PRIMARY 4

MINISTRY OF EDUCATION
DEPARTMENT OF EDUCATION

Essential Curriculum

2008

Curriculum and Instructional Leadership
Performance Standards Summary

ENGLISH LANGUAGE ARTS

MATHEMATICS

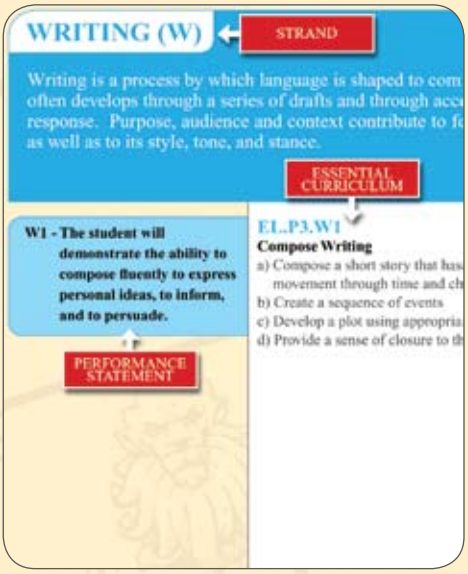
SCIENCE

SOCIAL STUDIES

"THE ESSENTIAL CURRICULUM"

The mission of the Bermuda Public School System (BPSS) is ***to be the first choice in education by providing rigorous and stimulating learning experiences in safe, responsive environments from which our students emerge confident and prepared to compete and contribute locally and globally.***

Performance Standards are statements of what students should know and be able to do and how they should demonstrate their knowledge and skills at the end of each year. Included within the Performance Standards document are **strands, performance statements** and **assessment indicators** for English language arts, mathematics, science and social studies. It is important to note that the assessment indicators listed in this booklet represents the **"Essential Curriculum."** They are the critical guidelines for ongoing and island-wide curriculum based assessment. They are guideposts in the journey our students make from the time they enter our schools to the time they graduate ***confident and prepared to compete and contribute locally and globally.***



Serving as guideposts, performance standards establish shared expectations for the:

- completion of each year of our school system,
- guidance in terms of how we may need to redirect our efforts during any given year of our school system
- direction in terms of what we should be able to expect of students entering each subsequent year of our school system.

As they serve as guideposts for teachers responsible for maximizing students' learning experiences, performance standards tell us not only the ***ultimate*** goals for each year level but also provide direction towards achievement of the goals ***during*** each year.

Bermuda Performance Standards will be used to:

- emphasize the concepts and processes all students should learn with understanding.
- provide explicit goals for student expectation at the end of each year.
- guide Bermuda Criterion Reference and classroom assessments

Bermuda Public School System Performance Standards

English Language Arts (EL)	Mathematics (MT)	Science (SC)	Social Studies (SS)
Strategic Reading (R)	Number and Number Operations (N)	Physical Science (P)	History (H)
Comprehension of Informational Text (I)	Patterns, Functions and Algebra (A)	Life Science (L)	Geography (G)
Comprehension of Literary Text (L)	Geometry (G)	Earth and Space Science (E)	Civics (C)
Language Usage (U)	Measurement (M)	Nature of Science (N)	Economics (E)
Writing (W)	Data Handling (D)		
Speaking & Listening (S)			
Processing Information and Mass Media (M)			

ENGLISH LANGUAGE ARTS (EL)

Introduction to Bermuda English Language Arts Performance Standards 7
- What are English Arts Performance Standards?
- Why English Arts Performance Standards?

References

Strategic Reading (R) 10
R1 Word Analysis and Vocabulary
R2 Meaning of Text/Reading Comprehension

Comprehension of Informational Text (I) 11
I1 Comprehension of Informational (Expository) Text
I2 Comprehension of Procedural Text
I3 Comprehension of Persuasive Text

Comprehension of Literary Text (L) 12
L1 Comprehension of Literary Text
L2 Comprehension of Characteristics of Various Genres

Language Usage (U) 13
G1 Grammar and Conventions of Standard English Language

Writing (W) 14
W1 Compose Writing

Speaking & Listening (S) 15
S1 Effective Communications

Processing Information and Mass Media (M).....16
M1 Information Retrieval and Technological Communication

MATHEMATICS (MT)

Introduction to Bermuda Mathematics Performance Standards.....17
- Mathematical Processing Skills

References

Number and Number Operations (N).....20
- N1 Numerical Representation
- N2 Numerical Operations
- N3 Numerical Relationships

Patterns, Functions and Algebra (A) 22
- A1 Pattern and Functions
- A2 Algebraic Representation
- A3 Algebraic Reasoning

Geometry (G) 23
- G1 Classification
- G2 Spatial Reasoning
- G3 Transformations

Measurement (M) 24
- M1 Tools and Units
- M2 Measuring

Data Handling (D) 25
- D1 Data Collection and Organization
- D2 Representation
- D3 Analysis and Interpretation
- D4 Probability

SCIENCE (SC)

Introduction to Science Performance Standards 27
- Physical Science
- Life Science
- Earth and Space Science
- Nature of Science

References

Physical Science (P).....30
P1 Matter and Materials
P2 Force and Motion
P3 Energy
P4 Forces of Nature

Life Science (L) 31
L1 Diversity of Life
L2 Heredity
L3 Cells, Organs and Organ Systems
L4 Interdependence
L5 Flow of Matter and Energy
L6 Evolution of Life

Earth and Space Science (E) 33
E1 Astronomy
E2 Geology
E3 Resources
E4 Meteorology
E5 Oceanography

Nature of Science (N) 34
N1 Scientific Investigation
N2 Data Representation and Interpretation
N3 Designed World: Science Technology and Society

SOCIAL STUDIES (SS)

Introduction to Social Studies Performance Standards 37
- History Standards
- Geography Standards
- Civics and Government Standards
- Economics Standards

References

History (H) 39
- H1 Organisation of Historical Information
- H2 Communication - Social Studies Analysis
- H3 Comprehension of Historical Issues
- H4 Development of Early Human Societies
- H5 Impact of Human Interaction on Social, Economic and Political Institutions and Development of Countries
- H6 Shifts in International Relationships
- H7 Impact of Political, Economic & Technological Issues Since 1990

Geography (G) 40
- G1 Geographic Representations
- G2 Regions and Their Patterns of Change
- G3 Human Migration and Settlement
- G4 Environmental Influences

Civics (C).....41
- C1 Laws and Government
- C2 Cultural Influences
- C3 Governments' Power
- C4 Bermuda's Constitution
- C5 Human Rights
- C6 Bermuda Symbols

Economics (E) 42
- E1 Use of Money
- E2 Bermuda's Economy and Career Choices
- E3 Economic Institutes
- E4 Goods and Services
- E5 Global Economics
- E6 Influence of Technology

BERMUDA ENGLISH LANGUAGE ARTS PERFORMANCE STANDARDS (EL)

Teachers gradually raised the bar for student performance by analyzing the type of support their students needed to demonstrate the knowledge and skills in the standards and by creating learning experiences that slowly built a framework for success.

(Birdyshaw, Wixson and Yochum)

English Language Arts (EL) is a core discipline that embraces multifaceted domains of learning which are principally reading, writing, speaking and listening and processing information and mass media. English Language Arts also acknowledges that students will develop skills in both the mechanics of language, in the reading and appreciation of literature and will give consideration to how knowledge is presented. The goal is for students to communicate their understanding of these multifaceted domains of learning by demonstrating what they are able to do.

WHAT ARE ENGLISH LANGUAGE ARTS PERFORMANCE STANDARDS?

The *Bermuda Performance Standards for English Language Arts* indicate benchmarks that students are expected to reach at the end of each level of their development in English Language Arts. These standards have been adapted from international standards set by the boards of education across the United States and the United Kingdom. A wealth of experience and expertise from a team of educational specialists has been the backdrop infused into the development of the *Bermuda Performance Standards.*

The B*ermuda Performance Standards* are aligned with current research practices and provide a comprehensive guide to appropriately assess the quality and level of student work and teacher performance. The same rigor of coverage evident in the international standards is evident in the B*ermuda Performance Standards for English Language Arts.*

WHY ENGLISH LANGUAGE ARTS PERFORMANCE STANDARDS?

Performance Standards are expected to drive graded level assessment for every student, every year, at every level. Whereas the curriculum indicates what students should know and be able to do at the end of each year level, performance standards are guideposts embedded in the curricula that indicate to teachers what students should be able to do at the end of a specific time frame of a learning phase.

Performance Standards are not aimed to address every aspect of curriculum, but rather they are designed to be guideposts for teachers to assess both what the student is able to do at various stages and how the student moves toward the achievement of each performance standard. Thus, *Performance Standards* are learning expectations that guide instruction.

