border security and safety systems
- ✔ Explain how natural and human factors affect settlement pattern and distribution
- ✔ Explain how migration causes settlements to change

Points to Note

- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

Students should be reminded to:

- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials and encourage others to do so
- Follow guidelines to promote healthy use of ICT tools

Extended Learning

Examine the Jamaican Farm Workers Programme and assess how it impacts the Jamaican economy and society.

RESOURCES

Atlas; Cartridge Paper; Computer; Glue; Maps; Markers; Multimedia Projector; Photographs; Population Statistics; Rope; Ruler; Scissors; String; Tape; Textbooks; Videos

http://www.worldometers.info/world-population/
https://www.nbcnews.com/news/nbcblk/jamaica-s-barrel-children-often-come-empty-parent-abroad-n830636
https://www.unicef.org/easterncaribbean/Impact_of_Migration_Paper.pdf

KEY VOCABULARY

Birth; Brain Drain; Death; Destination; Emigration; Employment; Flow Map; Ghost Town; Immigration; Migration; Natural Increase; Population; Population Change; Remittances; Scale; Settlement; Slum; Source Country; Tourism; Unemployment; Urban Sprawl

LINKS TO OTHER SUBJECTS

English Language; History; Mathematics; Social Studies

About the Unit

Careers in Geography
In this Unit, students will learn to appreciate the importance of Geography in making career choices. Students will learn that Geographical skills are important in many disciplines, broadening their options in the world of work.

RANGE OF CONTENT

Knowledge Students should acquire information and develop an understanding of:
- How Geography applies to a multitude of career options
- How they may use skills acquired in Geography in their chosen career

Skills Students should have the opportunity to develop and practise the following skills:
- Social skills (for example, working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)
- Researching skills

Attitude Students should develop:
- Positive attitudes towards themselves, others and their environment
- Self-confidence, self-esteem and a simple understanding of some of their perceptions
- Readiness for personal commitment and involvement

GUIDANCE TO THE TEACHER

- Plan a career day in collaboration with other schools in close proximity and various Agencies. Planning should begin at the start of the term and culminate the week of this Unit.
- Where possible, summer mentorships should be arranged with organisations in the community.

Prior Learning

Check that students can:

- Identify the career pathways they may wish to take
- Identify at least one career pathway that utilises skills learnt in Geography

CAREERS IN GEOGRAPHY

ATTAINMENT TARGET(S):

Gain knowledge and understanding of the physical and human processes and forces that shape the patterns of the Earth's surface and influence the distribution of people.

Standard(s): Students should acquire knowledge of different places on Earth and in the Solar System and an understanding of the spatial distribution of processes occurring within the Earth, on the Earth's surface, within the atmosphere and in the Solar System. They should also recognise that human and natural environments of the Earth consist of systems that are interdependent and understand the processes and forces that shape the patterns of the Earth's surface. They should understand the environment in which they live but also appreciate the diversity of other habitats and cultures globally.

Theme: The Human Habitat: Processes and Change

OBJECTIVES

Students should be able to:

- Identify at least five career options that require the use of geographic skills
- Visually outline the various geographical skills used in selected professions
- Plan and execute a Geography career day exposition

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

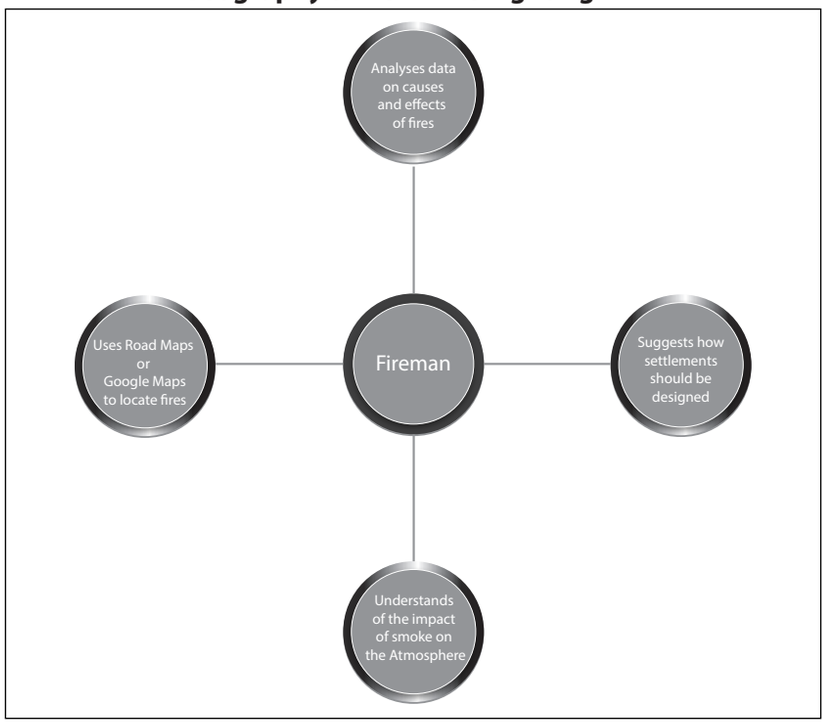
DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
Identify at least five career options they may wish pursue. Conduct research online to determine the requirements for entering each career/discipline and the types of skills and information learnt in Geography that may prove useful.	• Critical thinking; communicating; researching for information	At least five career options identified; Geography skills and knowledge required for each career option identified
In groups, given a photograph or description of selected professions, create concept maps to show how knowledge obtained in Geography is valuable.	• Critical thinking; communicating; creating; collaborating	Concept maps accurately created showing at least four ways knowledge in geography is important in selected fields

Students will:

Geography Skills in Fire Fighting



In small groups, conduct research to identify organisations in Jamaica where persons are engaged in the career activities identified. Each group will write a letter to a selected organisation inviting them to display information pertaining to their career at a planned career day exposition.	• Communicating	An appropriate invitation letter written outlining purpose of activity and information needed

Learning Outcomes

Students will be able to:

- ✔ Identify at least five career options that require the use of geographic skills
- ✔ Execute a career day exposition

Points to Note

- Students' career options should not be confined to already established areas of work. Allow students to create their own booth to show career pathways that may be new/emerging.
- Be aware that students may suggest interest in jobs/careers which do not currently exist. This innovative way of thinking should be encouraged and guided.
- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

Students should be reminded to:

- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials and encourage others to do so
- Follow guidelines to promote healthy use of ICT tools

Extended Learning

Students should explain what geographical skills and knowledge are important to each member of their immediate family.

RESOURCES

https://www.prospects.ac.uk/careers-advice/what-can-i-do-with-my-degree/geography

KEY VOCABULARY

Cartographers; Climatologist; Demographer; Emergency Management; Environmental Managers; Foreign Service; GIS Specialist; Marketing; Meteorologist; Park Rangers; Researchers/Writers; Teaching; Urban Planner

LINKS TO OTHER SUBJECTS

Agricultural Science; Biology; Chemistry; English Language; History; Information Technology; Mathematics; Physics; Social Studies

GRADE 9

GEOGRAPHY

TERM 2 UNITS

TERM 1

Unit 1: 3 weeks
Earth System Science

The Atmosphere, Hydrosphere, Biosphere and Lithosphere
Caring for the Earth – Green Technology

Unit 2: 5 Weeks
Interpreting Maps and Photographs 3

Map Symbols
Direction and Bearings
Measuring Curved Distances
Six-Figure Grid References
Contour Patterns: Landform Types and Shapes
Cross-Sections and Intervisibility
Gradient
Sketch Maps
Analysing Maps
Reproducing Map Sections

Unit 3: 3 weeks
World: Population, Migration and Settlement

International Migration
Human Trafficking
Settlement Distribution
Global Security and Safety
Flow Maps
Statistical Diagrams

Unit 4: 1 week
Careers in Geography

TERM 2

Unit 1: 4 weeks
Weather, Climate and Vegetation

Types of Biomes
Characteristics of Tropical Biomes
Influence of Climate Change on Biomes

Unit 2: 6 weeks
Internal Forces and Processes of the Earth

Structure of the Earth
Plate Tectonics
Natural Hazards
Evacuation Planning

Unit 3: 2 weeks Fieldwork and Investigation 3

Fieldwork Techniques
Conducting Fieldwork
Drawing Conclusions
Ethics in Research

TERM 3

Unit 1: 1 week
Resources and Tertiary Economic Activities

Types of Resources Used in Tertiary Economic Activities
Types of Tertiary Economic Activities

Unit 2: 3 weeks
Jamaica: Tourism

Types of Resources Used in Tourism
Location of Tourism in Jamaica
Types and Characteristics of Tourism in Jamaica
Importance of Tourism
Impact of Climate Change on Tourism in Jamaica
Coral Reefs

Unit 3: 5 weeks
Caribbean Weather Systems

Depressions, Tropical Storms and Hurricanes
Cold Fronts
Impact of Climate Change on Caribbean – El Nino Southern Oscillation
Weather Maps and Symbols
Managing Hazards/Disasters

About the Unit

Weather, Climate and Vegetation

In this Unit, students will learn about the variety of biomes that exists on Earth. The various biomes will be examined with a special focus on Caribbean biomes. The distribution and characteristics of biomes globally will be explored. Students will be expected to use maps and photographs extensively to support the content of this Unit.

RANGE OF CONTENT

Knowledge Students should acquire information and develop an understanding of:

- Examples of human and physical environmental phenomena and processes relating to Jamaica and the rest of the World
- How physical environmental phenomena interact and the effects of such interaction
- Key concepts of location, spatial distribution and interaction, interrelationship and pattern
- The practical aspects of the above as they relate to the learner's environment

Skills Students should have the opportunity to develop and practise the following skills:

- Using and interpreting a variety of information sources, for example, photographs, diagrams and texts
- Presenting and communicating information in a variety of ways including diagrams and models
- Selecting and using of a variety of modes of enquiry and the proper use of equipment and techniques
- Social skills (for example, working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)

Attitude Students should develop:

- Positive attitudes towards themselves, others and their environment
- Self-confidence, self-esteem and a simple understanding of some of their perceptions
- Appreciation of environmental diversity.
- A positive attitude towards conservation of resources

GUIDANCE TO THE TEACHER

- There should be collaboration with teachers of Biology so that links can be established with respect to shared curriculum content.
- Global examples of biomes can be explored using Google Earth.

Prior Learning

Check that students can:

- Identify major lines of latitude and major climatic zones
- Explain how climate changes with latitude and altitude

WEATHER, CLIMATE AND VEGETATION

ATTAINMENT TARGET(S):

Gain knowledge and understanding of the physical and human processes and forces that shape the patterns of the Earth's surface and influence the distribution of people.

Standard(s): Students should acquire knowledge of different places on Earth and in the Solar System and an understanding of the spatial distribution of processes occurring within the Earth, on the Earth's surface, within the atmosphere and in the Solar System. They should also recognise that human and natural environments of the Earth consist of systems that are interdependent and understand the processes and forces that shape the patterns of the Earth's surface. They should understand the environment in which they live but also appreciate the diversity of other habitats and cultures globally.

