PRIMARY 5

MINISTRY OF EDUCATION
DEPARTMENT OF EDUCATION

Essential Curriculum

2008

Curriculum and Instructional Leadership
Performance Standards Summary

ENGLISH LANGUAGE ARTS

MATHEMATICS

SCIENCE

SOCIAL STUDIES

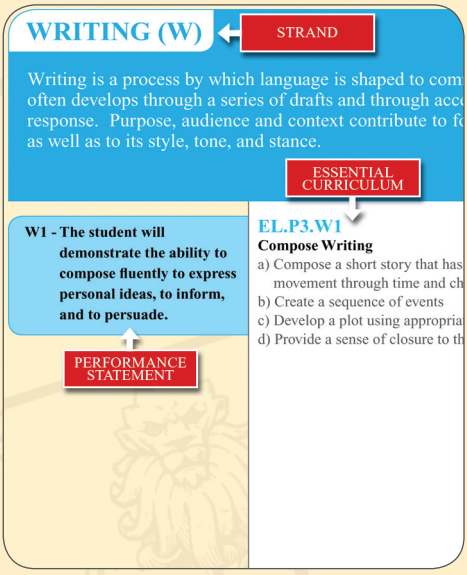

QUO·FATA·FERUNT

PERFORMANCE STANDARDS ARE LEARNING EXPECTATIONS

"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)			

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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.P5.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
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) Apply knowledge of sentence structure and context.
h) Locate information in reference sources

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

EL.P5.R2

Meaning of Text/Reading Comprehension

i) Identify important facts/details
j) Draw texts together to compare/contrast themes, characters and ideas
k) Make perceptive and well-developed connections
l) Note underlying themes or messages; identify main idea
m) Make and support inferences
n) Make and support warranted and responsible assertions about the text.
o) Summarize significant ideas in a text
p) Draw conclusions about contexts, events, characters, and settings
q) Determine cause and effect/ sequence of events
r) 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.P5.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) Detect Bias
f) Summarize information
g) Read and make connections to expository text about Bermudian culture/life
h) 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.P5.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
e) Interpret details from the text

Suggested texts:
- Schedules
- Diagrams
- Graphs

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

EL.P5.I3

Persuasive

a) Identify what the author is arguing or trying to persuade the reader to think or do

Suggested texts:
- Advertisements
- Newspaper in Education (NIE) editorials
- Feature articles
- Photo-essays
- Newspaper articles

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.P5.L1

Literary Elements and Devices

a) Identify the author's purpose
b) Identify the point of view (i.e., the perspective from which the story is being told)
c) Identify the basic motivation of a character
d) Explain a character's traits
e) Summarize the plot of a story
f) Identify the conflict, turning point, and resolution of a story
g) Recognize theme(s) in a literary text
h) Recognize literary devices (e.g., simile, metaphor, personification, onomatopoeia, sensory details, exaggeration)
i) Identify and explain the effect of author's word choice in a literary text

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

EL.P5.I2

Characteristics of Various Genres

a) Identify the characteristics of fiction (e.g., movement through time, imaginative elements) present in a literary work.
b) Identify the characteristics of literary nonfiction (e.g., figurative language,) and how they contribute to the text
c) Identify the characteristics of poetry (e.g., structure, rhyme, rhythm, word choice) and how they contribute to the meaning of a poem
d) Identify elements of drama (e.g., dialogue, stage directions, scenes, acts) and how they contribute to the play

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.P5.U1

Grammar and Conventions of Standard English Language

a) Capitalize proper nouns, titles of people, titles of books, letter parts, first word in sentence and first word in quotation
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 forms of adjectives
i) Use appropriate tenses including present, past and future
j) Use parts of speech correctly (nouns, verbs, pronouns, adjectives, adverbs)
k) Identify special usage of double negatives
l) Recognize subject and predicates in complete sentences
m) Use spelling correctly in patterns and words
n) 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.P5.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.P5.S1