Reading is the first strand addressed in this document. **Reading** is a skill that is demanded in the global society. It is therefore critical that students become proficient readers to not only become literate, but also to meet increasing societal demands. Research has shown that students who read become better readers by **reading.** Thus, it is important to provide students with multiple opportunities for literacy development. Students will experience literacy growth by exposure to a variety of quality texts.

Writing is the second strand of learning. Students write to inform, to clarify, to persuade and to express personal ideas. Through writing students cultivate an appreciation for the elements of language (tone, style, word choice and conventions of language) as they experience English Language Arts.

Speaking and listening strand serve as a framework to strengthen proficiency in English Language Arts. Oral language is a foundation on which other literacy skills are built. Students gain proficiency by participating in one-on-one and group conferencing. They also strengthen **speaking and listening** skills by delivering singular and group presentations and by participating in the evaluative process. Students who speak well and listen well hold a distinct advantage in school and social situations and are prepared to meet the challenges of society.

Processing Information and Mass Media is the fourth strand. By demonstrating an awareness of the presence of media in daily lives of most people, students must make informed judgments about **television, radio, internet, film productions and other technological advances.** It is important that they judge the extent to which the media are a source of entertainment and information.

These standards are for use in a diverse culture with a range of different settings. They are intended to focus on what is important and necessary for students to know, do and understand. Students will demonstrate competence in the following broad strands for English Language Arts:

STRATEGIC READING (R)

Reading is a process that includes interpretation of text. Strategic readers make meaning of text when they read, and extend their thinking by evaluating and making critical, thoughtful judgements.

R1 Word Analysis and Vocabulary - Students will use appropriate reading strategies in order to understand, reflect, evaluate and enjoy a variety of texts.
R2 Meaning of Text/Reading Comprehension - Students will use appropriate reading strategies in order to understand, reflect, evaluate, and enjoy a variety of texts.

COMPREHENSION OF INFORMATIONAL TEXT (I)

Informational text is text that informs, explains, describes, presents information or persuades. Readers of informational text decode information from a wide range of genres for understanding.

I1 Comprehension of Informational Text - Students will demonstrate the ability to [or be able to] read, comprehend, interpret, analyze, and use expository text.
I2 Comprehension of Procedural Text - Students will demonstrate the ability to read, understand, and use documentary and procedural text.
I3 Comprehension of Persuasive Text - Student will demonstrate the ability to read, comprehend, interpret, analyze and use persuasive text.

COMPREHENSION OF LITERARY TEXT (L)

Literary text offers insight about the human experience and encourages students to examine genres, authors and conventions of literature.

L1 Comprehension of Literary Text - Students will consider the contributions of literary elements and devices when constructing meaning of text.
L2 Comprehension of Characteristics of various genres - Students will identify and analyze the characteristics of various genres as forms with distinct characteristics

LANGUAGE USAGE (U)

Having control of the conventions and grammar of the English language means having the ability to represent oneself appropriately with regard to current standards of correctness (e.g., spelling, punctuation, paragraphing, capitalization, and subject and verb agreement.)

U1 Grammar and Conventions of Standard English Language - Students will demonstrate the ability to control language by using correct grammar and conventions of Standard English Language.

WRITING (W)

Writing is the process of controlling language to communicate thoughts, ideas and concepts effectively. The writing process is developed well by giving consideration to purpose, audience, content, form, word choice and voice; by producing a series of drafts; and by receiving informed feedback.

W1 Compose Writing - Students will demonstrate the ability to compose fluently to express personal ideas, to inform and to persuade.

SPEAKING AND LISTENING (S)

Speaking, listening and viewing are fundamental processes which people use to express, explore, and learn about ideas. The functions of speaking, listening and viewing include gathering and sharing information; persuading others, expressing and understanding ideas; coordinating activities with others; and selecting and critically analysing messages. The context of these communication functions include one-to-one conferences, small group interactions, large audiences and meetings, and interactions with broadcast media.

PROCESSING INFORMATION AND MASS MEDIA (M)

As students demonstrate awareness of the presence of media in their lives, they are encouraged to evaluate the role of the media, judge the extent to which the media is entertaining as well as informative and define the role of advertising as part of media presentation.

Although there are seven major strands in English Language Arts, indicators from five strands will be formally tested in the Bermuda Assessment Programme. However, it is the expectation that Speaking and Listening (S), Processing Information and Mass Media (M) will be taught and assessed in the classroom by the teacher during the course of the entire year.

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Strategic Reading (R)

Reading is a process which includes demonstrating comprehension and showing evidence of interpretation of the text. Strategic readers extend their thinking when they evaluate what they have read by making critical, thoughtful judgments about the text. When strategic readers comprehend and interpret text, they apply prior knowledge and skills to perform tasks, revise text and to answer questions.

R1 - The student will use appropriate reading strategies in order to understand, reflect, evaluate, and enjoy a variety of texts.

EL.P4.R1

Word Analysis and Vocabulary

a) Know meanings of word parts (prefixes, suffixes, roots)
b) Use double meanings and multiple meanings of words
c) Recognize high frequency words as they relate to other words synonyms/antonyms or which word is precise
d) Use a variety of strategies to determine words in context
e) Demonstrate understanding of the meaning of new words encountered in independent reading; compound words
f) Recognize word meanings encountered in reading antonyms, synonyms, homonyms
g) Demonstrate understanding of letter-sound relationships

R2 - The student will use appropriate reading strategies in order to understand, reflect, evaluate, and enjoy a variety of texts.

EL.P4.R2

Meaning of Text/Reading Comprehension

h) Identify important facts/details
i) Compare/contrast within a text or one text to another
j) Make connections and show how a text relates to something in real-life experience
k) Note underlying themes or messages; identify main idea
l) Make and support simple inferences
m) Summarize important and significant ideas in a text.
n) Draw conclusions
o) Determine sequence of events
p) Determine cause and effect
q) Use organizational structure to contribute to understanding of text

Comprehension of Informational Text (I)

This part of the Reading standard requires students to work with informational materials in order to develop understanding and expertise about topics they investigate. This area of informational materials is of great importance and its inclusion indicates our desire that more attention be given to reading a broad range of materials written for a variety of audiences and purposes.

I1 - The student will demonstrate the ability to [or be able to] read, comprehend, interpret, analyze, and use expository text.

EL.P4.I1

Expository

a) Use structure to retrieve information
b) Compare observations of author to their own observations
c) Identify purpose and main points
d) Distinguish fact from opinion
e) Use organizational structure to contribute to understanding text
f) Read and make connections to expository text about Bermudian culture/life
g) Identify important facts and details in informational text.

I2 - The student will demonstrate the ability to read, understand, and use documentary and procedural text.

EL.P4.I2

Documents and Procedural

a) Identify use of transitional words
b) Follow instructions and directions
c) Identify sequence of activities needed to carry out a procedure
d) Locate specific information

Suggested texts:
- Maps and charts
- How to…texts
- Recipes
- Tables
- Instructions/ Directions

I3 - The student will demonstrate the ability to read, comprehend, interpret, analyze, and use persuasive text.

EL.P4.I3

Persuasive

Not assessed at this level on the Bermuda Criterion Reference Test (BCRT)

Comprehension of Literary Text (L)

Readers who read regularly tend to read what interests them. Reading literary text encourages all students to do what good readers do and pursue themes, authors and genres that are of interest to them. Readers create justifiable critiques to appraise the text's effectiveness and quality. Therefore, the reader's perspective is valued in the process.

L1 - The student will consider the contributions of literary elements and devices when constructing meaning of a text.

EL.P4.L1

Literary Elements and Devices

a) Identify the author's purpose
b) Identify from whose point of view a story is being told
c) Identify the main character's motive
d) Explain a character's traits
e) Summarize the plot of a story
f) Identify the conflict and resolution of a story
g) Determine the main idea or message of a literary text
h) Identify simple literary devices (e.g., simile, personification, sensory words)

L2 - The student will identify and analyze the characteristics of various genres as forms with distinct characteristics.

EL.P4.I2

Characteristics of Various Genres

a) Identify the similarities and differences among a story, poem, and play
b) Read and understand a variety of literature representative of various genres. (Fiction, non-fiction , poetry)

Language Usage (U)

Having control of the conventions and grammar of the English language means having the ability to represent oneself appropriately with regard to current standards of correctness (e.g., spelling, punctuation, paragraphing, capitalization, and subject and verb agreement).