Theme: The Human Habitat: Processes and Change

OBJECTIVES

Students should be able to:

- Define the concept of biome
- Annotate large biomes on a blank map of the world
- Examine how variations in temperature and rainfall influence the vegetation of places
- Locate the Tropics on a World map
- Name the various biomes in the Tropics
- Locate major areas of tropical rainforest and savannah, globally
- Outline the main characteristics of the tropical rainforest and savannah
- Assess the relationship between climate (temperature, rainfall and amount of sunshine) and the structure of the vegetation of the rainforest and savannah
- Investigate how areas of rainforests and savannahs are valuable to humans
- Investigate the structure and location of the following types of Caribbean vegetation: coastal vegetation; grasslands/savannah; rainforest
- Outline how vegetation changes due to changes in temperature and rainfall amounts in Jamaica
- Investigate how varying weather patterns and the presence of various vegetation types influence human activities in Jamaica and the rest of the World
- Appreciate how weather and climate influences daily activities

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, examine a photograph of a selected biome. Select words/phrases which apply to the photograph, from a given word pile. Discuss why each word is chosen and what it says about the given photograph. Given the characteristics identified, determine in which climatic zone the biome may exist. Conduct research to verify choice.	• Collaborating; photograph interpretation; critical thinking; communicating	Correct description of each biome compiled; biome placed in correct climatic zone
Read about a selected biome from textbooks or conduct research online or view a video online about the given biome. In groups, given a set of scrambled words, unscramble to formulate a definition of biome. Continue to use the textbooks or online sources to conduct research to find places globally, which have biomes with the characteristics assigned to their photographs. Use Google Maps software to view areas of the world with the types of biomes represented in the photographs.	• Collaborating; photograph interpretation; critical thinking; communicating; researching for information; map reading	Global biomes correctly identified; definition of biomes correctly formulated; Google Maps software used appropriately; at least two countries with each biome type identified
Use an atlas/map/Google Earth to identify, name and label areas where different biomes can be found. Display maps and read the location of the biome using lines of latitude and longitude.	• Map reading; labelling; communicating	Areas correctly labelled; location correctly read; maps used accurately; biomes correctly identified, named and labelled; latitude and longitude correctly read

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, given a climograph or data to plot a climograph using appropriate software, of a given biome, explain how temperature and rainfall influences the vegetation. Create a photo-gallery on the walls using the pictures of the different biomes at various points in the year and their associated climographs. View the gallery and write a short explanation of how the vegetation changes with changes in temperature and rainfall.	• Photograph interpretation; interpreting graphs; communicating; collaborating; creating	Correct explanation of climatic influence on vegetation; correct association made between the relevant climograph and photograph; vegetation changes accurately associated with climate changes
Take samples of common plants that are used in the home or school and explain what they are used for and how they are used. Explain what conditions are necessary for their growth and in which biome the plants may be found.	• Observing; communicating; critical thinking	At least three common plants and one use for each plant identified
Using a poster showing various plants and their uses, supplied by the Forestry Department, write a report on the various uses of plants in Jamaica or create a poster using appropriate software to depict common plants and their uses.	• Observing; communicating; critical thinking	Poster shows at least three common plants and their uses; report written containing correct information
Examine photographs of tropical areas and record the general vegetation types seen. View photographs or online videos of rainforests and savannahs found in various areas globally. Record their general location. Gather information from the video and annotate a diagram showing the structure of the rainforest and savannah.	• Observing; annotating; communicating; photograph interpretation; critical thinking	Location of rainforest and savannah stated; diagrams correctly annotated; at least three ways each biome is important identified
In groups, observe photographs of vegetation of the Tropics and identify the ways the plants may have adapted to the climate. Suggest various ways the tropical rainforest and savannah biomes are important for the survival of humans.	• Collaborating; photograph interpretation; critical thinking; communicating	At least five adaptations, and accurate reasons for the changes related to the climate identified
In groups, design experiments to show how vegetation growth is affected by changes in the amount of water, sunlight and temperature. Germinate seeds in containers and grow the plants in varying amounts of light, keeping constant the amount of water all are given. Record the rate of growth for each plant daily over a given period of time. Associate the results obtained from the experiments with the varying heights of trees in a rainforest or the varying heights and amount of grass in a savannah.	• Observing; recording data; labelling; measuring; communicating; critical thinking; collaborating; creating	An appropriate procedure to test the hypothesis proposed; data recorded accurately; experiment question accurately answered

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
Conduct a nature walk or bus ride from a coastal area to an area inland. On a field guide, make notes of the changes in vegetation at specified points. Draw a diagram to show the changes noted in vegetation from the coast to the interior of the country. Conduct research to determine reasons for the changes. Determine the factors which may account for the changes noted. Make a list of the factors and discuss each as a class activity.	• Observing; recording data; drawing; labelling; researching for information	Field guide completed accurately; changes accurately noted; diagrams drawn correctly and properly labelled/annotated; plausible reasons for the changes noted
In groups, given maps of Jamaica showing rainfall and temperature patterns, and resource maps showing economic activities and land use maps, determine the relationships among the variables. Write a report on how climate affects human activities and land use.	• Map reading and interpretation; collaborating; communicating; critical thinking	At least four ways in which climate affects human activities and land use explained
In groups, propose how vegetation changes due to changes in temperature and rainfall amounts in Jamaica. Conduct a virtual field trip using Google Earth software along a transect from a point on Jamaica's north coast to a point on the south coast. Draw a diagram to show the changes in vegetation type and density noted. Use an atlas to support findings. Describe changes noted. Compare changes to those suggested in the textbook. Relate changes to rainfall data for Jamaica.	• Drawing; critical thinking; communicating	Diagram accurately drawn; changes in vegetation accurately described; association to rainfall patterns accurately determined
Individually, keep a diary which should detail clothing selection and other choices based on the weather. Observe daily activities in various parts of the world and suggest ways in which climate influences those activities.	• Observing; communicating	Ways in which climate and weather affect daily activities correctly identified

Learning Outcomes

Students will be able to:

- ✔ Write a definition for biome
- ✔ Identify and label features on maps
- ✔ Locate the climatic zones on a World map
- ✔ Name and describe the various biomes in the Tropics
- ✔ Use latitude and longitude to locate places on a map
- ✔ Make a list of the characteristics of the tropical rainforest and savannah
- ✔ Assess the relationship between climate (temperature, rainfall and amount of sunshine) and the structure of the vegetation of the rainforest and savannah
- ✔ Identify at least three ways rainforests and savannahs are valuable to humans
- ✔ Describe the structure and location of the following types of Caribbean vegetation: coastal vegetation; grasslands/savannah; rainforest
- ✔ Investigate how varying weather patterns and the presence of various vegetation types influence human activities

Points to Note

- The structure of the biome should focus on the vertical stratification of rainforests and the horizontal and vertical stratification of savannahs/ grasslands.
- Seasonal changes in the tropical grassland should also be discussed.
- Annotation involves labelling in addition to adding a comment about the feature that was labelled.
- On field trips, students must always have a field guide to remind them of the aims of the excursion; provide some background on the topic and areas to be covered; and space to make notes and draw diagrams of their observations.

Students should be reminded to:

- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials and encourage others to do so
- Follow guidelines to promote healthy use of ICT tools

Extended Learning

Observe how the weather changes over the period of a year and how the vegetation in the school is affected. Take photographs to track the changes in the vegetation. Determine how trees and grass in the school yard or community adapt to changes in the amount of water or sunlight available.

RESOURCES

Camera; Computer; Google Map Software; Internet; Multimedia Projector; Photographs; Videos
http://www.ucmp.berkeley.edu/glossary/gloss5/biome/

KEY VOCABULARY

Biome; Canopy; Climate; Deciduous; Desert; Ecosystem; Equatorial; Evergreen; Grassland; Polar; Rainforest; Savannah; Season; Temperate; Tropical; Tropics; Tundra; Vegetation; Weather

LINKS TO OTHER SUBJECTS

Agricultural Science; Biology; English Language; Information Technology; Mathematics; Social Studies; Visual Arts

About the Unit

Internal Forces and Processes of the Earth

In this Unit, the students will learn about the external and internal structure of the Earth and the processes which operate within that structure. They will understand how the crust moves and how these movements cause changes to the topography of the Earth. The features and activities generated by the movements of the crust will be discussed in detail. Students' map and photograph interpretation skills will be improved through use of maps and photographs to support content. Students will also learn of the associations between the movement of the Earth's crust and the occurrence of natural events such as earthquakes and tsunamis which may pose a threat to human populations.

RANGE OF CONTENT

Knowledge Students should acquire information and develop an understanding of:
- Examples of physical environmental phenomena and processes relating to Jamaica and the rest of the World
- The nature and diversity of the physical environment in Jamaica.
- Key concepts of location, spatial distribution and interaction, interrelationship and pattern
- The practical aspects of the above as they relate to the learner's environment

Skills Students should have the opportunity to develop and practise the following skills:
- Using and interpreting a variety of information sources for example photographs, maps and texts
- Presenting and communicating information in a variety of ways including diagrams and models
- Social skills (for example, working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)

Attitude Students should develop:
- Positive attitudes towards themselves, others and their environment
- Self-confidence, self-esteem and a simple understanding of some of their perceptions
- Appreciation of environmental diversity

GUIDANCE TO THE TEACHER

- Be aware that plate tectonics as a theory is an abstract concept that students may find challenging to grasp. As such, make use of models, photographs and videos which simulate the movements that would occur in the mantle as well as at various plate boundaries.
- A discussion on what are theories should be carried out and should include how theories are proven or rejected.

Prior Learning

Check that students can:

- Identify the main components of the Earth's structure

INTERNAL FORCES AND PROCESSES OF THE EARTH

ATTAINMENT TARGET(S):

Gain knowledge and understanding of the physical and human processes and forces that shape the patterns of the Earth's surface and influence the distribution of people.

Standard(s): Students should acquire knowledge of different places on Earth and in the Solar System and an understanding of the spatial distribution of processes occurring within the Earth, on the Earth's surface, within the atmosphere and in the Solar System. They should also recognise that human and natural environments of the Earth consist of systems that are interdependent and understand the processes and forces that shape the patterns of the Earth's surface. They should understand the environment in which they live but also appreciate the diversity of other habitats and cultures globally.

Theme: The Human Habitat: Processes and Change

OBJECTIVES

Students should be able to:

- Define the concept 'theory'
- Label the internal and external structure of the Earth
- Describe the characteristics of the core, mantle and crust
- Define the concept 'Plate Tectonics'
- Outline and explain possible reasons the Earth's crust moves
- Label major continental and oceanic plates
- Differentiate between oceanic crust and continental crust
- Identify and describe the Caribbean plate and the adjacent plates and explain their movement in relation to each other
- Define the characteristics of an earthquake
- Design an earthquake plan for your home, community and school
- Outline ways earthquakes are recorded and measured
- Classify earthquakes according to depth and origin
- Describe the types of plate boundaries
- Explain the processes occurring at each plate boundary
- Assess the nature of the movement and the resulting features along normal, transform and reverse faults
- Account for the occurrence of earthquakes, volcanoes, island arcs, fold mountains, mid-ocean ridges, rift valleys, lava plateaux, accretionary prisms/ wedges, subduction zones and faults at plate boundaries
- Connect the occurrence of major earthquakes, volcanoes and fold mountains to plate margins
- Compare the structures of shield cones, composite cones, ash and lava cones and dome cones, and determine reasons for the variations
- Establish the links among the nature of lava, type of volcanic eruptions and activities at plate boundaries
- Classify volcanic landforms as intrusive or extrusive
- Show how intrusive and extrusive features form
- Link the formation of hot springs and geysers to volcanic activity
- Distinguish among natural events, natural hazards and disasters
- Draw a map of the local community and identify the places at risk from specified natural hazards
- Using the theory of plate tectonics, explain the occurrence of earthquake in Caribbean countries
- Conduct and Earth System Science Analysis to determine the effects of a major earthquake and volcanic eruption on a selected Caribbean country
- Prepare an evacuation plan for the secondary hazards which may occur following an earthquake

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, given the dimensions of the Earth's crust, mantle and core, create a scaled model. Explain the model to class. Compare the model to a hard-boiled egg, to explain the exterior/interior structures of the Earth. Measure the width of the various components of the egg (the shell, the albumen and the yolk) and determine the ratio of the shell to the albumen to the yolk. Given the dimensions of the various components of the structure of the Earth, calculate the ratio of the crust to the mantle to core. Compare the Earth's structure to that of the egg. View online video on the structure of the interior of the earth and have a class discussion on the characteristics noted. Use appropriate software, where available, to draw and annotate the diagram of the structure of the interior of the Earth and insert the following: inner core, outer core, mantle and crust.	• Collaborating; measuring; calculating; drawing; labelling; communicating; critical thinking	Three layers of the Earth's interior identified and labelled correctly; ratio correctly calculated; diagram of the interior structure of the Earth accurately drawn
In groups, given a set of jigsaw puzzle pieces of the plates of the Earth's crust (with major mountain chains identified), arrange the major plates in order. Label the pieces with the names of the plates. Explain the placement of each piece and indicate the evidence on the pieces which gave clues as to where they should be placed. Check the evidence suggested with credible online sources or in textbooks. Write a list of at least two pieces of evidence to support the positions of the plates.	• Collaborating; critical thinking; communicating; researching for information	Jigsaw puzzle pieces arranged accurately; at least two pieces of evidence which gave clues to the correct placement of the pieces identified