Effective Communications

a) Talk about ideas or information gained from sources beyond personal experiences (e.g. "I read that the moon pulls from the ocean's tides")
b) 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
c) Initiate topics within conversations that are in progress
d) Sustain conversation by extending others' contributions
e) Refer to knowledge gained during discussion
f) Ask other students questions that require them to support their claims or arguments
g) Conduct firsthand interviews of peers, parents or community members
h) Give a short prepared speech or report informing others about some object, event or person (e.g. plan and present an oral report on a project or book, with a poster or diorama used in the presentation)
i) Conduct and /or make a lengthier presentation to the class or take part in full-length performances in front of larger groups or unfamiliar audiences
j) Consistently observe politeness, apologize when appropriate; occasionally compliment others
k) Ask relevant questions
l) Respond to questions with appropriate elaboration
m) Display appropriate turn-taking behaviors
n) Actively solicit another person's comment or opinion
o) Offer own opinion forcefully without dominating
p) Respond appropriately to comments and questions
q) Clarify, illustrate, or expand on a response when asked to do so; asks classmates for similar expansions
r) Engage the audience with appropriate verbal cues and eye contact
s) Collaborate by seeking out peers to solve problems, disagreeing diplomatically, and assigning or delegating tasks to organize a group
t) Listen to, comprehend and carry out directions
u) Listen attentively in a range of situations, one to one, group, class

Suggested Activities
- Book Talks
- Read Alouds
- Literature Circles

(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.P5.M1

Information Retrieval and Technological Communication

a) Make informed judgments about television, radio, and film productions:
b) Demonstrate an awareness of the presence of the media in the daily lives of most people
c) Evaluate the role of the media in focusing attention and in forming an opinion
d) Judge the extent to which media provide a source of entertainment as well as a source of information
e) Define the role of advertising as part of media presentation

Suggested Activities:

- Present a paper or report on reasons for selecting one media choice over another
- Prepare a report on the benefits obtained from media exposure
- Maintain a week's log to document personal viewing habits and analyze the information collected in the log
- Summarize patterns of media exposure in writing or in an oral report
- View two or more different media responses to a single topic and response
- Analyze the appeal of particularly memorable commercials

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

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.P5.N1

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

a) compare and order numbers $0.01 < n < 100{,}000$)
b) identify place value up to 100,000
c) apply equivalent representations of the same number and generate them by decomposing and composing numbers including expanded notation
d) know and 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.P5.N2

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

a) estimate by rounding numbers (no more than 2 decimals) to the nearest integer
b) apply the four operations and the relationship between them to problem solving

Assessment limits:
- multiplication facts to 12 X 12
- multiply 2 and 3 digit numbers by a 2-digit number
- divide a 3-digit number by a 1-digit number with remainders
- divide by multiples of 10
- test for divisibility for 3, 6, 9

c) understand and use the inverse relationship between addition and subtraction
d) use a variety of methods to check results and to determine reasonableness of the solution, including estimation and inverse operations
e) 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.P5.N3

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

a) add, subtract and multiply common fractions with unlike denominators
b) add, subtract and multiply decimal fractions
c) apply the relative magnitude and relationship among whole numbers, fractions, decimals and mixed numbers
d) apply proportional comparisons of fractions and decimals in the context of everyday situations

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.

MT.P5.A1
Students will demonstrate an understanding of algebra, by using, representing and explaining. They will:
a) create and extend geometric and numeric patterns
b) represent and describe patterns with tables, pictures, symbolic rules or words (e.g., add 2 or + 2)

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.

MT.P5.A2
Students will demonstrate an understanding of algebra, by using, representing and explaining. They will:
a) use symbols to represent numerical situations (multiplication and division) and simple formulas (e.g., the perimeter of a square)
b) illustrate how a change in one variable affects a second variable

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.P5.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 (division)
b) model and solve problem situations using objects and tables

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.P5.G1

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

a) name the different quadrilaterals
b) identify and classify three-dimensional shapes according to their attributes
c) identify lines (parallel, perpendicular) and angles (straight, obtuse)
d) identify and describe lines of symmetry in plane shapes
e) identify and describe the results of reflections (flips) and translations (slides)
f) identify and describe congruent shapes

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

MT.P5.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, triangles)

G3 - Transformations:
Draw shapes and build models.