U1 - The student will demonstrate the ability to control language by using correct grammar and conventions of Standard English language

EL.P4.U1

Grammar and Conventions of Standard English Language

a) Capitalize proper nouns, titles of people, titles of books, letter parts and first word in sentence
b) Punctuate using periods, question marks and exclamation marks
c) Punctuate using periods with abbreviations
d) Punctuate using apostrophes with contractions and possessives
e) Punctuate with commas with items in a series, in an address and in a compound sentence
f) Use quotation marks and comma with dialogue.
g) Use subject-verb agreement with simple subject
h) Use appropriate tenses including present, past and future
i) Use parts of speech correctly (nouns, verbs, pronouns, adjectives, adverbs)
j) Use spelling correctly in patterns and words
k) Combine sentences by employing strategies of coordination, subordination, and sequencing of ideas

WRITING (W)

Writing is a process by which language is shaped to communicate effectively. Writing often develops through a series of drafts and through access to informed feedback and response. Purpose, audience and context contribute to form and substance of writing as well as to its style, tone, and stance.

W1 - The student will demonstrate the ability to compose fluently to express personal ideas, to inform, and to persuade.

EL.P4.W1

Compose Writing

a) Compose a short story that has character(s), setting, plot, and movement through time and change
b) Create a sequence of events
c) Develop a plot using appropriate strategies (e.g., elaboration of details, suspense, emotions of characters)
d) Create organizational structure appropriate to a short story
e) Provide a sense of closure to the story

SPEAKING AND LISTENING (S)

Speaking, listening and viewing are fundamental processes which people use to express, explore, and learn about ideas. The functions of speaking, listening and viewing include gathering and sharing information; persuading others, expressing and understanding ideas; coordinating activities with others; and selecting and critically analysing messages. The context of these communication functions include one-to-one conferences, small group interactions, large audiences and meetings, and interactions with broadcast media.

S1 - Students will communicate effectively adhering to the conventions of standard English giving consideration to audience and purpose.

EL.P4.S1

Effective Communications

a) Talk about what they think, read or experience
b) Talk about ideas or information gained from sources beyond personal experiences (e.g. "I read that the moon pulls from the ocean's tides")
c) Talk in small groups to collaborate on a project, ask questions, and make comments or suggestions to facilitate work on a task or a project (e.g. we need to assign group leaders")
d) Talk in front of a group on a regular basis (e.g. give book reports, report out to the class on a small group discussion)
e) Mimic adult language
f) Recite facts to confirm what has been memorized (e.g. geographical facts, poems, multiplication tables, lines for a play)
g) Initiate topics within conversations that are in progress
h) Express and solicit opinions
i) Ask open-ended or long-answer questions
j) Restate their own ideas with greater clarity when a listener indicates no comprehension
k) Ask other students questions that require them to support their claims or arguments
l) Follow instructions or directions

Suggested Activities
• Book Talks
• Read Alouds
• Literature Circles

m) Solicit and/or engage the listener's attention
n) Conduct firsthand interviews of peers, parents or community members
o) Listen to, comprehend and carry out directions with eight or more steps
p) Disagree with another person's argument and then generate and promote alternative solutions to reach agreement
q) Consistently observe politeness, apologize when appropriate; occasionally compliment others
r) Speak one at a time, look at and listen to the speaker, signal for a chance to speak, adjust volume to the setting, and hold the floor and yield when appropriate
s) Agree or disagree appropriately to extend conversation
t) Play with alliteration, tongue twisters and onomatopoeia
u) Listen attentively in a range of situations, one to one, group, class

(It is the expectation that this strand will be taught and assessed in the classroom by the teacher throughout the entire year.)

PROCESSING INFORMATION AND MASS MEDIA (M)

Processing information and mass media is a vehicle that our students can use to become critical thinkers about the world around them. The omnipresence of media has forced our students to be enveloped, therefore they must be selective and focused on that which will enhance their learning.

M1 - The student will demonstrate the ability to analyse, synthesize and interpret information presented to them through mass media and process this information to enhance their learning.

EL.P4.M1

Information Retrieval and Technological Communication

Not assessed at this level

BERMUDA MATHEMATICS PERFORMANCE STANDARDS (MT)

Many of the elementary terms and concepts of mathematics have concrete applications and examples in the world. For they are part of a language developed to describe the physical (and social) world.
(Ernest, 1991, p.56)

"Improving mathematics education is not a matter of adding a little spice to a dull subject or of making a few minor changes in content or approach. It requires no less than a redefinition of mathematics (instruction) and an understanding that (its) goal must be the development of mathematical power in all students" (Parker, 1993, p. xi). From as early as preschool, we attempt to present the students with a balance of conceptual understanding, skills and problem solving. Mathematics is no longer viewed as the subject to be mastered by the chosen few. *Principles and Standards for School Mathematics,* published by the National Council of Teachers of Mathematics (NCTM 2000, p.4) states that the need to understand and be able to use mathematics in everyday life and in the workplace has never been greater and will continue to increase. While some careers are considered mathematics intensive, all will require fundamental mathematical skills, procedures and understandings.

The *Bermuda Mathematics Performance Standards* were developed from standards defined by the *National Council of Teachers of Mathematics* and from various jurisdictions including the United Kingdom and Canada. The *Bermuda Mathematics Performance Standards* support the Bermuda Mathematics Curriculum. The curriculum identifies the distribution of mathematics content over a 14-year period. It advises when enduring understandings and procedural knowledge should be introduced, reinforced and/or developed. The *Standards* provide a framework for assessing the understandings and applications of essential mathematical ideas, that is, what students should know and be able to do. The assessment indicators listed in the *Standards* define the critical elements of the mathematics programme that will be formally assessed at the end of each year level from Primary 3 through Senior 2. The assessment instruments will be comprised of selected- and constructed-response items with an emphasis on reasoning and problem solving. Students will be required to produce evidence that they are able to use, represent and explain the fundamental components of the mathematics programme. The *Standards* include these conceptual areas:

NUMBER AND NUMBER OPERATIONS (N)

A sense of number implies an ability to describe and apply relationships among numbers including their uses and their representations. These numbers are effectively used for various purposes such as counting, measuring, estimating and problem solving. A range of methods of computation is applied to practical tasks, in real-life situations and within mathematics itself.

N1. **Numerical Representation** - The positions of the digits in numbers determine what they represent, that is, which size group they count, measure or order and these numbers are best understood in terms of familiar real-world experiences, such as budgeting, cooking, carpentry, etc.
N2. **Numerical Operations** - Numerical operations consist of taking apart and combining numbers using a variety of strategies which require an understanding of the properties of the operations. Manipulatives and diagrams are used to model these operations and their inverses and to relate them to their symbolic expressions. The mathematical models or representations are also used to assist with solving contextual problems.
N3. **Numerical Relationships** - Equal shares or equal-sized portions of a whole or unit are compared using a variety of representations. Fractions, decimals and percents can be used interchangeably and equivalent fractions are ways of describing the same amount by using different-sized fractional parts. Ratio and proportion are used to represent relationships between quantities and measures as applied in problem solving

PATTERNS, FUNCTIONS AND ALGEBRA (A)

The generalization of patterns, relationships and change are expressed by means of symbolic notation, algebraic equations and graphical representations. Reasoning is used to generalize, formalize and communicate patterns and regularity in all aspects of mathematics.

A1. **Patterns and Functions** - Patterns are regular and predictable changes. They are found in nature, and numbers, as well as in physical and geometrical situations. Patterns show relationships among variables and can be recognized, extended or generalized.
A2. **Algebraic Representation** - Symbols are used to represent variables and equations. They assist us with understanding the patterns and relationships among forms of representations -

words, tables, graphs and rules. Variables are symbols used to represent quantities that change - time, temperature, distance traveled.

A3. **Algebraic Reasoning** consists of a variety of formats used to assist with understanding, justifying or presenting solutions to problems. Equations and inequalities are used to express the relationships.

GEOMETRY (G)

Spatial sense involves the application of the properties and relationships of points, lines, angles, planes and curves of shapes and solids. The space around us and the measurement of the objects and shapes in that space are defined and categorized according to a specific set of assumptions.

G1. **Classification** - Both two-dimensional and three-dimensional shapes can be described, analysed and classified in a variety of ways and according to their properties and relationships.

G2. **Spatial Reasoning** - Geometric properties, reasoning and visualization can be used to solve problems.

G3. **Transformations** - Draw shapes and build models

MEASUREMENT (M)

Measuring requires the use of tools and units to determine, describe and compare attributes. These measurements encompass the dimensions, size, quantity, length, or capacity of substances or figures as well as sequential relationships such as time and temperature.

M1. **Tools and Units** - Standard mathematical measurement tools and units depend on the real world situation.

M2. **Measuring** - The comparison of an item with a unit (length, time, volume, etc.)

DATA HANDLING (D)

Data may be presented in a variety of representations including graphs to show logical relationships between various quantities and to assist with decision-making. The collection and analysis of data is identified as either statistics or probability. Statistics is the mathematics used for collecting, organizing, and studying data while probability is the measure of the likelihood of an event.

D1. **Data Collection and Organization** - Data are collected and organised to help with the making of decisions, the drawing of inferences or the development of new ideas.

D2. **Representation** - Appropriate representations of data depend on characteristics of that data.