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
Label the puzzle pieces of the jigsaw to indicate the direction in which the plates are moving. In groups, move the pieces around according to the direction indicated by the arrows, and note the impact that the movement of one piece has on another piece. From this, gather information on the movement of the three types of plate boundaries Offer an explanation of what may happen at each boundary. On a map of the world showing major plates, colour the three types of plate margins. Label the major plates. Create a key to define the colours used on the map. Write an appropriate title for the map and ensure that the map has all five characteristics.	• Collaborating; critical thinking; communicating; map reading and interpretation; recording geographical data	All three major boundaries accurately identified and colour coded as the Key/Legend; major plates labelled correctly; map characteristics included – Border; Legend; Arrow (North); Scale; Title
In groups, given cuboid wooden blocks, brainstorm the ways in which two wooden blocks can move in relation to each other (towards each other, apart, slide past each other in opposite direction, slide past each other while moving in the same direction) and assign the relevant terms to their answers (convergent, divergent and transform). Apply an elastic band to the wooden blocks, and repeat the movements and determine when the force of tension or compression is operating. Based on the movement demonstrated with the wooden blocks and elastic band, draw and label the three types of plate margins, their movements and the forces causing the movements. Conduct research to determine the various names applied to each plate boundary. Apply these movements to the jigsaw puzzle pieces.	• Collaborating; experimenting; communicating; critical thinking; drawing; labelling; observing; researching for information	At least three of the following four movements demonstrated – towards each other, move apart, past each other while going in opposite directions, past each other while going in the same direction (one block must be moving faster than the other); three types of plate margins drawn with arrows indicating movement and correctly labelled; names for each plate determined – convergent/destructive, divergent/constructive, transform/passive; each plate margin accurately labelled to show force of tension or compression
Write a definition of plate tectonics after viewing online videos showing plate movements and the cause of the movement. In groups, suggest the most likely mechanism which causes plates to move after conducting a simple experiment using a Bunsen burner, beaker and water, to show convection currents in fluids. View online or offline videos which show animations of convection currents in the mantle as well as plate movements. Add convection currents to a diagram of the structure of the Earth. In groups, determine the direction of flow of convection currents to match the established movement of each plate.	• Collaborating; critical thinking; experimenting; creating; drawing; communicating	Causes of convection current related to the core (heat); interior structure of the Earth drawn showing convection currents in the mantle; oceanic crust and continental crust correctly identified and labelled; at least three differences between continental crust and oceanic crust identified
Examine a World map in atlases showing the major fragments or plates into which the Earth's outer crust is divided. Brainstorm ways of classifying the plates into groups. Outline criteria for classifications. Draw tables and outline the categories determined. Share classifications with class.	• Collaborating; critical thinking; classifying; creating; communicating; map reading	Plates accurately classified into distinct groups; criteria used for classification developed

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, given a World map showing plates, and a set of criteria, classify and label plates as Oceanic or Continental. Conduct research to determine the differences between continental crust and oceanic crust. Create a table to outline and explain reasons for the differences.	• Collaborating; critical thinking; classifying; creating; communicating; map reading	All plates shown correctly classified as Oceanic or Continental crust; at least three differences between Oceanic and Continental crust identified
In groups, examine a map showing the meeting of any two types of crustal plates, and a description of the resultant activities. Explain the actions of each plate given the following scenarios: - Oceanic Plate meets Oceanic Plate - Continental Plate meets Continental Plate - Continental Plate meets Oceanic plate - Oceanic Plate meets the oceanic edge of a Continental Plate	• Collaborating; critical thinking; classifying; creating; communicating; map reading	The activities which occur at each boundary accurately described.
In groups, identify on the map showing plate margins, locations where two continental plates meet; where a continental plate meets an oceanic plate; and where two oceanic plates meet. Superimpose the map showing the plate margins on a Relief map of the World to identify the type of landforms which are located at each plate boundary identified. Make a list of the landform features noted. Repeat this activity for the boundaries of the Caribbean Plate. Brainstorm how plate movement at each type of boundary leads to the formation of the landform features identified. Compare theories arrived at to information gathered from textbooks and online sources. View short online videos or animations showing the formation of landform features at each plate boundary. Compile notes on each feature's formation.	• Collaborating; critical thinking; communicating; map reading and interpretation; creating	All types of plate margins identified and accurately colour coded; features formed at each plate boundary identified and labelled; accurate description of the activities at each plate boundary given and the effects of the activities accurately suggested; accurate notes compiled
In groups, given a tectonic map of the Caribbean and the adjacent plates showing the types of plate boundaries bordering the Caribbean plate, determine the direction in which the Caribbean plate is moving, based on the map evidence. Draw arrow(s) on the map to show the direction of movement. Present findings and explanation to the class.	• Collaborating; critical thinking; communicating; map reading and interpretation	Direction of Caribbean Plate accurate; at least two pieces of evidence to support the direction of movement given

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: In groups, create models of selected landform features identified at each plate margin. Where appropriate, recreate the activities associated with landform features identified at each plate margins. Note the activities and give an explanation of how these activities can affect people and their property.	• Collaborating; creating; communicating	Models accurately created; activities associated with landform features accurately depicted; at least three ways these activities affect people identified
In groups, view photographs of natural events, hazards and disaster scenes. Determine which category each photograph represents: Natural Events; Natural Hazards; Disasters. Discuss reasons why each photograph is placed in each category. Conduct research to determine the differences between natural events; natural hazards; and disasters. Construct definitions of natural event, natural hazard and disaster. Reclassify photographs based on the findings from the research.	• Collaborating; photograph interpretation; researching for information; communicating	Photographs accurately classified; definitions accurate formulated
View videos of eruptions occurring from different types of volcanic cones. Write the characteristics of each eruption. Determine where each volcano is located and the type of plate boundary at which it is found. Determine what is happening at the plate boundaries identified. In groups, brainstorm to determine how the activities at the various boundaries lead to differences in the lava composition, the nature of the volcanic eruption and the shape and structure of the cones formed. Compare findings to information in textbooks or online sources.	• Collaborating; photograph interpretation; researching for information; communicating	Eruption type described; volcano location identified; activities at boundary identified; differences in lava types explained; volcanic shapes and structures described; lava type linked to types of cones.

Learning Outcomes

Students will be able to:

- ✔ Draw and label diagrams relating to the structure of the Earth and plate movements
- ✔ Create lists of landform features and processes occurring in the Earth's crust
- ✔ Locate features on maps
- ✔ Label maps accurately with specific information
- ✔ Describe the characteristics of the physical aspects of the Earth
- ✔ Formulate and revise definitions
- ✔ Describe processes occurring within the Earth
- ✔ Connect the occurrence of one natural phenomena to another natural phenomena
- ✔ Compare and classify landform features
- ✔ Use theories to explain the occurrence of natural phenomena
- ✔ Explain the effects of the activities of natural events on a selected Caribbean country
- ✔ Draw maps to show specific information
- ✔ Conduct Earth System Science Analyses
- ✔ Understand the formation of several landform features

Points to Note

- Alternative names, where necessary, should be introduced. For example, the crust is also called the lithosphere; transform margins are also called passive or conservative plate boundaries.
- The map and jigsaw puzzle pieces showing plates should have arrows showing directions.
- Transform plate boundaries are, more often than not, moving in the same direction but at different speeds. It can, therefore, appear that they are moving in opposite directions.
- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

Students should be reminded to:

- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials and encourage others to do so
- Follow guidelines to promote healthy use of ICT tools

Extended Learning

Research the formation of volcanic islands over hotspots in the mantle.

Design an experiment to show how other mechanisms besides the formation of convection currents may lead to the movement of plates.

RESOURCES

Calculator; Calliper; Cardboard Sheets; Cartridge Paper; Compass Rose; Computer; Divider; Glue; Graph Sheets; Magnetic Compass; Maps; Multimedia Projector; Photographs; Protractor; Ruler; Scissors; String/Wire; Tape; Videos

https://www.youtube.com/watch?v=WaUk94AdXPA
https://www.nationalgeographic.com/environment/natural-disasters/volcanoes/
http://www.geosci.usyd.edu.au/users/prey/ACSGT/EReports/eR.2003/GroupD/Report1/web%20pages/Driv_tectonics.html

KEY VOCABULARY

Accretionary Prism/Wedge; Compression; Constructive/Divergent; Continental Crust; Convection Currents; Core; Crust; Destructive/Convergent; Earth; Earthquakes; Fault; Faulting; Folding; Inner Core; Lava Plateau; Mantle; Ocean Ridge; Ocean Trench; Oceanic Crust; Outer Core; Pacific Ring of Fire; Passive/Transform; Plate; Rift Valley; Sea-Floor Spreading; Subduction; Subduction Zone; Submarine; Tension; Volcano

LINKS TO OTHER SUBJECTS

Chemistry; English Language; Mathematics; Physics; Social Studies; Visual Arts

About the Unit

Fieldwork and Investigation 3

In this Unit, students will engage in further fieldwork to reinforce data gathering techniques. Students will be introduced to tools for data analysis and interpretation. At the end of this Unit, a simple report will be compiled outlining techniques used and an analysis of findings.

RANGE OF CONTENT

Knowledge Students should acquire information and develop an understanding of:

- Examples of human and physical environmental phenomena and processes relating to Jamaica and the rest of the World
- How physical environmental phenomena interact and the effects of such interaction
- Key concepts of location, spatial distribution and interaction, interrelationship and pattern
- The practical aspects of the above as they relate to the learner's environment

Skills Students should have the opportunity to develop and practise the following skills:

- Using and interpreting a variety of information sources, for example, photographs, diagrams and texts
- Presenting and communicating information in a variety of ways including diagrams and models
- Selecting and using of a variety of modes of enquiry and the proper use of equipment and techniques
- Distinguishing facts from opinions, prove simple hypotheses, and suggest sensible solutions to problems
- Social skills (for example, working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)

Attitude Students should develop:

- Positive attitudes towards themselves, others and their environment
- Self-confidence, self-esteem and a simple understanding of some of their perceptions
- Appreciation of social, cultural and environmental diversity

GUIDANCE TO THE TEACHER

- Fieldwork and other investigations should be based on topics which the students are already familiar. For instance, a study of a problem which the population of an area experiences, or a hazard affecting the community or vegetation in the community, is recommended, as students would have already learnt the basic concepts and terminology.
- Students should research a variety of techniques that can be used to gather data and be allowed, in groups, to design their own methodologies.
- Ensure safety measures are strictly adhered to when outdoors or when conducting experiments.
- Ensure that all students possess the requisite permissions from parents or guardians before they are allowed to participate in field excursions.

Prior Learning

Check that students can:

- Design a simple data collection instrument
- Calculate sample size
- Write a simple report

FIELDWORK AND INVESTIGATION 3

ATTAINMENT TARGET(S):
Apply geographical knowledge and skills in understanding and solving real world problems.

Standard(s): Students should develop problem-solving, decision-making and inquiry skills through identifying problems; formulating hypotheses; planning investigations; recording; interpreting and analysing data; communicating results and drawing conclusions.

