RATIONALE:

This course outline is the result of a four year project sponsored by the NCB Foundation. Through a partnership between St. George's College and key Mathematics educations, pilot schools were evaluated in order to define and produce a curriculum that would emphasize scope and sequencing of mathematical topics from first to fifth form. The topics in the outline are not taught in isolation but by linking with other topics and in a spiral approach across the grade levels and within grade levels.

This course outline is a simplification of that scope and sequence document and is intended to provide parents and students with a tool to assist the home in working along with the school, to improve student performance. Use it well!

NUMBER: Number Theory and Computation

Topic	Sub-topic

2.0 Whole Numbers (Representation, Basic concepts and Operations)

2.1
a) application of the order of operations when numbers with indices/exponents are included in the computation;
b) approximate values to 1 or 2 significant figures;
c) estimates of results by using 1 or 2 significant figures;
d) problem-solving that uses additional strategies and skills including:
   d.i) identification of patterns;
   d.ii)   classification of information, and making of organised lists;
   d.iii)   **construction** of tables/charts,   bar graphs, pictograms, **pie charts** to represent information given in other formats;
   d.iv)   making sketches, models and drawing diagrams
e) continuation of the operations, A, S, M with numbers in bases besides 10;
   e.i) application of (i) – (iii) to non-metric systems of measurement

2.2
a) evaluation of numbers with integral indices;
b) use of the index form to derive squares and square roots of numbers;

3.0 Sets

3.1
a) additional concepts and related set language and symbols:
   a.i) the number of subsets in a set of n elements;
   a.ii)   equal and equivalent sets;
   a.iii)   finite and infinite sets;
   a.iv)   the universal set, & the complement of a set
b) use of set notation to represent the solution of linear inequalities with one variable
c) the construction and interpretation of Venn diagrams which show
   - the universal set and its subsets;
   - a set & its complement

MEASUREMENT

Topic	Sub-topics

2.0 Length
(Linear or one-dimensional measure)

2.1   approximate measures
   (ii) to 3 decimal places
   (iii) to 1 or 2 sig. Figures

3.0 Perimeter and Circumference
(distance around the outside of a
shape/region)

3.1

a) measurement around plane shapes with curved lines:
a.i) circumference of circle;
a.ii)   length of a ½ or ¼ of the whole circumference;
a.iii)   perimeter of composite shapes bounded by straight line(s) and semi-circular arcs or arcs of quarter circles
b) computation of the perimeter of polygons of n sides, $3 \leq n \leq 12$, and of missing side(s) when the perimeter is known;

4.0 Area
(Space covered by a shape or region)

4.1

a) area of region covered by
a.i) the *parallelogram, rhombus, trapezium;*
a.ii)   circle, semi-circle and quadrant given the radius or diameter;
a.iii)   composite shapes: polygon or part of polygon plus circle or part circle;
b) conversion from one sq. unit to another;

GEOMETRY AND TRIGONOMETRY

Topic	Sub-topic

1.0 Basic Geometric Concepts

1.1   use of ruler and compasses to bisect a line / construct its perpendicular bisector

1.2

a) use of compasses to bisect an angle;
b) use of ruler and compasses only to draw an angle of 60°, 30°, 90°;

4
MEASUREMENT

Topic   **Sub-topics**

c)   other types of angles: angles formed when two or more straight lines are cut by a transversal: *alternate, corresponding, co-interior/allied;* special relationship between these sets when the lines that are cut are parallel

2.0 Plane Figures   2.1
  (Polygons and Circles)
a)   special names for polygons with n sides, $3 \le n \le 12$;
b)   identification and sketching of n-sided polygons

2.2
a)   the circle, enclosed by a curved line:
   a.i) identification and names of parts of   the circle…*centre, radius, diameter, circumference,   arc,* and   the   relationships among them;
   a.ii)   use of compasses to draw a circle of a given radius;
b)   angles at the centre of the circle:
   b.i) sum of angles;
   b.ii)   measurement of a given angle (central $\angle$) & drawing an angle when its measurement is given
   b.iii)   calculation of missing angle(s)
c)   construction of a Δ :
   c.i) given the lengths of 3 sides   (special application to the equilateral triangle);
   c.ii)   if it is right-angled, given the position of the rt. $\angle$, the length of the hypotenuse and of one other side (RHS);
   c.iii)   using ruler and compasses only if the given angles are of size 60°, 30° or 90°