D3. **Analysis and Interpretation** - Provides information on the attributes of data

D4. **Probability** - The occurrence or non-occurrence of an event is characterized as impossible, less likely, equally likely, more likely or certain. The likelihood of an event or its probability is quoted as a ratio between 0 and 1 inclusive.

Mathematics processes are the means by which students use mathematical ideas and procedures to communicate, represent, connect, reason and solve problems. These skills assist in the acquisition of knowledge and the application of ideas. Students are required to use a variety of techniques to understand and solve problems, reason and construct proofs as well as communicate and make connections. They express and extend their mathematical ideas using correct notations, generalizations, inferences and rigorous arguments leading to notions of proof. The solutions involve a process as well as a product.

The use of mathematical process skills are categorized as follows:

1. **Mathematical processes are used to identify and explain everyday experiences, in and outside of school, and to make connections with other disciplines.**
   a) use reasoning ability to analyze, perceive patterns, identify relationships and formulate questions for further exploration
   b) formulate a problem and set limits for acceptable solutions

2. **Mathematical reasoning and problem solving provide a means for making sense of, investigating, evaluating and justifying the solution to problems.**
   a) systematically apply a model (plan) for problem solving - understand the problem, select a strategy, implement the strategy, evaluate the solution.
   b) select or develop an appropriate problem-solving strategy
   c) analyze problems using appropriate processes such as modelling, simplifying, generalizing, etc
   d) validate conclusions using mathematical properties and relationships

3. **Appropriate mathematical representations and technology tools are used to illustrate and assist with the solution process.**
   a) determine the most efficient manner to solve problems
   b) design representations of the problem using technology and appropriate mathematical discourse (terminology, symbols and drawings)
   c) select mathematical ideas and tools to support the reasoning process

4. **Ideas and solutions are communicated mathematically using language and symbols, efficient tools, appropriate units and graphical, numerical, physical or algebraic models.**

   a) communicate logical arguments clearly to show why the solution makes sense

Using the Standards as a framework, the assessment results will provide teachers with information on how well the students perform procedures, understand concepts, solve problems and communicate their reasoning. Administrators will be able to analyze and compare data to ascertain trends in student performance over time. The Bermuda Mathematics Performance Standards define the framework for assessing the depth and breadth our students are engaging in mathematical thinking and are confidently using quantitative and spatial information to make decisions.

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Number and Number Operations (N)

A sense of number implies an ability to describe and apply relationships among numbers, their uses and their representations. These numbers are effectively used for various purposes such as counting, measuring, estimating and problem solving. A range of methods of computation is applied to practical tasks, in real-life situations and within mathematics itself.

Students will explore and make sense of the meaning, relationship and application of numbers, number systems and number operations. They will extend their estimation and computation skills, develop procedural fluency and represent their conceptual understanding using words, formulas, diagrams, charts and graphs.

N1 - Numerical Representation:
The positions of the digits in numbers determine what they represent, that is, which size group they count, measure or order and these numbers are best understood in terms of familiar real-world experiences, such as budgeting, cooking, carpentry, etc.

MT.P4.N1

Students will demonstrate an understanding of numbers, by using, representing and explaining. They will:

a) compare and order numbers ($0.1 < n < 10{,}000$)
b) identify place value up to 10,000
c) represent numbers with
- number lines
- verbal descriptions
- symbolic renaming (e.g. 333 = 300 + 30 + 3 = 300 + 20 + 13)

d) apply the properties of the special numbers, 0 and 1

N2 - Numerical Operations:
Numerical operations consist of taking apart and combining numbers using a variety of strategies which require an understanding of the properties of the operations. Manipulatives and diagrams are used to model these operations and their inverses and to relate them to their symbolic expressions. The mathematical models or representations are also used to assist with solving contextual problems.

MT.P4.N2

Students will demonstrate an understanding of numbers, by using, representing and explaining. They will:

a) estimate by rounding numbers less than 1000 to the nearest 10 or 100
b) apply the four operations (with regrouping) and the relationship between them to problem solving

Assessment limits:
- add 4-digit numbers (2 addends)
- subtract 4-digit numbers
- multiply using facts up to 9 X 9
- multiply a 2-digit number by a 2-digit number
- divide using facts up to 9 X 9
- test for divisibility for 2, 5, 10

c) use a variety of methods to check results and to determine reasonableness of the solution, including estimation and inverse operations
d) apply appropriate problem solving strategies

Number and Number Operations (N) (continued)

A sense of number implies an ability to describe and apply relationships among numbers, their uses and their representations. These numbers are effectively used for various purposes such as counting, measuring, estimating and problem solving. A range of methods of computation is applied to practical tasks, in real-life situations and within mathematics itself.

Students will explore and make sense of the meaning, relationship and application of numbers, number systems and number operations. They will extend their estimation and computation skills, develop procedural fluency and represent their conceptual understanding using words, formulas, diagrams, charts and graphs.

N3 - Numerical Relationships :
Equal shares or equal-sized portions of a whole or unit are compared using a variety of representations. Fractions, decimals and percents can be used interchangeably and equivalent fractions are ways of describing the same amount by using different-sized fractional parts. Ratio and proportion are used to represent relationships between quantities and measures as applied in problem solving.

MT.P4.N3

Students will demonstrate an understanding of numbers, by using, representing and explaining. They will:

a) add and subtract simple common fractions with like denominators
b) identify fractions as part of a whole
c) represent equal fractions with different denominators (using pictures)
d) add and subtract decimal fractions in the context of money

Patterns, Functions and Algebra (A)

The generalization of patterns, relationships and change is expressed by means of symbolic notation, algebraic equations and graphical representations. Reasoning is used to generalise, formalise and communicate patterns and regularity in all aspects of mathematics.

Students will explore and make sense of patterns, functions, symbols and models. They will use symbolic forms to represent and analyze mathematical situations and use mathematical models to analyze change in both real and abstract contexts. Students will create and translate multiple representations of mathematical relationships.

A1 - Patterns and Functions:
Patterns are regular and predictable changes. They are found in nature, and numbers, as well as in physical and geometrical situations. Patterns show relationships among variables and can be recognized, extended or generalized.

A2 - Algebraic Representation:
Symbols are used to represent variables and equations. They assist us with understanding the patterns and relationships among forms of representations - words, tables, graphs and rules. Variables are symbols used to represent quantities that change - time, temperature, distance traveled.

A3 - Algebraic Reasoning:
Algebraic reasoning consists of a variety of formats used to assist with understanding, justifying or presenting solutions to problems. Equations and inequalities are used to express the relationships.

MT.P4.A1

Students will demonstrate an understanding of algebra, by using, representing and explaining. They will:

a) make predictions and extend numeric and geometric patterns

b) represent and describe patterns with symbolic rules or words

MT.P4.A2

Students will demonstrate an understanding of algebra, by using, representing and explaining. They will:

a) use symbols to represent numerical situations (multiplication)

MT.P4.A3

Students will demonstrate an understanding of algebra, by using, representing and explaining. They will:

a) find solutions to number sentences with a missing value (multiplication)

b) model and solve problem situations using objects and tables (example)

Geometry (G)

Spatial sense involves the application of the properties and relationships of points, lines, angles, planes and curves of shapes and solids. The space around us and the measurement of the objects and shapes in that space are defined and categorized according to a specific set of assumptions.

Students will use a variety of techniques, tools and formulas to analyze characteristics and properties of two- and three-dimensional geometric objects; apply coordinate geometry and graph theory; and solve problems using visualization and spatial reasoning

G1 - Classification:
Both two-dimensional and three-dimensional shapes can be described, analysed and classified in a variety of ways and according to their properties and relationships.

MT.P4.G1

Students will demonstrate an understanding of geometry by using, representing and explaining. They will:

a) name two-dimensional shapes (circle, polygons up to eight sides)
b) identify the attributes of three-dimensional objects and of solids using formal geometric vocabulary (sphere, cuboids, cone, cylinder)
c) identify lines (horizontal, vertical) and angles (acute, right)
d) identify lines of symmetry in pictures and plane figures
e) identify and describe the results of reflections (flips)

G2 - Spatial Reasoning:
Geometric properties, reasoning and visualization can be used to solve problems.

MT.P4.G2

Students will demonstrate an understanding of geometry by using, representing and explaining. They will:

a) solve problems related to two-dimensional shapes and three-dimensional objects
b) solve problems using congruency (rectangles)
c) classify two- dimensional shapes according to their properties

G3 - Transformations:
Draw shapes and build models.

MT.P4.G3

Students will demonstrate an understanding of geometry by using, representing and explaining. They will:

a) draw and classify two-dimensional shapes
b) visualize and describe the results of combining three-dimensional objects (sphere, cuboids, cone, cylinder)
c) reflect (flip) plane figures

Measurement (M)

Measuring requires the use of tools and units to determine, describe and compare attributes. These measurements encompass the dimensions, size, quantity, length or capacity of substances or figures as well as sequential relationships such as time and temperature.