Theme: Geographical Investigation, Methods and Project Design

OBJECTIVES

Students should be able to:

- Recall steps in preparing for fieldwork
- Design suitable data collection instruments
- Use fieldwork techniques to collect data to answer a given question or solve a problem
- Justify the selection of a specific methodology and instruments for collecting data
- Compile data collected and summarise using statistical diagrams
- Use the data to support hypothesis or research question
- Prepare a written report to present findings
- Cooperate by working in small groups to gather and report data
- Show willingness to participate in learning activities
- Demonstrate ethical conduct in the gathering, handling and processing of data

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, select a problem or topic for study. Conduct research, using secondary sources, on the problem or topic and record the information. Record information to create a bibliography.	• Communicating; critical thinking; researching for information; creating	Bibliography correctly formatted according to style selected; information on the problem correctly recorded
Using a handout, textbook, or online sources, read about a variety of simple, appropriate methods for collecting data on the selected problem or topic. Select the most appropriate methods and tools for collecting the data. Adjust the process as necessary to suit local conditions.	• Collaborating; critical thinking; communicating; creating	Appropriate method for collecting data selected and outlined
In groups, using the selected methods and tools, write a brief methodology outlining the steps for collecting the data. Use appropriate software or simple material to design and make data collection tools such as questionnaires or open quadrats.	• Collaborating; critical thinking; communicating; creating	Methodology outlined in logical sequence; data collection tools created/gathered
In groups, collect data using the steps outlined in the methodology. Record the data on data collection sheets or in field guides. Compile the data appropriately.	• Collaborating; critical thinking; communicating; creating	Data accurately recorded in field guide
Use the data compiled to generate appropriate statistical diagrams. Use the diagrams to support the description of findings. Write a short report, presenting the findings, incorporating the statistical diagrams.	• Collaborating; critical thinking; communicating; creating	Appropriate statistical diagrams used to represent data gathered; diagrams accurately represent the data gathered; sound report written

Learning Outcomes

Students will be able to:

- ✔ Demonstrate mastery of simple fieldwork skills
- ✔ Cooperate by working in small groups
- ✔ Design suitable data collection instruments
- ✔ Use appropriate fieldwork techniques to collect data
- ✔ Compile data using appropriate statistical diagrams
- ✔ Interpret data and use to support hypothesis
- ✔ Prepare a written report to present findings
- ✔ Write a bibliography using selected format
- ✔ Secure sensitive data

Points to Note

- Ensure that students use appropriate fieldwork and data presentation techniques for the type of study they are undertaking.
- Ensure that students are aware of the types of graphs that are used to represent specific types of data.
- For vegetation studies, open quadrats should be used so that it would be easier to include tall trees in the sample.
- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

Students should be reminded to:

- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials and encourage others to do so
- Follow guidelines to promote healthy use of ICT tools

Extended Learning

Research alternative methods online that could be used to collect the data gathered for the problem identified or the question posed.

RESOURCES

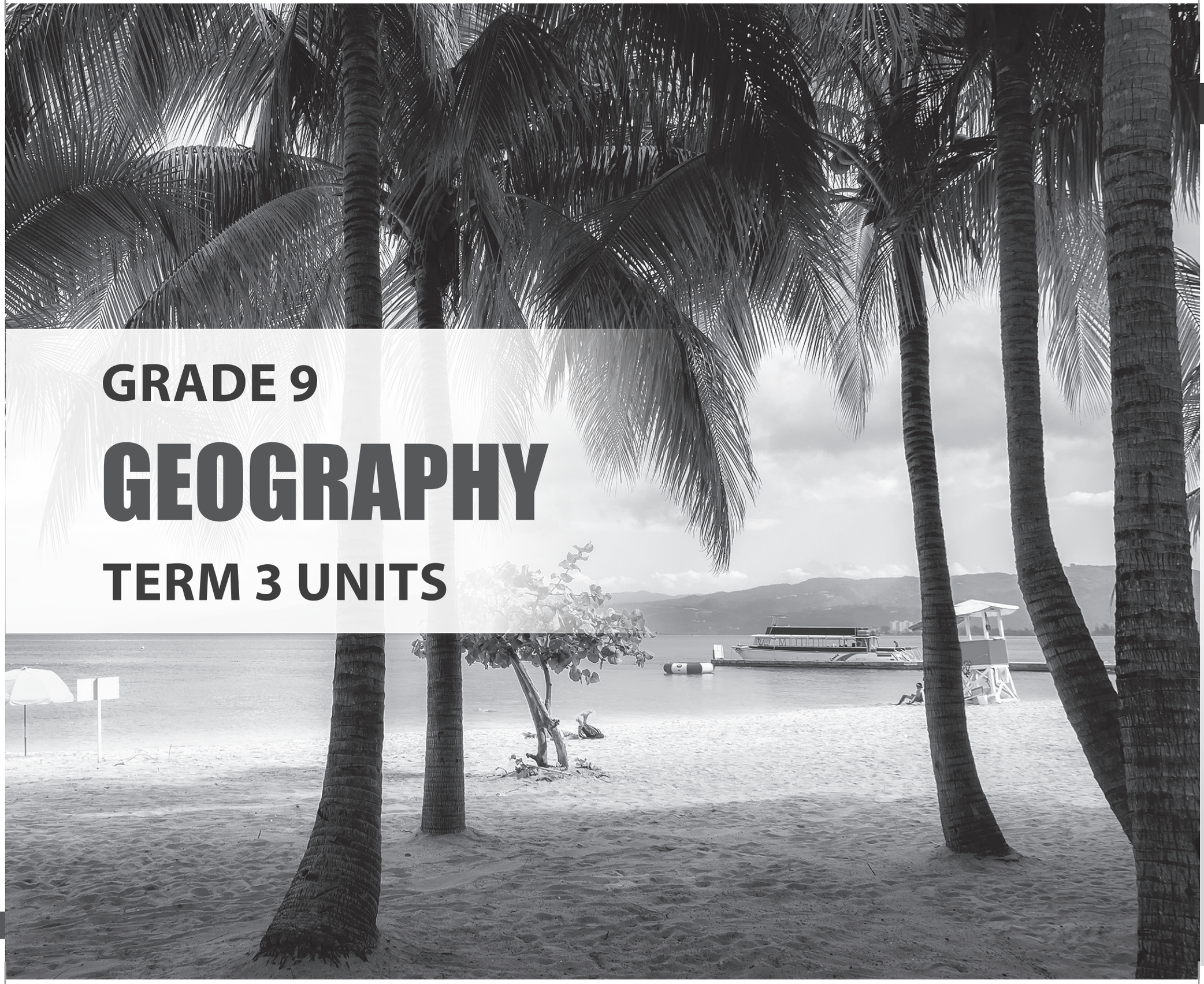
Atlas; Cartridge Paper; Computer; Glue; Maps; Markers; Multimedia Projector; Photographs; Population Statistics; Rope; Ruler; Scissors; String; Tape; Textbooks; Videos

KEY VOCABULARY

Bar Graph; Bibliography; Camera; Field Guide; Interview Schedule; Maps; Measuring Tape; Methodology; Pie Chart; Quadrats; Questionnaire; Ruler; Sample Size; Table; Textbook

LINKS TO OTHER SUBJECTS

Agricultural Science; Biology; English Language; Mathematics; Social Studies



GRADE 9

GEOGRAPHY

TERM 3 UNITS

TERM 1

Unit 1: 3 weeks
Earth System Science

The Atmosphere, Hydrosphere, Biosphere and Lithosphere
Caring for the Earth – Green Technology

Unit 2: 5 Weeks
Interpreting Maps and Photographs 3

Map Symbols
Direction and Bearings
Measuring Curved Distances
Six-Figure Grid References
Contour Patterns: Landform Types and Shapes
Cross-Sections and Intervisibility
Gradient
Sketch Maps
Analysing Maps
Reproducing Map Sections

Unit 3: 3 weeks
World: Population, Migration and Settlement

International Migration
Human Trafficking
Settlement Distribution
Global Security and Safety
Flow Maps
Statistical Diagrams

Unit 4: 1 week
Careers in Geography

TERM 2

Unit 1: 4 weeks
Weather, Climate and Vegetation

Types of Biomes
Characteristics of Tropical Biomes
Influence of Climate Change on Biomes

Unit 2: 6 weeks
Internal Forces and Processes of the Earth

Structure of the Earth
Plate Tectonics
Natural Hazards
Evacuation Planning

Unit 3: 2 weeks Fieldwork and Investigation 3

Fieldwork Techniques
Conducting Fieldwork
Drawing Conclusions
Ethics in Research

TERM 3

Unit 1: 1 week
Resources and Tertiary Economic Activities

Types of Resources Used in Tertiary Economic Activities
Types of Tertiary Economic Activities

Unit 2: 3 weeks
Jamaica: Tourism

Types of Resources Used in Tourism
Location of Tourism in Jamaica
Types and Characteristics of Tourism in Jamaica
Importance of Tourism
Impact of Climate Change on Tourism in Jamaica
Coral Reefs

Unit 3: 5 weeks
Caribbean Weather Systems

Depressions, Tropical Storms and Hurricanes
Cold Fronts
Impact of Climate Change on Caribbean – El Nino Southern Oscillation
Weather Maps and Symbols
Managing Hazards/Disasters

About the Unit

Resources and Tertiary Economic Activities
In this Unit, students will expand on the knowledge gained in the previous years of study. They will also come to understand the differences among primary and secondary economic activities and the tertiary sector.

RANGE OF CONTENT

Knowledge Students should acquire information and develop an understanding of:
- How groups of social, cultural and economic phenomena interact
- Key concepts of location, spatial distribution and interaction, interrelationship and pattern

Skills Students should have the opportunity to develop and practise the following skills:
- Using and interpreting a variety of information sources, for example statistics, graphs and maps
- Presenting and communicating information in a variety of ways including diagrams and models
- Social skills (for example, working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)

Attitude Students should develop:
- Willingness to perceive and evaluate natural and cultural phenomena
- A responsible attitude towards the exploitation and conservation of resources
- Appreciation of social, cultural and environmental diversity

GUIDANCE TO THE TEACHER

- Local resources or activities that the students are familiar with should be used in the lessons for this Unit. This information may then be expanded to include resources and activities from other areas in Jamaica and the rest of the world.
- Data on types of economic activities that contribute to Jamaica's economy should be obtained for the Statistical Institute of Jamaica (STATIN) or the Planning Institute of Jamaica (PIOJ).
- Ensure that the linkages between industries, including those which exist at the community level, are established.
- There are five categories of economic activities: Primary, Secondary, Tertiary, Quaternary, and Quinary. Ensure that the examples given for tertiary activities do not fall in the quaternary and quinary categories.

Prior Learning

Check that students can:

- Define 'resource' and 'economic activities'
- Classify resources as 'human' or 'physical'
- Recall the definitions of primary and secondary economic activity
- Make a list of resources in Jamaica
- Explain how resources are used to generate revenue

RESOURCES AND TERTIARY ECONOMIC ACTIVITIES

ATTAINMENT TARGET(S):

Gain knowledge and understanding of the physical and human processes and forces that shape the patterns of the Earth's surface and influence the distribution of people.

Standard(s): Students should acquire knowledge of different places on Earth and in the Solar System and an understanding of the spatial distribution of processes occurring within the Earth, on the Earth's surface, within the atmosphere and in the Solar System. They should also recognise that human and natural environments of the Earth consist of systems that are interdependent and understand the processes and forces that shape the patterns of the Earth's surface. They should understand the environment in which they live but also appreciate the diversity of other habitats and cultures globally.