MT.P5.G3

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

a) draw and classify triangles, quadrilaterals and polygons
b) visualize and describe the results of combining three-dimensional objects (sphere, cuboids, cone, cylinder, pyramid)
c) reflect (flip) and translate (slide) plane figures
d) locate or plot on a map using cardinal (N,E,S,W) directions

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.P5.M1

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

a) identify the appropriate measurement tools to find length, perimeter, weight, time and temperature
b) convert units within a system (time [hours, minutes], money)

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

MT.P5.M2

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

a) find the perimeter and area of a rectangle (provide formulae, use grids)
b) determine the relationship between perimeter and area of a rectangle
c) read and write time to the minute using both analogue and digital clocks
d) solve real world problems (e.g., measure with a ruler in one-inch, half-inch and quarter-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.P5.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.P5.D2
Students will demonstrate an understanding of data handling by using, representing and explaining. They will:
a) compare different graphical representations for the same set of data (tables, bar graphs, pictographs)

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

MT.P5.D3
Students will demonstrate an understanding of data handling by using, representing and explaining. They will:
a) analyse and interpret data presented in a graph (pictographs – include 1/2 symbols; bar graphs - bars can go between lines; scales can jump)
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.P5.D4
Students will demonstrate an understanding of data handling by using, representing and explaining. They will:
a) list all possible outcomes of a probability experiment

PLANNING NOTES

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.P5.P1

Students will produce evidence that demonstrates understanding of :

a) Materials can be compared, grouped, ordered based on their attributes.

Assessment limits:

- mass, volume, temperature, length

b) Matter can be mixed and separated.

c) Matter can be composed of parts too small to see with the naked eye.

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

SC.P5.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.P5.P3

Students will produce evidence that demonstrates understanding of :

a) Energy can be stored and transformed in many ways.

Assessment limits:

- electrical to heat, light, sound and mechanical

b) Electricity travels through circuits to make things work. Electricity in circuits can produce heat, light, sound and magnetism.

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

SC.P5.P4

Students will produce evidence that demonstrates understanding of :

a) A magnet pulls on things made of iron and pushes or pulls other magnets.

Assessment limits:

- like poles, unlike poles
- north and south poles
- Attract, repel

b) Materials that have been electrically charged pull on uncharged materials and may push or pull other charged materials.

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.P5.L1

Students will produce evidence that demonstrates understanding of :

a) Living things can be sorted into groups using various features. The features used for grouping depend on the purpose of grouping.

Assessment limits:

- for example physical characteristics
- understanding of sorting into smaller and smaller groups (kingdom to species)
- do not test terms such as phylum etc but can use a full pictorial classification chart as stimulus for questions about each group with details of a animal and plant kingdom
- animal kingdom; characteristics of animals
- symmetry vs. no symmetry
- vertebrates including mammals, birds, ,fish, amphibians, reptiles
- invertebrates can use chart for distinguishing characteristics; general examples such as squid, snails, spiders, insects, sea anemones, jellyfish

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

SC.P5.L2

Students will produce evidence that demonstrates understanding of :

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

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.P5.L3

Students will produce evidence that demonstrates understanding of :

a) Some living things have a single cell, but still need water, air, food, a method of getting rid of waste and an environment in which to live. Living things are made mostly of cells.

b) Microorganisms are too small to be seen with unaided eye. They can be harmful but most are beneficial.

c) Recognize plant cells and animal cells including the basic cell parts and functions.

Assessment limits:

- cell membrane – boundary
- cell wall – support
- nucleus – "control centre/ brain" of the cell
- can use more fully labeled diagrams to respond to questions on distinguishing characteristics.

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.P5.L4

Students will produce evidence that demonstrates understanding of :

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

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.P5.L5

Students will produce evidence that demonstrates understanding of :

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

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

SC.P5.L6

Students will produce evidence that demonstrates understanding of :

a) Individuals of the same kind differ in their characteristics. This can help them to continue to survive and reproduce.

b) Fossils can be compared to one another and to organisms that are alive today.