Students will use a variety of techniques, tools and formulae to determine the dimensions or the capacity of shapes and figures. Students will understand the systems of units for measuring perimeter, area and volume and will understand how to measure the volume and surface area of solid figures.

M1 - Tools and Units:
Standard mathematical measurement tools and units depend on the real world situation.

MT.P4.M1

Students will demonstrate an understanding of measurement by using, representing and explaining. They will:

a) identify the appropriate tools for measuring length and weight
b) identify the appropriate units for measuring length and weight

M2 - Measuring:
The comparison of an item with a unit (length, time, volume, etc.).

MT.P4.M2

Students will demonstrate an understanding of measurement by using, representing and explaining. They will:

a) show measurement ideas using manipulatives, like paper clips, diagrams, and written symbols
b) find surface area using counting methods (grid, colour tiles)
c) tell time to the minute using both analogue and digital clocks
d) use money in real life situations to estimate, count, record collections, and to make change up to $10
e) solve real world problems (e.g., measure with a ruler in one-inch and half-inch intervals)

Data Handling (D)

Data may be presented in a variety of representations, including graphs to show logical relationships between various quantities and to assist with decision-making. The collection and analysis of data is identified as either statistics or probability. Statistics is the mathematics used for collecting, organizing, and studying data while probability is the measure of the likelihood of an event.

Mathematics instruction will include data analysis, statistics and probability. Students will be given the opportunity to pose questions and collect, organize, represent and interpret data to answer those questions; develop and evaluate predictions and arguments that are based on data; and apply basic notions of chance and probability. Students will use technology tools to investigate large samples, explore graphical representations and simulate events.

D1 - Data Collection and Organisation:
Data are collected and organised to help with the making of decisions, the drawing of inferences or the development of new ideas.

MT.P4.D1
Students will demonstrate an understanding of data handling by using, representing and explaining. They will:
a) collect and organise data

D2 - Representation:
Appropriate representations of data depend on characteristics of that data.

MT.P4.D2
Students will demonstrate an understanding of data handling by using, representing and explaining. They will:
a) create tally charts, pictographs and bar graphs

D3 - Analysis and interpretation:
Provides information on the attributes of data.

MT.P4.D3
Students will demonstrate an understanding of data handling by using, representing and explaining. They will:
a) read and interpret tables and graphs to solve problems (bars must hit a line; complete symbols only; each symbol may represent 1, 2, 5, 10 things; no jumps on the scale)
b) use data to solve problems

D4 - Probability:
The occurrence or non-occurrence of an event is characterized as impossible, less likely, equally likely, more likely or certain. The likelihood of an event or its probability is quoted as a ratio between 0 and 1 inclusive.

MT.P4.D4
Students will demonstrate an understanding of data handling by using, representing and explaining. They will:
a. use the data to describe an event as more likely, less likely or equally likely

BERMUDA SCIENCE PERFORMANCE STANDARDS (SC)

The study of science is an intellectual and social endeavour – the application of human intelligence to figuring out how the world works.

Benchmarks for Science Literacy: Project 2061 (1993)

The *Bermuda Science Performance Standards* document is an amalgam of widely respected science documents that have been developed in many different countries, including the United Kingdom, United States and Canada. As is easily recognizable in standards documents from other jurisdictions, *Benchmarks for Science Literacy* has been used as the basis for *Bermuda Science Performance Standards.* Science in the schools provides an introduction to many different scientific disciplines from the traditional physics, chemistry and biology to geology, environmental science and meteorology. These standards are therefore wide ranging and provide the foundation for not only scientific literacy, but also the critical knowledge and skills for those who intend to study science as a requisite for their careers.

The National Science Education Standards (NSES, National Research Council, 1995) define scientific literacy as the knowledge and understanding of scientific concepts and processes which are required for participation in civic and cultural activities, economic productivity and personal decision making. The philosophy of The Bermuda Science Curriculum (Bermuda Ministry of Education, 1997) echoes the intent of the NSES statement and indicates that science education should empower all students to make informed choices concerning personal, societal, environmental and technological issues, thus fostering an appreciation and a sense of responsibility for the future.

In Bermuda, science is considered a critical component of education for *all* children and is therefore mandated as a core subject from preschool through to senior school. *The Bermuda Science Performance Standards* are not a curriculum. They provide the framework for our year-by-year science curriculum that spans the fourteen years from preschool to senior school. They expand the "what" students should know and be able to do to the "how" and "to what extent" students should demonstrate their understanding of scientific concepts and skills.

As stated in the National Curriculum for England, the standards must be *"robust enough to define and defend the core of knowledge and cultural experience and flexible enough to give teachers scope to build their teaching around it in ways that will enhance its delivery to pupils"* (The National Curriculum for England, 2000).

The *Bermuda Science Performance Standards* are categorized into four (4) strands, recognizable as organizers in curriculum documents of many jurisdictions:

1. **Physical Science (P)**
2. **Life Science (L)**
3. **Earth and Space Science (E)**
4. **Nature of Science (N)**

The first three strands, communicate the knowledge and concepts of science using traditional categories. The Nature of Science emphasizes the way that science and scientists work and how, together with mathematics and technology, the world has been shaped by human endeavour.

The strands are divided into standards that spiral throughout the compulsory years of the science programme in Bermuda. When the goal is deep understanding it is essential for concepts to be revisited over time. Standards are further broken down into indicators for assessment.

Students show conceptual understanding when they can:

- *use a concept accurately to explain observations and make predictions, first in familiar then unfamiliar situations*
- *represent the concept in a variety of ways including words, diagrams, charts and graphs, as appropriate*

Both aspects of understanding – explaining and representing – are required to meet the standard.

PHYSICAL SCIENCE (P)
Physical science, which consists of concepts of chemistry and physics, involves the study of matter and materials, forces and energy. There are four (4) physical science standards.

The student will produce evidence that demonstrates understanding of:

- **P1 Matter and Materials** - their properties, components, interactions and changes
- **P2 Force and Motion -** the relationship between force, mass and motion of an object and the nature and interaction of waves and matter
- **P3 Energy -** the sources and forms of energy, including transmission and transformations and how energy helps explain the structure of matter and the universe
- **P4 Forces of Nature -** gravitational, electrical and magnetic forces as the fundamental forces acting in nature

LIFE SCIENCE (L)
Life Science, which consists of concepts of biology and ecology, deals with the diversity of living organisms, their organization, life processes, relationships with one another and their environment. There are six (6) Life Science standards.

The student will produce evidence that demonstrates understanding of:

- **L1 Diversity of Life -** the variety of living things and the processes responsible for the maintenance of life
- **L2 Heredity** – biological traits and how they are passed on from generation to generation
- **L3 Cells, Organs and Organ Systems** – the structure, function and reproduction of cells that maintain the organization essential for life and specialized organs systems that interact with each other to maintain internal balance
- **L4 Interdependence of Life** – relationships amongst organisms and their dependence on their environment
- **L5 Flow of Matter and Energy -** the linking of organisms to one another and their physical setting by the transfer and transformation of matter and energy
- **L6 Evolution of Life** – the evolution of life on earth and natural selection as an explanation of biological processes

EARTH AND SPACE SCIENCE (E)
Earth and Space Science consists of concepts of astronomy, geology, resources, meteorology and oceanography. Earth and Space Science involves the study of the earth, the universe, their components and interactions. There are five (5) Earth and Space Science standards

The student will produce evidence that demonstrates understanding of:

- **E1 Astronomy -** the current scientific view of the nature, components, matter and energy sources of the universe
- **E2 Geology -** the features of the earth's surface, how they were formed and how they are continually changing
- **E3 Resources -** the earth's limited and varied materials that supply many of the resources that humans use
- **E4 Meteorology -** the interactions of structures of the earth's system and the sun's energy which cause weather and climate patterns
- **E5 Oceanography -** the features of oceans and the impact of these features on the global ecosystem

NATURE OF SCIENCE (N)
The Nature of Science strand involves of the understanding and application of scientific investigative techniques and data analysis. Nature of Science also includes the study of the interrelationships among science, technology, and society. There are three (3) Nature of Science standards.

The student will produce evidence that demonstrates understanding of:

- **N1 Scientific Investigation -** People can often learn about things around them by just observing those things carefully, but sometimes they can learn more by doing something to things and noting

what happens. Investigations are conducted for different reasons, which include exploring new phenomena, checking on previous results and comparing different theories. Investigations usually involve collecting evidence, reasoning, devising hypotheses, and making predictions.

N2 Data Representation and Interpretation - Data must be analysed in order to make sense of what has been collected. Sometimes the evidence collected might not be what you expected or might not be sufficient to draw a conclusion. Clear and accurate communication is important in doing science and an essential part of sharing an investigation order to inform others.