Theme: The Human Habitat: Processes and Change

OBJECTIVES

Students should be able to:

- Recall the definition of the terms 'resource' and 'economic activity'
- Define the terms 'tertiary economic activity' and 'economic linkage'
- Identify and describe types of tertiary economic activities in Jamaica
- Identify the resources which are used in tertiary economic activities
- Establish the linkages among the primary, secondary and tertiary industries
- Classify the activities carried out in a selected industry as primary, secondary or tertiary
- Appreciate the importance of human resources
- Compare the contributions of various tertiary activities to the local economy
- Assess the importance of the tertiary economic sector to Jamaica
- Outline the various aspects of the tourism industry in Jamaica
- Recognise the contributions made by tourism to Jamaica
- Conceptualise and write a proposal for a service their school may offer to the surrounding community
- Write a simple business plan

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, unscramble a set of words to complete definitions of the terms 'resource', 'economic activity' and 'economic linkage'.	• Collaborating; creating; communicating	Definitions correctly formulated
In groups, given cue cards with selected occupations and economic activities, identify which sector – primary, secondary or tertiary – the occupation/ economic activities fall. Create a chart based on the groupings. Present the chart to the class and explain why each occupation/activity was placed in a specific group. Discuss the characteristics of each of the occupations and economic activities placed in each group and share findings with the class. Conduct research to support findings. Reclassify occupations or economic activities if necessary. Formulate a definition of the concept of tertiary economic activity based on the characteristics identified above. Compare the definition formulated to definition online or in textbooks.	• Collaborating; creating; communicating; critically thinking; classifying; researching for information	Classification correct; explanation for grouping justified; at least three common characteristics for each sector listed; definition correctly formulated
Based on the definition of tertiary economic activity formulated, identify jobs/activities in Jamaica/the Caribbean/the World that fall in the tertiary sector. Create a chart and present findings.	• Collaborating; creating; communicating; critically thinking; classifying; researching for information	At least five jobs in the tertiary sector identified; chart created

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, given tertiary economic activities, determine the types of resources that will be needed to adequately carry out that activity. Create a poster or any other visual aid to show the sectors that will be involved.	• Collaborating; communicating; researching for information; creating	At least two resources for each activity correctly identified
In groups, given a set of products, determine how the products are made and how it reaches the consumer. Create a chart to show the information, establishing the various sectors which are involved. Using the chart, determine how various sectors are linked. Formulate a definition for the concept of economic linkages.	• Collaborating; communicating; researching for information; creating	Economic linkages identified; chart accurately created
In groups, given a case study which outlines the inner workings of a given industry in Jamaica, identify its linkages to each economic sector based on its inputs and outputs. Create a Flow chart to represent the linkages.	• Collaborating; communicating; critical thinking; creating	Flow chart showing linkages to various sectors created
In groups, make a list of all the tertiary economic activities students and their families use and/or provide. Conduct research to determine the contribution of the activities identified to the economy. Present findings graphically.	• Collaborating; communicating; critical thinking; creating	List of at least five tertiary economic activities created; accurate data obtained from a reliable source; graph accurately created
In groups, conceptualise a service that the school may offer the surrounding community. Conduct research and write a simple business plan which should include all the resources that will be needed and all the activities that will be carried out. Present the business plan to the class.	• Collaborating; communicating; critical thinking; creating	Feasible business plan created; resources needed for the business identified

Learning Outcomes

Students will be able to:

- ✔ Formulate accurate definitions for terms 'resource', 'economic activity', 'economic linkage' and 'tertiary economic activity'
- ✔ Establish linkages between economic activities
- ✔ Categorise economic activities
- ✔ Create graphs to compare economic contributions
- ✔ Create a business plan

Points to Note

- A business may have workers who fall into each of the categories of economic activities
- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

Students should be reminded to:

- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials and encourage others to do so

Follow guidelines to promote healthy use of ICT tools

Extended Learning

Examine five common household products and establish the linkages among the three types of economic activities.

RESOURCES

Internet; Computer; Multimedia Projector

https://www.sba.gov/business-guide/plan-your-business/write-your-business-plan

KEY VOCABULARY

Business; Economic Activity; Economic/Industrial Linkage; Human Resource; Industry; Primary Industry/Sector; Resource; Secondary Industry/Sector; Tertiary Industry/Sector

LINKS TO OTHER SUBJECTS

English Language; Social Studies

About the Unit

Jamaica: Tourism

In this Unit, students will explore the nature of one of Jamaica's most important economic activity. The main locations used to develop the product will be examined and ways the industry can be diversified explored. The impact of changes in climate on the industry and the fragile environment in which it is largely based will also be determined. Solutions to problems which may arise in the future will also be discussed. Community-based tourism will be explored and promoted to encourage greater community participation, which can be of great benefit to all.

RANGE OF CONTENT

Knowledge Students should acquire information and develop an understanding of:
- Examples of physical environmental phenomena and processes relating to tourism in Jamaica and the rest of the World
- Key concepts of location, spatial distribution and interaction, interrelationship and pattern

Skills Students should have the opportunity to develop and practise the following skills:
- Using and interpreting a variety of information sources, for example statistics, photographs, graphs and maps
- Presenting and communicating information in a variety of ways including diagrams and models
- Social skills (for example, working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)
- Selecting and using of a variety of modes of enquiry, both geographical and general in nature
- Using proper equipment and techniques in field investigations
- Synthesising and evaluating information to make informed judgements and suggest adequate solutions to problems

Attitude Students should develop:
- A responsible attitude towards the exploitation and conservation of resources
- Appreciation of social, cultural and environmental diversity

GUIDANCE TO THE TEACHER

- Information for this Unit should be obtained from the Jamaica Tourist Board (JTB) offices or online.
- Plan field trips to tourism resort centres.
- Ensure that all students possess the requisite permissions from parents or guardians before they are allowed to participate in field excursions.

Prior Learning

Check that students can:

- Identify the category of economic activity in which tourism falls
- Explain how resources are used to generate revenue

JAMAICA: TOURISM

ATTAINMENT TARGET(S):

Gain knowledge and understanding of the physical and human processes and forces that shape the patterns of the Earth's surface and influence the distribution of people.

Standard(s): Students should acquire knowledge of different places on Earth and in the Solar System and an understanding of the spatial distribution of processes occurring within the Earth, on the Earth's surface, within the atmosphere and in the Solar System. They should also recognise that human and natural environments of the Earth consist of systems that are interdependent and understand the processes and forces that shape the patterns of the Earth's surface. They should understand the environment in which they live but also appreciate the diversity of other habitats and cultures globally.

Theme: The Human Habitat: Processes and Change

OBJECTIVES

Students should be able to:

- Define the term 'tourist'
- Outline the concept 'tourism'
- Identify, on a map, the location major tourist resort areas in Jamaica
- Describe the types of resources located in each resort area to support the tourism product
- Investigate how different types of resources are used to develop different types of tourism – eco/natural, sport, culinary/gastronomic, health, historical, business, cruise, heritage/cultural and community-based
- Outline the characteristics of the types of tourism in Jamaica
- Justify the fluctuations in the arrivals of tourists over the period of a year
- Create an appropriate system to show movement and volume of tourists from countries of origin to Jamaica
- Analyse the importance of various sectors to the tourism industry - accommodation, transportation, attractions and tours, dining and entertainment, communication networks
- Suggest ways in which tourism has contributed to national development
- Formulate a definition for the concept of community- based tourism
- Design a plan to establish community-based tourism in a local area
- Describe the coral reef biome
- Describe the types of coral reefs which grow along Jamaica's coastline
- Suggest ways in which the presence of reefs along Jamaica's coastline contribute to the development of tourism in Jamaica
- Research the conditions which favour coral reef growth
- Explain how coral bleaching occurs
- Assess the threats to coral reefs in the Caribbean and propose one solution to mitigate each threat identified
- Propose ways in which changes in climate will affect tourism and coral reefs in Jamaica
- Discuss behavioural changes which can help to preserve the environment

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, view advertisements online created by the Jamaica Tourist Board (JTB) as well as short online documentaries featuring the resort centres in Jamaica. Identify the resources which are used for tourism and the major towns in which they have been developed. Create a list of the resources and give a short description of how they are used and the types of tourism the resources facilitated.	• Collaborating; communicating; critical thinking; creating	At least five resources used in tourism identified and their purposes outlined
In groups, brainstorm to identify the resources that exist in their communities that could be used to develop a tourism product. Create an advertisement to sell their community as a tourist destination. Formulate a definition of community-based tourism.	• Collaborating; communicating; critical thinking; creating	Advertisement generated; definition correctly formulated
Conduct research on the JTB website or use textbooks or online sources to gather information on the various types of tourism. Write a report on the characteristics of each. Suggest the types of resources which are used for each type of tourism.	• Collaborating; communicating; critical thinking; researching for information; creating	At least four types of tourism identified; at least five characteristics of each type of tourism listed; at least three types of resources used in each type of tourism identified
In groups, gather data from online sites on the number of tourist arrivals to Jamaica over the last ten-year period. Represent the data using an appropriate graphical method. Suggest reasons for the annual changes noted in the data. Examine the data for a single year. Identify the peak period for tourist arrivals and offer explanations for when it occurrence at a specific period of the year.	• Collaborating; communicating; critical thinking; creating	Report contains accurate information on the characteristics of each type of tourism; December to March identified as peak period due to weather changes in countries of origin
Given a blank map of the world, design an appropriate method to show tourist arrival numbers for a given year and their point of origin (arrows drawn on the map will show direction of movement and the width of arrow scaled to show numbers of tourists).	• Critical thinking; creating; drawing maps	Flow map or other appropriate method created – arrows show correct direction and properly scaled to show number of tourist arrivals
Embark on a field trip to a tourist resort town. In groups, use a field guide to record the types of business which are established to support tourism. Interview owners/operators of these businesses to establish how their business is linked to tourism. Sketch and annotate a map of the study area. Write a brief report on findings.	• Collaborating; communicating; critical thinking; creating; report writing; drawing	Accurate map drawn; field guide completed; sound report completed

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: In groups, brainstorm to derive a definition for the concept of community-based tourism. Share definitions with the class and offer justification for each definition. Select a community and work alongside the residents to conceptualise a tourism product. Assist the community in making a plan keeping the following in mind: • Who will lead the process? • What products and services will be offered and how will the community ensure quality control? • What are the roles of community members? • How will participants be compensated for their services? • What will be the rewards and benefits for the community and its members? • Who are the other stakeholders outside of the community? • How will the community be accessed by the tourists? • Who will train persons and what type of training is needed? Draw a sketch map of the community and pinpoint where various activities will be located. Create an advertisement to promote the new tourism product. Have a group viewing of each advertisement and the whole group will offer constructive criticism on the pros and cons of each advertisement.	• Collaborating; communicating; critical thinking; creating; report writing; drawing	Plan meets criteria outlined; definition formulated; advertisement created; pros and cons identified
In groups, view online videos of reefs in Jamaica. Identify the characteristics of reefs and create a list for class presentation. Examine a map of Jamaica showing the distribution of coral reefs. Explain the distribution. Make suggestions why coral reefs are important to tourism in Jamaica.	• Collaborating; communicating; critical thinking	Map read accurately; at least three reasons why coral reefs are important suggested
In groups, given various scenarios of climate change, determine how coral reefs in Jamaica may be affected. Conduct research and create a poster with information on ways to preserve and protect coral reefs.	• Critical thinking; Collaborating; communicating	Poster created with at least four ways of preserving and protecting coral reefs shown

Learning Outcomes

Students will be able to:

- ✔ Describe resources and economic activities in Jamaica
- ✔ Locate tourist resort sites on maps
- ✔ Develop a plan for community-based tourism
- ✔ Create Flow maps and graphs
- ✔ Establish the links among tourism and supporting businesses
- ✔ Appreciate the importance of coral reefs
- ✔ Identify the threats to coral reefs
- ✔ Demonstrate ways of preserving the environment

Points to Note

- Information should be obtained from the Jamaica Tourist Board (JTB) on locations that are considered resort areas in Jamaica.
- A very simple introduction to coral reefs should be done in this Unit.
- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

Students should be reminded to:

- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials and encourage others to do so

Follow guidelines to promote healthy use of ICT tools

Extended Learning

Conduct a class Skype session with students from Barbados to discuss the similarities and differences between the types of tourism developed. A case study approach may also be used.