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.P5.E1
Students will produce evidence that demonstrates understanding of :
Not assessed at this level on the Bermuda Criterion Reference Test (BCRT)

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

SC.P5.E2
Students will produce evidence that demonstrates understanding of :
a) Rocks consist of different combinations of materials.
b) When rocks break and are weathered smaller rocks are formed.
c) Soil consists of rocks and remains of plants and can contain living organisms or their remains.

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

SC.P5.E3
Students will produce evidence that demonstrates understanding of :
Not assessed at this level on the Bermuda Criterion Reference Test (BCRT)

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

SC.P5.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.P5.E5
Students will produce evidence that demonstrates understanding of :
a) Oceans provide evidence of earth's change over time.
Assessment limits:
- e.g., presence of fossils

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.

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.P5.N1

Students will produce evidence that demonstrates understanding of :

a) Planning an investigation

Assessment limits:

- Suggest some ways of finding things out through scientific investigation
- Order steps in a plan for an investigation /match set-up to experiment.
- Make simple prediction where outcome might be obvious
- Recognize/describe simple cause and effect relationship (more complex relationships)
- Recognize when comparisons might not be fair because some conditions are not kept the same
- Understand that results of investigations are seldom exactly the same, but if differences are large, the observations should be made again
- Determine whether it was a fair or unfair test

b) Obtaining evidence for investigation.

Assessment limits:

- Select instruments to measure distance, volume, mass and temperature (measure to accuracy in P4)
- Choose the most accurate or precise measuring procedure.
- Locate scientific information from sources including books, databases, CD -ROMS, articles in magazines
- Understand fact v. opinion -distinguish factual/ scientifically accurate v. fictional resources

SC.P5.N2

Students will produce evidence that demonstrates understanding of :

a) Summarising and organising data

Assessment limits:

- Record observations (with more detail and in other ways than P3/ P4)
- Organize and display data in a variety of forms (tables, bar graphs, pictographs)
- Describe simple patterns/ extrapolate based on simple trends in data.

b) Analyzing evidence and making conclusions

Assessment limits:

- Interpret, describe, and explain what has been found out from data presented in graphs (tables, bar graphs and pictographs) Interpret different graphical representations for sets of data
- Use diagrams to help explain things. Make comparisons using diagrams
- Use numerical data to describe and explain things, events
- Use facts to support conclusions. Understand observations are needed to develop explanations.
- Develop follow-up questions for investigation (results of experiment generate new questions for further study)
- Use simple models to predict changes in real systems. Understand importance of scale in models. Compare parts of model with real system.

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.P5.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.

Assessment limits:

- Developments in science and technology can result in things used in our everyday lives (e.g., microscopes, binoculars for observing things too small to see)
- Science knowledge changes as new discoveries are made (interpret or analyze timelines of scientific events).
- When people want to develop or expand things , they should figure out ahead of time how it might affect other people and other living things (e.g., more electricity used, fossil fuels, air pollution near electrical companies; some energy sources cost less than others and some cause more pollution than others)
- Identify repeated elements in sequences in designs, structures, sounds, and events; identify symmetry in a design/structure; identify possible solution and analyze the effectiveness of solution.

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 things in the environment make people sick. Tobacco, alcohol and other drugs can harm human beings and other living things.
- Vaccinations protect people from certain diseases and medicines help people who are sick to recover.

PLANNING NOTES

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.P5.H1** **The students will produce evidence that demonstrate their ability to:** a) Create, use or interpret a tiered timeline, graphic organiser, charts, graphs or illustrations. b) Explain the sequence and relationship of events. c) Place data in tabular form to show change over time, e.g., charts or graphs.
H2 - Communicate in various forms using social studies vocabulary and concepts to engage in inquiry, research, social studies analysis, and decision-making.	**SS.P5.H2** **The students will produce evidence that demonstrate their ability to:** a) Recognize and understand an increasing number of social studies terms. b) Form a simple organisation of key ideas related to a topic, e.g., the journey and shipwreck of the Sea Venture. c) Collect supporting evidence from primary and secondary sources. d) Analyse primary and secondary 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.P5.H3** **The students will produce evidence that demonstrate their ability to:** a) Understand the difference between fact and opinion. b) Identify relevant factual information regarding Bermuda's model of democracy and give supporting evidence, e.g., parliamentary government, citizens' rights and responsibilities. c) Draw inferences from factual information.
H4 - Analyse the development of early human societies, civilisations and empires.	**SS.P5.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.P5.H5** **The students will produce evidence that demonstrate their ability to:** Not assessed at this level on the Bermuda Criterion Reference Test (BCRT)
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.P5.H6** **The students will produce evidence that demonstrate their ability to:** Not assessed at this level on the Bermuda Criterion Reference Test (BCRT)
H7 - Identify and explain the political, economic, social and technological issues challenging the world since 1990.	**SS.P5.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.P5.G1