N3 Designed World: Science, Technology and Society - Over the course of the history of world exploration, humans have shaped and reshaped the world we live in by using technology in tandem with expanding science knowledge. Science cannot answer all questions and technology cannot solve all human problems or meet all human needs. Science influences society through its knowledge and world view. Technology influences society through its products and processes. Science and technology have advanced through contributions of many different people, in different cultures, at different times in history.

REFERENCES

It should be noted that there is a great deal of similarity amongst standards. The main sources for the Bermuda Performance Standards document contain hundreds of pages of detail that cannot be provided in the Bermuda *Science Performance Standards*. If further amplification of standards is required, it would appropriate to research the sources cited in this section.

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Physical Science (P)

Physical science (P), which consists of concepts of chemistry and physics, involves the study of matter and materials, forces and energy.

Conceptual understanding should be demonstrated by

- *Using a concept accurately to explain observations and make predictions*
- *Representing the concept in a variety of ways including words, diagrams, charts and graphs, as appropriate*

P1 - Matter and Materials - their properties, components, interactions and changes

SC.P4.P1

Students will produce evidence that demonstrates understanding of :

a) The basic properties of solid, liquid, gas can be observed and described.

Assessment limits:

- solid is hard/firm
- liquid flows, etc.

b) Materials can be changed by heating and cooling. Heating makes things happen faster. These changes can be measured.

Assessment limits:

- Including terms freezing, melting, evaporating

c) Materials have different properties that can be observed, described and recorded.

Assessment limits:

- group, identify, and order objects based on their physical properties

P2 - Force and Motion - the relationship between force, mass and motion of an object and the nature and interaction of waves and matter.

SC.P4.P2

Students will produce evidence that demonstrates understanding of :

Not assessed at this level on the Bermuda Criterion Reference Test (BCRT)

P3 - Energy - the sources and forms of energy, including transmission and transformations and how energy helps explain the structure of matter and the universe.

SC.P4.P3

Students will produce evidence that demonstrates understanding of :

a) Heat can be produced in many ways.

Assessment limits:

- rubbing – friction, burning fuels some machines that are working
- mixing some things together

b) Some things conduct heat and some things do not.

Assessment limits:

- insulators – warm clothing like wool and fat in animals and things that are not insulators
- do not use term "conductor"

c) Heat flows from warmer things to cooler things. Heat changes some matter.

Assessment limits:

- taking temperature to measure how hot or how cold
- adding heat to make things warmer, melting, evaporating
- making and keeping things cold i.e. taking away heat

d) Things that give off light also give off heat.

Assessment limits:

- For example light bulb, sun

P4 - Forces of Nature - gravitational, electrical and magnetic forces as the fundamental forces acting in nature.

SC.P4.P4

Students will produce evidence that demonstrates understanding of :

a) The earth's gravity pulls any object towards it. Gravity is the force which pulls objects towards the earth, and this force (weight) differs in places where gravity is different.

Life Science (L)

Life Science (L) which consists of concepts of biology and ecology, deals with the diversity of living organisms, their organization, life processes, relationships with one another and their environment.

Conceptual understanding should be demonstrated by

- *Using a concept accurately to explain observations and make predictions*
- *Representing the concept in a variety of ways including words, diagrams, charts and graphs, as appropriate*

L1 - Diversity of Life - the variety of living things and the processes responsible for the maintenance of life.

SC.P4.L1

Students will produce evidence that demonstrates understanding of :

a) Life processes common to animals include nutrition, movement, growth and reproduction.

b) Organisms need certain conditions to remain healthy.

c) Plants and animals have features that help them live in different places and have structures that perform specific functions.

d) Understand the difference between *living* and *nonliving.*

L2 - Heredity – biological traits and how they are passed on from generation to generation

SC.P4.L2

Students will produce evidence that demonstrates understanding of :

a) Organisms grow from egg to adult.

Assessment limits:

- butterfly – Monarch
- toad- same as frog
- human, or other mammal
- flowering plant
- life cycles – order, and identify missing stage

b) Some likenesses between offspring and parents are inherited. Characteristics are transferred from one generation to another.

Assessment limits:

- identify parent and offspring

L3 - Cells, Organs and Organ Systems – the structure, function and reproduction of cells that maintain the organization essential for life and specialized organ systems that interact with each other to maintain internal balance

SC.P4.L3

Students will produce evidence that demonstrates understanding of :

a) The body is a system in which parts do things for other parts and for the organism as a whole.

Assessment limits:

- People obtain energy from food and materials for body repair and growth.
- The indigestible parts of food are eliminated - mouth, stomach, large intestine, small intestine.
- By breathing, people take in oxygen they need to live.
- The skeletal and muscular systems help us to move (skull, ribs, backbone, muscles, joints).
- The skin protects the body from harmful substances and other organisms.
- The brain enables human beings to think and sends messages to other body parts to help them work properly.
- Some other animals have body systems with the same functions as humans.

Life Science (L) (continued)

Life Science (L) which consists of concepts of biology and ecology, deals with the diversity of living organisms, their organization, life processes, relationships with one another and their environment.

Conceptual understanding should be demonstrated by

- *Using a concept accurately to explain observations and make predictions*
- *Representing the concept in a variety of ways including words, diagrams, charts and graphs, as appropriate*

L4 - Interdependence of Life – relationships amongst organisms and their dependence on their environment.

SC.P4.L4

Students will produce evidence that demonstrates understanding of :

a) Living organisms modify their environment to meet their needs.

Assessment limits:

- use examples of commonly known Bermudian organisms

L5 - Flow of Matter and Energy - the linking of organisms to one another and their physical setting by the transfer and transformation of matter and energy.

SC.P4.L5

Students will produce evidence that demonstrates understanding of :

a) Food can be traced back to plants. Plants get their food from the sun.

b) Organisms grow, die and decay.

L6 - Evolution of Life – the evolution of life on earth, natural selection as an explanation of biological processes.

SC.P4.L6

Students will produce evidence that demonstrates understanding of :

Not assessed at this level on the Bermuda Criterion Reference Test (BCRT)

Earth And Space Science (E)

Earth and Space (E) Science consists of concepts of astronomy, geology, resources, meteorology and oceanography. Earth and space science involves the study of the earth, the universe, their components and interactions.

Conceptual understanding should be demonstrated by

- *Using a concept accurately to explain observations and make predictions*
- *Representing the concept in a variety of ways including words, diagrams, charts and graphs, as appropriate*

E1 - Astronomy -
the current scientific view of the nature, components, matter and energy sources of the universe.

SC.P4.E1

Students will produce evidence that demonstrates understanding of :

a) Our sun is one of many stars. There are stars smaller and larger than the sun.
b) The sun is a source of light and casts shadows on objects on earth.
Assessment limits:
- basic understanding of sun and shadows
- shadows cast at noon vs. early morning or evening
- appropriate shape of shadows

c) The Earth is one of the planets that orbit the sun. The Earth is the third planet from the sun.
d) The Earth orbits around the sun and the moon orbits around the Earth.
e) Days, months and years are related to the movement of the Earth and the moon. The rotation of the Earth every 24 hours produces a day and night cycle. The moon orbits the Earth. The shape of the moon looks different every day, but looks the same in about 28 days.
f) A telescope can help people see distant objects better that they can with unaided eyes. Some stars and planets can only be seen with telescopes.

E2 - Geology -
the features of the earth's surface, how they were formed and how they are continually changing.

SC.P4.E2

Students will produce evidence that demonstrates understanding of :

a) The earth has changed over time. Waves, wind, water and ice are always acting on the earth. They erode rocks and soil. This can happen in seasonal patterns.
Assessment limits:
- e.g., the loss of beach sand during storms

E3 - Resources -
the earth's limited and varied materials that supply many of the resources that humans use

SC.P4.E3

Students will produce evidence that demonstrates understanding of :

a) Earth's resources include air, water, soil, minerals and fuels.
b) Living things need a clean environment to survive including clean air and water etc.

E4 - Meteorology -
the interactions of structures of the earth's system and the sun's energy which cause weather and climate patterns

SC.P4.E4

Students will produce evidence that demonstrates understanding of :

Not assessed at this level on the Bermuda Criterion Reference Test (BCRT)

E5 - Oceanography -
the features of oceans and the impact of these features on the global ecosystem

SC.P4.E5

Students will produce evidence that demonstrates understanding of :

Not assessed at this level on the Bermuda Criterion Reference Test (BCRT)

Nature Of Science (N)

Nature of Science (N) consists of the understanding and application of scientific investigative techniques and data analysis. Nature of Science also involves the study of the interrelationships between science, technology, and society.

N1 - Scientific Investigation

-People can often learn about things around them by just observing those things carefully, but sometimes they can learn more by doing something to things and noting what happens. Investigations are conducted for different reasons, which include exploring new phenomena, checking on previous results and comparing different theories. Investigations usually involve collecting evidence, reasoning, devising hypotheses, and making predictions.