RESOURCES

The Marine Lab and Biodiversity Centre (Port Royal and Discovery Bay) – The University of West Indies
The Alligator Head Marine Lab – Portland
https://www.youtube.com/watch?v=ZiULxLLP32s

KEY VOCABULARY

Accommodation, Arrivals, Attractions, Business Tourism, Communication Network, Community, Community-Based Tourism, Coral Reef; Cruise Tourism, Culinary tourism, Dining, Eco- Tourism, Entertainment, Flow Line Map, Gastronomy, Heritage/Cultural Tourism, Historical Tourism, Resort, Service Industry, Sport Tourism, Stop Overs, Tertiary Industry, Tourist, Tours, Transportation

LINKS TO OTHER SUBJECTS

Biology, English Language, History, Mathematics, Social Studies

About the Unit

Caribbean Weather Systems

In this Unit, students will expand on their knowledge of weather and climate. The common weather systems of the Caribbean will be examined and mapped as they move across the Caribbean Basin. The potential impact of changes in climate on weather systems will be explored, along with the changes to climate due to events such as the El Niño Southern Oscillation. Managing hazards and disasters will be examined with the aim of building resilience in local communities.

RANGE OF CONTENT

Knowledge Students should acquire information and develop an understanding of:

- Physical environmental phenomena and processes relating to Jamaica and the rest of the World
- Key concepts of location, spatial distribution and interaction, interrelationship and pattern

Skills Students should have the opportunity to develop and practise the following skills:

- Using and interpreting a variety of information sources for example, photographs, graphs and maps
- Presenting and communicating information in a variety of ways including diagrams and models
- Social skills (for example, working effectively alone or in groups; following instructions; teamwork and cooperation; communicating effectively to transmit information)
- Selecting and using of a variety of modes of enquiry, both geographical and general in nature
- Using proper equipment and techniques in field investigations
- Synthesising and evaluating information to make informed judgements and suggest adequate solutions to problems

Attitude Students should develop:

- A responsible attitude towards themselves, others and the environment
- A simple understanding of some of their perceptions
- An appreciation of environmental diversity

GUIDANCE TO THE TEACHER

- Photographs, satellite imagery, videos, and models should be used to support this Unit.

Prior Learning

Check that students can:

- Plot location on a map using latitude and longitude
- Define 'climate change'
- Identify at least two effects of climate change

CARIBBEAN WEATHER SYSTEMS

ATTAINMENT TARGET(S):
Recognise the interdependent relationship between humans and the natural environment.

Standard(s): Students should develop an understanding of the environment as a system of interdependent components affected by human activity and natural phenomena. They should also recognise the significance of using past and present events to make predictions for the future and apply sustainable practices in preserving the environment for future generations.

Theme: Environmental Awareness, Change and Sustainability

OBJECTIVES

Students should be able to:

- Differentiate between a depression, tropical storm and hurricane
- Differentiate between a 'warning' and a 'watch' as it relates to the occurrence of natural events
- Recall the difference among natural event, natural hazard and disaster
- Define the term tropical cyclone.
- Describe and categorise depressions, tropical storms and hurricanes based on wind speed
- Describe and categorise hurricanes based on the Saffir-Simpson Scale of hurricane intensity
- Examine water vapour content data of tropical storms and hurricanes and determine the propensity for flooding from the system
- Explain the development of hurricanes in the western hemisphere
- Plot the track of depressions, tropical storms and hurricanes on a map using global coordinates (latitude and longitude) and appropriate weather symbols
- Explain the path (curvature) of hurricane/tropical storm tracks for the past 2 years
- Recognise why cones are drawn around tropical storm and hurricane tracks
- Identify depressions, tropical storms and hurricanes on synoptic charts
- Read synoptic charts/weather maps
- Determine how the direction of approach to a country and speed of forward movement of a tropical storm or hurricane may be linked to potential for damage
- Annotate a simple cross-section to show the vertical structure of a hurricane
- Examine satellite imagery and determine the weather patterns expected in each quadrant of a tropical storm/hurricane
- Create a plan for the home/school/community to deal with the impact of a tropical storm/hurricane
- Explore the convention used to name tropical storms/hurricane
- Identify the main factors influencing the formation of hurricanes
- Explain why tropical storms/hurricane are most likely to occur during a particular period of the year
- Suggest ways in which global warming is expected to influence hurricane strength, frequency and range
- Describe the changes in weather patterns associated with the passage of a Cold Front across the Caribbean
- Simply describe the El Niño Southern Oscillation and explain how it affects weather patterns in the Caribbean
- Explain and apply the Emergency Management Cycle to a common hazard in the Caribbean

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, view online simulations showing the stages of development of a tropical storm/hurricane in the Northern hemisphere. In groups, identify the stages of development and describe the characteristics of each stage. Conduct research using textbooks or online sources to clarify information garnered from the video.	• Collaborating; critical thinking; communicating; researching for information	Four major stages of development from a tropical disturbance identified; wind speed range of each stage described
In a lab, in groups, calculate the area of the water sinks. Mark the filled, half-filled and quarter-filled points with dry erase marker. Plug the sink and fill with a known volume of water. Calculate the pressure which the water would exert on the base of the sink (research how to do this calculation) at the filled, half and quarter mark. Pull the plug and record the characteristics of the vortex as the water is emptied from the sink at the fill, half and quarter points. Relate the changes in the vortex to changes in the pressure of the water. Relate the changes observed in the lab to changes expected to happen in the atmosphere as a hurricane develops. Repeat the experiment a second time and use a finger to plug the 'eye' of the vortex. Record what occurs to the vortex.	• Collaborating; critical thinking; communicating; experimenting; recording information	Pressure correctly calculated; changes in the vortex formed recorded

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
View a video of a named hurricane. Describe the weather pattern as the vortex passes overhead – at the front of the vortex; at the eye wall; in the eye of the vortex; at the back of the vortex. Create a table to show the changes in the weather noted for the following elements of weather – wind direction, cloud cover, rainfall, and temperature. In groups, create a plan to prepare for the hurricane/ tropical storm. Plan should include actions to carry out before, during and after the event.	• Collaborating; critical thinking; communicating; creating	General changes noted in cloud cover, wind speed, wind direction, temperature, pressure and rainfall; tropical storm/hurricane plan created detailing at least three actions to be taken before; during and after the event
Conduct online research on how tropical storms and hurricanes are named. Given the number of predicted systems for a given year, indicate the names that will be used.	• Collaborating; critical thinking; communicating; experimenting; recording information	Six lists of names identified for use – one in a determined year; indication that hurricanes named alphabetically
In groups, given a list of past tropical storms and hurricanes and the dates they developed for given years, establish which months the systems are most likely to develop. Given the time of year, suggest the factors that promote the formation of tropical storms and hurricanes – warm ocean surface temperatures; rising moist air; upper level air divergence. Relate these factors to the findings of the lab experiment.	• Collaborating; critical thinking; communicating;	Hurricane season identified; at least two factors that promote the formation of tropical storms/hurricanes identified
Given a blank map of the world and a list showing the coordinates of two named systems over the course of their lifespans, plot the tracks and indicate, using appropriate weather symbols and colours, the stages of their development. Based on where the systems dissipate, create a list of factors which will cause tropical storms and hurricanes to strengthen or dissipate.	• Collaborating; critical thinking; communicating; mapping; creating	Tracks plotted completely and precisely; symbols used to indicate type of weather system; list of at least three factors which lead to dissipation/ strengthening of tropical storms/hurricanes listed
Examine images showing hurricane tracks and their associated cones and brainstorm, in groups, to give reasons for the size of the cones and the reason they are drawn around the tracks.	• Collaborating; critical thinking; communicating; photograph/image interpretation	One reason for the cone around tropical storm/ hurricane identified

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
In groups, examine a satellite imagery of an approaching cold front. Suggest the weather patterns expected as the cold front passes overhead. Given a synoptic chart, read the weather associated with cold fronts. Present the description and explain the changes which will occur to each element of weather as the cold front passes over.	• Collaborating; critical thinking; communicating; photograph/image interpretation	Weather pattern associated with a cold front accurately listed; synoptic chart correctly read; changes to the weather elements identified
View an online video outlining the anticipated effects of climate change and El Niño. Brainstorm, in groups, how these changes will affect the frequency, intensity, and range of tropical storms and hurricanes. Present suggestions to class.	• Collaborating; critical thinking; communicating	Present changes in climate generally expected to cause increase in frequency correctly identified; Effects of El Niño correctly identified
Given the Emergency Management Cycle, in groups, determine the actions to be taken in each component for a given hazard. Complete a cycle for specific hazards including tropical storms and hurricanes, drought, and emerging hazards such as sea level rise, and vector-borne diseases. Present the cycle to the class for discussion.	• Collaborating; critical thinking; communicating	Cycle accurately developed for a given hazard

Learning Outcomes

Students will be able to:

- ✔ Distinguish among weather systems
- ✔ Describe weather patterns
- ✔ Track weather systems on maps using global coordinates
- ✔ Use synoptic charts/weather maps
- ✔ Understand simple weather reports
- ✔ Understand satellite imagery of weather systems
- ✔ Make decisions regarding preparing for impact from weather systems
- ✔ Write a hazard mitigation plan
- ✔ Outline the actions within the Emergency Management Cycle for specific hazards

Points to Note

- The naming of hurricanes is done by the World Meteorological Organisation. There are six lists which contains alternative male and female names in alphabetical order. The letters Q, U, V, X, Y, Z are not used. If the list is exhausted in a given year, the Greek alphabet is used to add names.
- Names for systems which caused large-scale destruction are retired from lists and a substitute starting with the same letter inserted.
- The category of a system does not indicate the amount of rainfall that the system will produce.
- Where needed, rubrics should be created to evaluate the tasks assigned to students. These should be shared with the students before they begin each task.

Students should be reminded to:

- Demonstrate safe online behaviours
- Acknowledge the owners of digital materials and encourage others to do so
- Follow guidelines to promote healthy use of ICT tools

Extended Learning

Research the various names cyclones are called globally. Identify and explain the differences between hurricanes formed in the Northern hemisphere and those in the Southern hemisphere.

RESOURCES

Videos, maps, synoptic charts

BBC Weather: How do Hurricanes Form?
https://www.youtube.com/watch?v=Wk_FVXVnE2I
National Hurricane Centre: Tropical Cyclone Names
http://www.nhc.noaa.gov/aboutnames.shtml#atl
http://www.nhc.noaa.gov/aboutnames_history.shtml
http://www.nhc.noaa.gov/tracking_charts.shtml

KEY VOCABULARY

Climate Change, Cold Front, Cone, Cross-Section, Disaster, Drought, El Niño, Emergency Management, Eye, Eye Wall, Frequency, Hazard, Hurricane, Hurricane Intensity, Hurricane Season, Latitude, Longitude, Natural Event, Natural Hazard, Saffir-Simpson Scale, Spiral, Track, Tropical, Tropical Depression, Tropical Disturbance, Tropical Storm, Tropics, Vortex, Warning, Watch

LINKS TO OTHER SUBJECTS

English Language; Mathematics; Physics; Social Studies

APPENDICES

SUBJECT GLOSSARY

TERMS	DEFINITIONS/MEANINGS
Account for	Give a satisfactory record for why an event occurs
Analyse	Examine something in detail, interpret and explain it
Annotate	Add notes (giving some explanation) to the labels on a diagram
Appreciate	Grasp fully all the implications of a situation
Assess	Evaluate the nature, ability or quality of
Associate	Make connections between two or more components/concepts
Calculate	Determine mathematically value or size
Categorize /Classify	Put into distinct groups or classes based on common factors
Cite evidence	Find material from textbooks or other sources to support, prove or confirm a point, support an idea or argument or to answer a question or make a claim
Compare/Contrast/Differentiate	Note the similarities and differences between two or more components
Compile data	Put information in some logical order or sequence and represent appropriately
Conceptualize	Put together ideas about something to form a concept
Conduct experiments	Follow a series of logical steps to prove or disprove a hypothesis
Critically examine	Inspect evidence and provide an analysis that points out weaknesses and strengths. Judgements made must be supported by evidence
Define	State the precise meaning of a concept or term
Demonstrate	Show understanding by using relevant examples or showing of a skill
Describe	Identify and give a detailed account of characteristics