The students will produce evidence that demonstrate their ability to:

a) Identify and interrelate each of the seven continents, e.g., landforms and climate, resources, people and their culture.
b) Use cardinal and intermediate directions, latitude and longitude to locate specific points in the community and the world.
c) Compare the climate, vegetation and resources in Bermuda with those in the Caribbean, Britain, Azores, North America and Africa.

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.P5.G2

The students will produce evidence that demonstrate their ability to:

a) Describe and compare parishes and population in Bermuda and other parts of the world (at least one country from the Caribbean, Europe, South/Central America, Asia, Africa and Pacific Islands) and explain how these communities depend upon each other.
b) Explain how communities in Bermuda are linked politically; Identify constituencies and representatives.
c) Understand how resources influence economic activity.

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.P5.G3

The students will produce evidence that demonstrate their ability to:

a) Explain economic, political and cultural issues concerning the journey of the Sea Venture.

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

SS.P5.G4

The students will produce evidence that demonstrate their ability to:

a) Explain how people in Bermuda have adapted to and changed the environment over time, e.g., water collection, building materials, forts, multi-level commercial building, condos, transportation and roads/bridges, reclamation, introduction of plants and animals.
b) Demonstrate how people can work together to solve present environmental problems and prevent future ones, e.g., encourage the adoption of new behaviours (reuse, repair and recycle), preservation to sustain good living standards in future.

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.P5.C1

The students will produce evidence that demonstrate their ability to:

a) Explain the purpose of government.
b) Describe a community without rules.

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.P5.C2

The students will produce evidence that demonstrate their ability to:

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

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

SS.P5.C3

The students will produce evidence that demonstrate their ability to:

a) Describe how controversies can be resolved in Bermuda's Parliamentary democracy, e.g., election, lobbying, petition, private bills, arbitration/ negotiation.

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.P5.C4

The students will produce evidence that demonstrate their ability to:

a) Describe the roles and responsibilities of the Governor, Premier and Legislature in the present.

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

SS.P5.C5

The students will produce evidence that demonstrate their ability to:

a) Describe how different political systems define and protect individual human rights- political democracy, theocracy, dictatorship.

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

SS.P5.C6

The students will produce evidence that demonstrate their ability to:

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

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.P5.E1

The students will produce evidence that demonstrate their ability to:

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

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.P5.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.P5.E3

The students will produce evidence that demonstrate their ability to:

a) Identify and explain various points of view concerning economic issues such as taxation, unemployment, inflation, the national distribution of income.

b) Identify the major players in the various economic activities.

E4 - Distinguish between private and public goods and services.

SS.P5.E4

The students will produce evidence that demonstrate their ability to:

a) Explain how goods and services in Bermuda have changed over time, e.g., changes generated from our transition from privateering, piracy, whaling, salt-raking, agriculture, Tourism to International Business.

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

SS.P5.E5

The students will produce evidence that demonstrate their ability to:

a) Describe and explain global economic interdependence and competition, using examples to illustrate their influence on national and international policies, e.g., taxes, treaties, European Union, Caricom.

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

SS.P5.E6

The students will produce evidence that demonstrate their ability to:

a) Understand how individuals and groups influence each other using different forms of technology- email, advertising, websites, video games, etc.

English Language Arts (EL)

Mathematics (MT)

PLANNING NOTES

Science (SC)

Social Studies (SS)


QUO·FATA·FERUNT

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.

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