SC.P4.N1

Students will produce evidence that demonstrates understanding of :

a) Planning an investigation

Assessment limits:

- recognise some ways of finding things out from a scientifically testable question
- Order steps in a plan for an investigation/ match set-up to experiment.
- "guess" /predict what might happen in a simple investigation
- decide when fresh observations should be made (if descriptions and findings are different)
- Understand that if conditions are the same, results are usually very similar.

b) Obtaining evidence for investigation.

Assessment limits:

- Identify appropriate tools for task including magnifier, spring scale, balance, thermometer/ match tool to the property it can measure.
- Choose the most accurate or precise measuring procedure (measure length to the nearest cm; mass to the nearest gram, volume to the nearest ml or litre, temperature to the nearest degree Celsius, time to the nearest minute)
- Support findings with data found in investigation, books, articles and databases
- Identify best/most reliable sources to be used and expect others to do the same

N2 - Data Representation and Interpretation -

Data must be analysed in order to make sense of what has been collected. Sometimes the evidence collected might not be what you expected or might not be sufficient to draw a conclusion. Clear and accurate communication is important in doing science and an essential part of sharing an investigation in order to inform others.

SC.P4.N2

Students will produce evidence that demonstrates understanding of :

a) Summarising and organising data

Assessment limits:

- Make observations and describe and compare things in terms of number, colour, size, texture, motion, weight etc.
- Create tally charts, pictographs and bar graphs (choose table design/ identify row/column headings and title for table)
- Make comparisons between objects and events
- Identify patterns/ trends in data
- Compare things and describe observations clearly and use a simple table
- Draw/describe pictures to portray features of things being described

b) Analyzing evidence and making conclusions

Assessment limits:

- interpret tally charts, pictographs and bar graphs. Say whether findings are what is expected/draw simple conclusions from data presented
- Interpret/explain pictures of things, situations, events

Nature Of Science (N) (continued)

Nature of Science (N) consists of the understanding and application of scientific investigative techniques and data analysis. Nature of Science also involves the study of the interrelationships between science, technology, and society.

N3 - The Designed World - Over the course of the history of world exploration, humans have shaped and reshaped the world we live in by using technology in tandem with expanding science knowledge. Science cannot answer all questions and technology cannot solve all human problems or meet all human needs. Science influences society through its knowledge and world view. Technology influences society through its products and processes. Science and technology have advanced through contributions of many different people, in different cultures, at different times in history.

SC.P4.N3

Students will produce evidence that demonstrates understanding of :

a) Things found in nature are different from those that are made by humans. New products and systems can be developed to help solve problems, but there could be desirable or undesirable consequences.

Assessment limits:

- Some kinds of materials are natural and some are man-made. Some materials can be used again and some cannot
- People all throughout history invented tools. Tools of today are different from those of the past

for example

- *stone hammers bound with leather straps and steel hammers;*
- *development of tools including telescopes for seeing things far away*
- *rocketry for exploration of outer space*
- *X-ray to see bones*
- *Stethoscopes*
- Technology has made it possible to repair and sometimes replace body parts.
- Identify the most appropriate design for a particular purpose. Improve solution/design to solve a problem.
- When people want to build something new they should figure out ahead of time how it might affect other people and the environment. (cars and pollution, more waste and problem of disposal, re-using or recycling)
- People try to conserve energy in order to slow down depletion of resources and/or to save money.

b) Important contributions to the advancement of science, mathematics and technology have been made by different kinds of people in different cultures in different times.

Assessment limits:

- Identify science careers that involve science (doctor, veterinarian, nurse, etc.).

c) Diet, exercise, disease and toxic substances influence the physical health of individuals. Science has contributed to health and health technologies.

Assessment limits:

- Humans must eat certain kinds of food to grow and develop healthy bodies.
- Some diseases are caused by germs and some are not/ Washing one's hands with soap and water reduces the number of germs that can be passed onto other people.
- Some poisons in the environment make people sick.
- Vaccinations protect people from certain diseases and medicines help people who are sick to recover.

BERMUDA SOCIAL STUDIES PERFORMANCE STANDARDS (SS)

Social Studies is the integrated study of the social sciences and humanities to promote civic competence. Within the school program, social studies provides coordinated, systematic study drawing upon such disciplines as anthropology, archaeology, economics, geography, history, law, philosophy, political science, psychology, religion and sociology, as well as appropriate content from the humanities, mathematics, and natural sciences. The primary purpose of social studies is to help young people develop the ability to make informed and reasoned decisions for the public good.

Expectations of Excellence Curriculum Standards for Social Studies: NCSS (1994)

The Bermuda Social Studies Performance Standards document endorses an international network of standards infused with Bermuda standards for social studies. The standards for social studies cover standards in critical thinking, history, geography, economics, civics/government, problem-solving and technology as it relates to social studies.

Most of the standards apply to all phase levels. However, the criteria by which to measure mastery of a standard will differ at each level and this will be shown separately. Also included in this document are additional assessment indicators. This section is displayed in green and reflects what will be taught and assessed in the classroom by the teacher during the course of the entire year.

The standards are aligned to the five goals that form the foundation for the Bermuda Social Studies Curricula and the ten social studies themes promoted by the NCSS. The Bermuda Social Studies Standards, if adhered to and taught effectively, with confidence, will help Bermuda's students to meet not only the national standards but also educational standards internationally.

HISTORY STANDARDS (H)

History requires the student to understand how the past has influenced the present development of a country, including its values, beliefs, government and economy. A good understanding of a country's evolution should enable the student to make predictions for future possibilities. It should also give students an understanding and appreciation for their own culture and that of others.

The students will produce evidence that demonstrates their ability to:

H1 Organise information chronologically and understand the sequence and relationship of events.
H2 Communicate in various forms using social studies vocabulary and concepts to engage in inquiry, research, social studies analysis, and decision-making.
H3 Comprehend, analyse, and interpret historical information, including literature, documents and data to make decisions on appropriate and viable solutions to historical issues.
H4 Analyse the development of early human societies, civilisations and empires.
H5 Explain the impact of the interaction of people, culture, and ideas and analyse the effects it has on the social, economic and political institutions and development of countries and regions.
H6 Explain how shifts in international relationships and world power impacts on individual countries and world affairs recognising long-term changes and recurring patterns in world history.
H7 Identify and explain the political, economic, social and technological issues challenging the world since 1990.

GEOGRAPHY STANDARDS (G)

Geography will give the student an understanding of its three interrelated components- subject matter, skills, and perspectives. Subject matter (the Earth) provides the basis on which geographic skills are applied. Skills are: (1) asking geographic questions, (2) acquiring geographic information, (3) organising geographic information, (4) analysing geographic information, and (5) answering geographic questions about the Earth. Knowledge and skills must be considered from two perspectives – spatial and ecological (place). Space in the world is identified in terms of location, distance, direction, pattern, shape, and arrangement. Place is identified in terms of the relationships between physical environmental characteristics, such as climate, topography, and vegetation and human characteristics such as economic activity, settlement, and land use.

The student will produce evidence that demonstrates their ability to:

G1 Use maps, globes and other geographic representations, tools and technologies to locate, obtain, process and report information about people, places and environments.
G2 Use information on the physical and human features and cultural characteristics of places to define and study regions and their patterns of changes including changes in distribution and importance of resources.

G3 Explain how economic, political, and cultural processes interact to shape patterns of human migration and settlement, influence and interdependence, and conflict and cooperation.
G4 Apply geographic knowledge of people, place, and environments to interpret the past, understand the present, and plan for the future.

CIVICS AND GOVERNMENT STANDARDS (C)

Civics will allow the student to obtain the knowledge and skills necessary to participate in political life in Bermuda as a responsible and informed citizen committed to the further enhancement of democratic values both locally and globally.

The students will produce evidence that demonstrates their ability to:

C1 Explain why society needs rules, laws, and governments.
C2 Explain how culture influences self-perception, national identity, and the social and political characteristics of a country and result in different interpretations of events by people from diverse cultural perspectives.
C3 Describe how governments' powers are acquired, used and justified.
C4 Analyse Bermuda's Constitution, the type of government that it creates and the parameters that it sets for Bermuda as a colony, the roles of the individual, political parties, interest groups and public opinion in the democratic process.
C5 Report and evaluate the changes in human rights in Bermuda and the world.
C6 Identify and explain the significance of various Bermuda symbols, landmarks, physical features, and personalities.

ECONOMIC STANDARDS (E)

Economics will provide the student with a basic understanding of economic issues in Bermuda. It will also give them an understanding of how local and global economics can influence political and social aspects of a country and changes over time.