TERMS	DEFINITIONS/MEANINGS
Design	Plan how to carry out a task or create a blueprint for a model
Determine	Establish exactly how something occurs by research and/or calculation
Discuss	Write about a topic in detail taking into consideration various ideas
Distinguish	Determine the difference between two or more concepts
Enlarge	Make something bigger (drawn to scale when applied to map work)
Evaluate	Examine something in detail to arrive at a judgement; form an opinion
Evaluate	Determine the value, usefulness or number of something (assess)
Explain	Give details about the workings or characteristics of a feature or give a detailed rationale for an idea
Formulate	Express an idea in a concise or systematic way
Generate	Formulate a new idea or give unique interpretations on a subject
Implement	Put a plan into action
Interpret	Examine the key characteristics of a topic and give an evaluation
Investigate	Research and study a topic in great detail
Justify	Give reasons for taking a position or giving an argument
Label	Apply a name to a feature
Link	Show a relationship between two or more things
Locate	Find a precise point
Observe	To examine in detail over a defined timeframe

TERMS	DEFINITIONS/MEANINGS
Outline	Give in some sequence, information on a subject; only the main points are required
Plan	Write a proposal for action
Plot	Map or chart the movements or progress of a system (e.g. hurricane)
Propose	Put forward a plan or suggestion for consideration
Recall	To remember something
Reduce	To make smaller (drawn to scale when applied to map work)
Represent	Show (on a map) using symbols
Revise	Alter in light of evidence obtained from research
Sketch	Make a rough drawing of a map or study site or diagram
State	Express, in brief detail, the relevant points about a concept
Use	Demonstrate competence with equipment or show a skill
Revise	Alter in light of evidence obtained from research
Sketch	Make a rough drawing of a map or study site or diagram
State	Express in brief detail the relevant points about a concept
Use	Demonstrate competence with equipment or show a skill

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The 21st century is a time of rapid technological growth and social change. The school curriculum must, therefore, ensure that young people are well prepared for the challenges and opportunities that they will meet as adults in this century. The MoEYI is making every effort to provide for the multiple intelligences of our children and cater to their diverse needs in order to fully maximize their capabilities. Hence, the MoEYI has created alternative pathways to receiving an education at the secondary level.

Providing alternative pathways will be far-reaching in carrying out the Ministry's mantra, "Every child can learn....every child must learn". Learning pathways will allow for an inclusive approach in which instruction is based on tailored curricula, enabling each learner to perform to his/her fullest potential based on aptitude, interest and ability. Alternative Pathways represent a new approach to secondary education. Secondary education in Jamaica is being reframed and re-positioned as customised, diverse, relevant, equitable, outcomes-based, and inclusive; and significantly, this approach will signal the introduction of a seven year (Grades 7-13) period of instruction for students on all secondary pathways.

Goals of the APSE

- Design the school system to offer differentiated instructional programmes, informed by the National Standards Curriculum (NSC).
- Develop individualized intervention/learning plans based on students' performance profile.
- Provide special educators as Pathway Coaches to support subject teachers of students on Secondary Pathways II and III in the delivery of instruction.
- Facilitate a functional academic approach at the secondary level characterised by response to intervention (RtI) methodology, interactive, learner-centred, project-based and problem- based learning, reflection and alternative forms of assessment.
- Foster a system for ALL students to exit the secondary level with the knowledge, skills, competences and attitudes which will have them ready for the world of work or to access tertiary level education.

Secondary Pathways I, II & III (SP I, II & III)

All students will access secondary education via the prevailing Grade Six examination. The exit examination will provide individual profiles to inform decisions for pathway access and standards for differentiation.

SPI is a 7-year programme with a curriculum based on the constructivist approach. At Grades 7-9 students will access the National Standards Curriculum (NSC), and at Grades 10, 11, 12 & 13, they will access the curricula/syllabi of the examining body.

SP II is a 2-year transitional programme with a curriculum based on the constructivist approach. Special educators/pathway coaches will work with teachers and students on this pathway. Students will be provided the required intervention and support to allow for transition. At the end of Grade 8 students will be re-evaluated through psycho-educational evaluation to determine their readiness for crossing over into either SP I or SP III.

SP III is a 7-year programme with a curriculum based on the constructivist approach. At Grades 7-9 students will access the National Standards Curriculum (NSC), and at Grades 10 & 11, they will access the curricula/syllabi of the examining body. At the end of Grade 11 SP III students will transition into the Career Advancement Programme.

At Grades 7-9 the NSC, will be modified to meet the needs of the SP III students. Students in SP III will be instructed through a functional academics curriculum in the core subjects- Mathematics, English Language, Communication, Social Studies and Science. Their instruction will be further enriched with Personal Empowerment, Technical and Vocational instruction, as well as the performing and creative arts. Pathway Coaches will collaborate with subject teachers to prepare content, ensuring differentiation in instruction for students on SP II and III. These students will also be supported through use of the Response to Intervention (RtI) methodology.

PERSPECTIVES OF SCIENCE, TECHNOLOGY, ENGINEERING, MATHEMATICS & THE AESTHETICS (STEM/STEAM) IN RELATION TO THE NATIONAL STANDARD CURRICULUM (NSC)

INTRODUCTION & BACKGROUND

The integration of theoretical principles that relate to STEM/STEAM Education in the NSC began in June 2014. This move was influenced by recommendations of the STEM Steering Committee that emphasized the need to develop learners who are not just productive, but who would also be innovative Jamaicans. STEM integration was also regarded as one of the strategic long term means of addressing the economic challenges being faced by Jamaica using education as a primary vehicle for the implied transformational change to happen, beginning from short term efforts.

Initial discussions and deliberations promoted an emphasis on STEM rather than STEAM Education. However, critical analysis of the conversations conveyed the perspective of STEM as a collection of related disciplines that all learners should have the opportunity of pursuing, to develop the competencies they offer and as a consequence be able to gain employment or become employers in STEM related areas. As stakeholders from different backgrounds processed their understanding of STEM, new meanings of the concept emerged from the discussions. One was the perspective of STEM as a methodology. There was, however, concern about the exclusion of “A” in STEM. This “A” component however, brought to the discussion, multiple meanings. In some Aesthetics as a field and was considered an important component to be included if educators are serious about issues of discrimination, holistic learning and current research on the iterative function of the brain that warrants attention to brain based learning and the role of the Arts in promoting knowledge integration to cater to multiple domains of learning. There was also discontent about neglecting the Performing Arts when related creative industries contribute significantly to economic development. The concern was that the role of the Arts to economic development was being trivialized.

The call for the integration of the Aesthetics or Art forms became more pronounced as STEM took on more national significance. This was supported by research that indicates the importance of the Aesthetics in developing values and attitudes, in promoting holistic learning and in serving as drivers of innovations. By integrating principles from STEM with those from the Arts/Aesthetics, the approach to problem solving would encourage greater appreciation for and reliance on the interdependent nature of knowledge when science and arts intersect. Additionally, STEAM as a methodology encourages the harmonizing of the cognitive and the emotional domains in the problem-solving process.

The concept of STEAM was adopted in 2015, as an integrative approach to education and a methodology that pays attention to the benefits to be derived from the inclusion of the Arts or Aesthetics with STEM related principles. These collective benefits are supported by Jolly (2014), Sousa and Pilecki (2013) and include divergent thinking; differentiated learning; Arts integration; focus on intrinsic motivation and informed decision-making.

PERSPECTIVES OF STEM/STEAM IN THE CONTEXT OF THE NSC

In the context of the NSC, STEM/STEAM is used in a number of ways. These include:

STEM/STEAM as an integrative learning approach and methodology in facilitating learning. This perspective places emphasis on STEM/STEAM as a means of helping learners become creative or innovative problem solvers and lifelong learners who rely on scientific principles (laws and theories) to address issues/concerns or to deal with observed phenomenon that are puzzling for them or that inspire interest. As an approach, the focus is on solving problems based on principles. As methodology, the focus is on the system of practical procedures to be used to translate principles into the problem - solving processes or to choose from available problem- solving models.

STEM/STEAM as an Experiential-Vocational Learning Framework that is based on problem solving through the project-based approach. Emphasis is placed on solving real life problems in a context that requires learners and their facilitators to observe work-based principles. The primary purpose for this focus is for learners to: (i) become employable (ii) prepare for further education and/or for occupational or work readiness.

STEM as types of institutions in which learning is organized as a meta-discipline as described by Morrison and Bartlet (2009). Based on this perspective, STEM facilitates the demonstration of knowledge in a manner that removes the boundaries of each discipline for application to problem as would be practised in the real world.

IMPLICATIONS OF PERSPECTIVES OF STEM/STEAM IN LIGHT OF THE NSC

Since the NSC is based on Constructivism principles, STEM/STEAM as an approach and methodology, has to be established on post-positivistic thinking. From this position, STEM/STEAM influences the kind of practice that promotes collaboration, negotiation of meaning and openness to scrutiny.

The NSC developers selected a Constructivist approach that included the deliberation, designing and development stages of the curriculum process. Evidence of the influence of Constructivism can be seen the NSC Framework Document that conveys the following emphasis:

(i) **The element of objectives** is presented in two forms; firstly as **Learning Objective**s to focus attention on process and experience rather than product. Secondly as Learning Outcomes that serve as some of the outputs of the process. They include the basic understandings, skills and dispositions anticipated from learners' engagement in the planned experiences.

(ii) **The element of content** is treated as contexts for learners to think critically, solve problems creatively while developing their identity as Jamaicans. Content is not expected to be treated as disciplines to be mastered but as areas that contribute knowledge, skill sets and attitudes that form the composite of competencies to be acquired from their integration in the learning situations.

(iii) **The element of learning experiences (method)** is presented as a set of learning activities that serves as a source of problems to be addressed as a part of the learning process. These real-life activities provide the scope of knowledge, skills and required dispositions or character traits for learners to make sense of that aspect of life or the world that they represent. They are the threads that connect all the other elements of the curriculum and allow for the integration of STEM/STEAM in the following ways:

- Identification of activities that are presented as problems to be solved using the STEM/STEAM approach based on contextual factors that include the profile of the learner, the learning conditions and the anticipated impact.
- Integrating activities to form a real problem to be solved as a short, medium or long term project to which the project based learning would be applied.
- The examination of learning activities by learners and teachers as co-learners through multiplelenses using content of science, technology, mathematics and the humanities that they have already explored to engage in the problem identification and definition processes.
- Extending learning in the formal setting to the informal by connecting co-curricular initiatives that are STEM/STEAM based that learners are undertaking at the institutional level through clubs and societies, as whole school projects or in partner ship with external stakeholders.
- Using the learning activities to review STEM/STEAM initiatives that form a part of the informal curriculum to and for reflection on action.

- Using activities as springboards for reflecting on career or occupational interest in STEM/STEAM related areas.

(iv) The element of evaluation is communicated in two major ways; firstly as prior learning which serves diagnostic purpose and secondly as an on-going developmental process. This formative focus is indicated by the inclusion of explicitly stated assessment criteria that are to be used alongside the learning activities. The use of assessment criteria as counterparts of the learning activities also indicates that assessment is learner centred since it is serving developmental rather than promotional purpose and as a consequence, allows learners to self-correct as they use feedback to develop feed-forward capabilities. Evidence of learning, based on the learning outcomes, can be collected from various types of assessment methods that emphasize the learner centred constructivist orientation. This brings to the fore the need for serious consideration to be given to differentiation in assessment for fairness and credibility of claims about learners' capabilities and to inform decisions that will impact their educational journey.

In general, this integrated approach, which is the context of STEAM, is aimed at improving the quality of the educational experience for learners while influencing the achievement of the aims of education that relate to productivity and creativity as part of the profile of the Jamaican learner.

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The 5Es Overview: "The 5E Learning Cycle"

What is a 5E Learning Cycle?

This model describes an approach for facilitating learning that can be used for entire programmes, specific units and individual lessons. The NSC supports the 5E constructivist learning cycle, as it places emphasis on the processes that may be used to help students to be personally involved in the learning situation as they are guided to build their own understandings from experiences and new ideas.

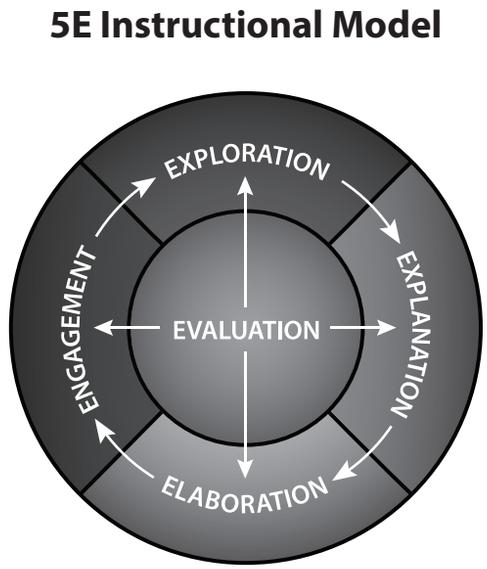

Figure 1. Illustrating one version of the 5E model that conveys the role of valuation as an interconnecting process that is at the core of the learning experience.

Figure 2, illustrating a cyclical perspective of the model with each process being given similar emphasis in contributing to the learning experience on a whole.

EXPLANATION OF THE INSTRUCTIONAL MODEL

What are the 5Es?
The 5Es represent five key interrelated processes that provide the kind of learning experiences for learners to experience the curriculum or planned learning episodes: Engage, Explore, Explain, Extend (or Elaborate), and **Evaluate**.

ENGAGE: The purpose of the ENGAGEMENT dimension is to help students to be ready intellectually, socially, emotionally etc. for the session. Attention is given to the students' interests and to getting them personally involved in the lesson, while pre-assessing prior understandings, attitudes and/or skills. During the experience, students first encounter and identify the instructional task and their roles and responsibilities. During the ENGAGEMENT activity, students make connections between past and present learning experiences, setting the organizational groundwork for upcoming activities. The engagement activity may be used to (a) help student unearth prior knowledge (b) arouse their curiosity (c) encourage students to ask questions as a sign that they have wonderments or are puzzled.

EXPLORE: The purpose of the EXPLORATION dimension is to get students involved in solving a real problem that is based on a selected context. EXPLORATION provides them with a chance to build their own understanding of the phenomenon being investigated and the attitude and skills involved for arriving at a workable solution. In exploring the students have the opportunity to get directly involved with the phenomenon and materials. As they work together in learning teams or independently, the need to share and communicate becomes necessary from the experiences. The teacher functions as a facilitator, providing materials, guarding against obstacles to learning and guiding the students to operate based on agreements. The students become inquirers and co-owners of the learning process. In exploring, they also ask questions, formulate hypothesis, search for answers or information/ data, reflect with others, test their own predictions and draw conclusions.

EXPLAIN: The purpose of the EXPLANATORY dimension is to provide students with an opportunity to assess their thinking and to use intellectual standards as critical thinkers to communicate their perspectives and/or the meaning of the experiences. They rely on communication tools and their skills as Language users to: (a) organize their thoughts so that they are clear, relevant, significant, fair, accurate etc. (b) validate or affirm others (c) self-motivate. Reflection also occurs during the process and may cause students to adjust their perspective or justify their claims and summarise the lessons being learned. Providing explanations contributes to vocabulary building and self-corrective actions to deal with misconceptions that they become aware of from feedback of their peers and/or their facilitator.

EXTEND: The purpose of this dimension is to allow students to use their new knowledge and continue to explore its significance and implications. Students work independently or with others to expand on the concepts and principles they have learned, make connections to other related concepts and principles within and/or across disciplines, and apply their understandings in new ways to unfamiliar situations.

EVALUATE: The purpose of the EVALUATION dimension is for both students and facilitator to determine progress being made or the extent to which learning has taken place based on the stated objectives or emergent objectives. EVALUATION is treated primarily as an on-going diagnostic and developmental process that allows the learner to become aware of gaps to be treated and progress made from their efforts to acquire the competencies that were the focus of the session. Examples of competencies include understanding of concepts, principles and processes and demonstrating various skills. Evaluation and assessment can occur at different points during the learning episode. Some of the tools that assist in this diagnostic and formative process include rubrics, teacher observation log, self-inventories, peer critique, student interviews, reflective presentations, displays/expositions,

portfolios, performances, project and problem-based learning products. Analysis of reflections, video recordings are useful in helping students to determine the depth of their thinking and understanding and the objectives they have or have not achieved.

Who developed the 5E model?

The Biological Science Curriculum Study (BSCS), a team led by Principal Investigator Roger Bybee, developed the instructional model for constructivism, called the “Five Es”.

The Link between the 5E model and Types of Learning Activities

The five (5) types of Learning Activities purported by Yelon (1996) can be integrated with the 5E’s so as to enrich the teaching and learning process. He noted that every instructional plan should include the following learning activities

1. Motivation Activities: Intended to help learners to be ready for the session
2. Orientation Activities: Inform students of their roles and responsibilities based the purpose or objectives of a learning episode.
3. Information Activities: Allow students to manipulate current knowledge, access/retrieve and generate new ideas
4. Application Activities: Allow for the use of knowledge and skills in novel situations
5. Evaluation Activities: Allow for reflection, corrective actions and sourcing of evidence to confirm/refute claims about learning.

These activities can be planned to serve one of the purposes of each dimension of the 5E model. For example, ENGAGEMENT may be comprised a Motivation Activity and an Orientation Activity. EXPLORATION and EXPLANATION require an Information Activity, while EXTEND requires an Application Activity. EVALUATION requires the kind of activity that will contribute to the collection of data for assessing and arriving at a conclusion about performance based on stated or expected purpose for which learning is being facilitated.

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LESSON PLANS

SUBJECT: Geography
GRADE: 8
DURATION: 60 minutes

LESSON TOPIC: Direction and Angular Bearing

OBJECTIVES: By the end of the lesson students should be able to:

i. Use a magnetic compass to find direction from one point to another
ii. Use a protractor to find bearing from one point to another
iii. Draw and label an eight point Compass Rose
iv. Find directions and bearings from one point to another on a map using an eight point Compass Rose and a protractor
v. Differentiate between Magnetic North, True North and Grid North
vi. Appreciate the importance of using directions and bearings

RESOURCES:

Magnetic Compass, Compass Rose (paper); Measuring Tape, String, Paper (for making planes), Protractor; Topographic Map

CONTENT OUTLINE:

Direction is used to determine where things are in relation to other things. Most people use direction casually to describe position, such as Anthony sits to the left of Adam. Direction can also describe movement: Samantha can walk forward or backward, and she can turn left or right when walking to school.

Cardinal directions are probably the most important directions in Geography. There are four Cardinal Points: North, South, East and West. These directions help us orient ourselves. For example, Kingston is South of Ocho Rios, St. Ann. The eight point Compass Rose, has four additional points called primary inter-cardinal points – North-East; South-East; South-West and North-West. These eight points, spaced

evenly, breaks the Compass Rose into 45 degrees angles. Using primary inter-cardinal points gives someone the ability to give more precise directions. For example, Kingston is South-East of Ocho Rios, St. Ann.

There are other methods which can be used to obtain or give direction. A magnetic compass, which uses the Earth's magnetic field to determine direction and bearing, may be used. Magnetic compasses always point to magnetic North. The position of the overhead Sun through the course of the day may also be used to establish direction. The sun rises in the East and sets in the West. Therefore, in the morning, the sun will be in the East; in the afternoon, it will be in the West. The arrow is a universal symbol for direction. Arrows are, therefore, used on roadways to indicate direction to drivers and other road users.

Angular Bearings are a measure of direction. It gives a more accurate idea of the direction of one point from another than simply using compass directions. Angular bearings measure an angle clockwise from North (0 degree).

PRIOR LEARNING: Check that students can:

- Construct and use a four point Compass Rose
- Use a protractor to find Angular Bearing

***If the class is large, activities may be rotated to ensure that limited resources can be utilised effectively.**

PROCEDURES/ACTIVITIES

Engage - How can I get students interested in this? How do I elicit prior learning? How do I set the ground work for upcoming activities in the lesson?

Ask students to point to where they think North is located in relation to their present position. Make note of their answers.
Members of groups will make paper planes from sheets of paper. They will fly their planes in the direction they believe to be North.
A short class discussion will highlight what happens when people are not aware of directions. Make note of the challenges identified.

Explore - How do I get students involved in the topic? What tasks/activity/questions can I use to help students analyse and think while extracting information?

1. In groups, using a magnetic compass (an Application may be downloaded beforehand on smart phones) or knowledge of the position of the overhead sun during the course of a day, students will set up a paper four point Compass Rose on the floor/ground.

2. Students will use the magnetic compass to determine the mid-points between the Cardinal Points to establish the primary inter-cardinal points of an eight point Compass Rose. Students will create the eight point Compass Rose on the floor/ground.

   OR

   Students will use a protractor to measure the angles between the Cardinal Points of the Compass Rose and then establish the mid-points at 45 degrees to make an eight point Compass Rose having the primary inter-cardinal points. Students will create the eight point Compass Rose on the floor/ground.

3. Students will draw and label the eight point Compass Rose in their notebooks. Labels must include the angular bearing of each point.

4. Students in each group will fly their paper planes a second time from one point to another while standing in the centre of their group's Compass Rose. When each plane lands, students will use the Compass Rose and string to determine the direction in which the plane flew.

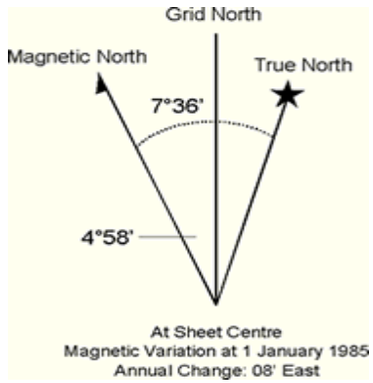
5. Using a protractor and string, students will measure the angular bearings of the final location of their paper planes relative to the start point.

Explain - What have the students learnt so far? How can I help students make sense of their observations? How will students communicate what they have learnt so far? How do students correct misconceptions? How do I correct misconceptions?

Each group will explain how they arrived at the direction (for example, when to use North East instead of East) and bearing for their paper planes. Also, each group will explain the importance of measuring bearings in addition to using directions.

Elaborate/Extend - How can students apply their new knowledge to other situations? How can students apply their knowledge to real world situations?

Given a simple topographic map, students will find the direction and bearing of identified features from given points. On the map, students will be required to use Grid North. Each group will conduct research to explain each of the three positions identified in the diagram below. They will present their findings to the class and a summary or points will be written in notebooks.



Evaluate - How much learning has taken place? How can I help students self-evaluate and reflect on the teaching and learning? How can I evaluate the students' learning of concepts and skills?

1. Eight point Compass Rose constructed (on floor/ground)
2. Eight point Compass Rose drawn and labelled in notebooks
3. Protractor accurately used with 0 degree aligned to north. Protractor read in a clockwise direction
4. Bearings measured and recorded
5. Worksheet based on the given map completed
6. Grid North, Magnetic North and True North explained

EXTENDED LEARNING: After class, students can view live aeroplanes flight patterns online on a Flight Tracker Application and determine their direction and angular bearing from the airport of departure to the destination airport. They can determine the factors which prevent most aeroplanes from flying in a straight line from one airport to another. Make a list and share findings at the start of the following map reading class.

National Standards Curriculum (Teachers' Guide)
August, 2018