The students will produce evidence that demonstrates their ability to:

E1 Explain the concept and use of money.
E2 Use their understanding of past and present economic activities in Bermuda to make plausible predictions on Bermuda's economic future and career choices.
E3 Identify and describe the roles of various economic institutions, including but not limited to, financial institutions, labour unions, local and international companies, and not-for-profit organizations for ensuring the positive economic development of the country.
E4 Distinguish between private and public goods and services.
E5 Describe and explain global economic interdependence and competition, using examples to illustrate their influence on national and international policies
E6 Identify the role and influence of technology on daily life.

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History (H)

History requires the student to understand how the past has influenced the present development of a country, including its values, beliefs, government and economy. A good understanding of a country's evolution should enable the student to make predictions for future possibilities. It should also give students an understanding and appreciation for their own culture and that of others.

H1 - Organise information chronologically and understand the sequence and relationship of events.

SS.P4.H1

The students will produce evidence that demonstrate their ability to:

a) Create, use or interpret a tiered timeline or graphic organizer.
b) Place information in proper sequence, e.g., order of occurrence; and order of importance.

H2 - Communicate in various forms using social studies vocabulary and concepts to engage in inquiry, research, social studies analysis, and decision-making.

SS.P4.H2

The students will produce evidence that demonstrate their ability to:

a) Define and give examples of key vocabulary words, terms and concepts.
b) Use appropriate sources to gain meaning of essential terms, e.g., glossary, dictionary.
c) Collect supporting evidence from primary sources.
d) Analyse year level appropriate sources.

H3 - Comprehend, analyse, and interpret historical information, including literature, documents and data to make decisions on appropriate and viable solutions to historical issues.

SS.P4.H3

The students will produce evidence that demonstrate their ability to:

Not assessed at this level on the Bermuda Criterion Reference Test (BCRT)

H4 - Analyse the development of early human societies, civilisations and empires.

SS.P4.H4

The students will produce evidence that demonstrate their ability to:

Not assessed at this level on the Bermuda Criterion Reference Test (BCRT)

H5 - Explain the impact of the interaction of people, culture, and ideas and analyse the affects it has on the social, economic and political institutions and development of countries and regions.

SS.P4.H5

The students will produce evidence that demonstrate their ability to:

a) Analyse the impact of media on contemporary Bermudian culture.

H6 - Explain how shifts in international relationships and world power impacts on individual countries and world affairs recognising long-term changes and recurring patterns in the world.

SS.P4.H6

The students will produce evidence that demonstrate their ability to:

a) Connect the economic changes in 16th century Europe to the discovery of Bermuda, e.g., search for sea routes to Asia as land routes were restricted, Bermuda's location in the mid-Atlantic between Europe and Americas.

H7 - Identify and explain the political, economic, social and technological issues challenging the world since 1990.

SS.P4.H7

The students will produce evidence that demonstrate their ability to:

Not assessed at this level on the Bermuda Criterion Reference Test (BCRT)

Geography (G)

Geography will give the student an understanding of its three interrelated components- subject matter, skills, and perspectives.

Subject matter (the Earth) provides the basis on which geographic skills are applied. Skills are:

- asking geographic questions,
- acquiring geographic information,
- organising geographic information,
- analysing geographic information, and
- answering geographic questions about the Earth.

Knowledge and skills must be considered from two perspectives – spatial and ecological (place).

Space in the world is identified in terms of location, distance, direction, pattern, shape, and arrangement.

Place is identified in terms of the relationships between physical environmental characteristics, such as climate, topography, and vegetation and human characteristics such as economic activity, settlement, and land use.

G1 - Use maps, globes and other geographic representations, tools and technologies to locate, obtain, process and report information about people, places and environments.

SS.P4.G1

The students will produce evidence that demonstrate their ability to:

a) Create and interpret maps of Bermuda and the world, using 8 cardinal directions, symbols and simple legends.
b) Identify and describe major land forms and water bodies in Bermuda, e.g., hills, marsh, ocean, arable land, golf courses.
c) Identify and locate Bermuda, the continents, the Caribbean, the Azores and Great Britain on a map.
d) Describe Azores in relation to "Portuguese".

G2 - Use information on the physical and human features and cultural characteristics of places to define and study regions and their patterns of change, including **changes** in distraction and importance of resources.

SS.P4.G2

The students will produce evidence that demonstrate their ability to:

a) Describe Bermuda's industries in relationship to its location and availability of resources, e.g., labour, farming, fishing, service industries, wholesale, utilities, crafts; mainly from U.S. due to Bermuda's location.

G3 - Explain how economic, political and cultural processes interact to shape patterns of human migration and settlement, influence and interdependence; and conflict and cooperation.

SS.P4.G3

The students will produce evidence that demonstrate their ability to:

Not assessed at this level on the Bermuda Criterion Reference Test (BCRT)

G4 - Apply geographic knowledge of people, place and environments to interpret the past, understand the present and plan for the future.

SS.P4.G4

The students will produce evidence that demonstrate their ability to:

Not assessed at this level on the Bermuda Criterion Reference Test (BCRT)

Civics (C)

Civics will allow the student to obtain the knowledge and skills necessary to participate in political life in Bermuda as a responsible and informed citizen committed to the further enhancement of democratic values both locally and globally.

C1 - Explain why society needs rules, laws and governments.

SS.P4.C1

The students will produce evidence that demonstrate their ability to:

a) Describe the structure of Bermuda's government.
b) Explain the function of government.

C2 - Explain how culture influences self-perception, national identity and the social and political characteristics of a country and result in different interpretation of events by people from diverse cultural perspectives.

SS.P4.C2

The students will produce evidence that demonstrate their ability to:

a) Identify and understand the importance of citizenship traits.

C3 - Describe how governments' powers are acquired, used and justified.

SS.P4.C3

The students will produce evidence that demonstrate their ability to:

Not assessed at this level on the Bermuda Criterion Reference Test (BCRT)

C4 - Analyse Bermuda's Constitution, the type of government that it creates and the parameters that it sets for Bermuda as a colony, the roles of the individual, political parties, interest groups and public opinion in the democratic process.

SS.P4.C4

The students will produce evidence that demonstrate their ability to:

a) Evaluate the importance of a written constitution to citizens with a focus on its status as a contract between the government and its citizens.

C5 - Report and evaluate the changes in human rights in Bermuda and the world.

SS.P4.C5

The students will produce evidence that demonstrate their ability to:

Not assessed at this level on the Bermuda Criterion Reference Test (BCRT)

C6 - Identify and explain the significance of various Bermuda symbols and personalities.

SS.P4.C6

The students will produce evidence that demonstrate their ability to:

a) Explain the relevance of major symbols of Bermuda, e.g., coat of arms, motto, flag, national song/anthem, Bermudiana flower, cahow bird, cedar tree.

Economics (E)

Economics will provide the student with a basic understanding of economic issues in Bermuda. It will also give them an understanding of how local and global economics can influence political and social aspects of a country and changes over time.

E1 - Explain the concept and use of money.

SS.P4.E1

The students will produce evidence that demonstrate their ability to:

a) Describe the role of money, banking and savings in everyday life- direct purchase, describe U.S.A and Bermuda coins and notes.

E2 - Use their understanding of past and present economic activities in Bermuda to make plausible predictions on Bermuda's economic future and career choices.

SS.P4.E2

The students will produce evidence that demonstrate their ability to:

Not assessed at this level on the Bermuda Criterion Reference Test (BCRT)

E3 - Identify and describe the roles of various economic institutions, including but not limited to, government, financial institutions, labour unions, local and international companies and not-for-profit organizations for ensuring the positive economic development of the country.

SS.P4.E3

The students will produce evidence that demonstrate their ability to:

Not assessed at this level on the Bermuda Criterion Reference Test (BCRT)

E4 - Distinguish between private and public goods and services.

SS.P4.E4

The students will produce evidence that demonstrate their ability to:

Not assessed at this level on the Bermuda Criterion Reference Test (BCRT)

E5 - Describe and explain global economic interdependence and competition, using examples to illustrate their influence on national and international policies.

SS.P4.E5

The students will produce evidence that demonstrate their ability to:

a) Describe ways in which Bermuda is interdependent with other countries based on factors of production and demand for goods, e.g., food, clothing & household goods, building supplies, oil, gas, etc.

E6 - Describe and explain global economic interdependence and competition, using examples to illustrate their influence on national and international policies.

SS.P4.E6

The students will produce evidence that demonstrate their ability to:

a) Describe how technology affects people's lives and how the community operates- mass media effects choices and opinions.

English Language Arts (EL)

Mathematics (MT)

Science (SC)

Social Studies (SS)

MISSION STATEMENT

The mission of the Bermuda Public School System is to be the 1st choice in education by providing rigorous and stimulating learning experiences in safe responsive environments from which our students emerge confident and prepared to compete and contribute locally and globally.

MINISTRY OF EDUCATION

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