2.3
a)   Quadrilaterals, 4-sided polygons:
   a.i) classification by relationships between sides, angles, diagonals, lines of symmetry;
   a.ii)   sum of interior angles;
   a.iii)   identification and naming of some 'special' quadrilaterals, their common as well as their distinctive properties: *parallelogram, rhombus, rectangle, square, kite, trapezium;*
b)   diagrammatic representation of quads.:

MEASUREMENT

Topic

Sub-topics

    b.i) sketches to match verbal descriptions;
- c) solving problems which involve
  - c.i) the calculation of missing angles;
  - c.ii)   use of the properties of 'special' quadrilaterals

ALGEBRA

Topic

Sub-topics

1.0 Symbolic Representation and Arithmetic Type Operations

1.1

- a) evaluation of terms written in index form with positive and negative indices e.g. the value of x^4 when $x = 3$;
- b) Simplify fractions in the form   +   -
  - x ,   + ,   7 +
- c) simplification of algebraic expressions:
  - c.i) the removal of brackets before the collection of like terms
  - c.ii)   with some or all terms in index form (positive indices only)
- d) factorisation of expressions in the form
  - d.i) ax + bx + cx
  - d.ii)   ax + bx + ay + by
- e) solution of equations of the forms,
  - a.i) (i) $m - 17 = 20$, $-7t = 35$,
    - $= 9$;
      - (ii) $2x - 7 = 25$,
    - $- 2 = 10$;

  - (iii) $2\,(p + 7)\ =\ 3\,(p - 1)$,
    - $y\ -\ 3\,(\,2y +\ 4\,) = 8$

  - iv) $= 7$, $= -15$

ALGEBRA

$$\text{c.iv)} \quad x^3 = 27, \quad y^{-2} = 16$$

3.0 Inequalities

3.1 a) identification and /or oral description of quantities that are not equal
   b) use of one or more symbols to convert a verbal statement to an algebraic inequality with one variable and interpret an inequality given by its symbols
   c) use of inequality symbols to express verbal statements as two inequalities, each with two variables;
   d) solution of an inequality with one variable using techniques for solving equations
   e) representing the solution on a number line

RELATIONS, FUNCTIONS AND GRAPHS

Topic	**Sub-topics**

1.0 Relations & Functions

a) 1.1 examination of the connection or relationship
   a.i) between members of a set;
   a.ii)   between the members of two sets… identification of the *rule* which governs a connection or relationship;
b) pictorial representation of a relation by *arrow/ mapping diagrams*:
   b.i) concepts and related vocabulary: *element, image, image set, domain, range/ co-domain;*
   (ii) classification of a member of the domain and its corresponding member in the range as an *ordered pair;*
   (iii) representation of ordered pairs on mapping diagrams or on (function) tables;
c) types of relations as shown by mapping diagrams:
   1-1, 1-M, M-1, M-M;
d) use of the number line (vertical or horizontal) :
      i) to give the position of a point along a path;
      ii) as a picture or graph of the relation between integers.

e) examination of the connection or relationship between a relation & an equation

RELATIONS, FUNCTIONS AND GRAPHS

showing the same information
f) pictorial representation of a relation by showing a set of ordered pairs on a coordinate/Cartesian plane; finding the domain and/or the range from the graph
g) types of relations:
g.i) relations which are functions:
g.ii) special properties of functions;
h) identification of the function rule;
i) use of function notation:
i.i) $f(x) = x - 4$, $y = f(x)$, $f : x \rightarrow x - 4$, to represent the function rule;
i.ii) evaluation of $f(x)$ for a given value of x and the function rule
(the *input →output* relationship);
j) use of function rule to construct and interpret *flow diagrams.*

2.0 Graphs of Linear and Non-linear Functions/Equations

2.1
a) use of perpendicular number lines to show the relationship between two variables:
b) associated concepts, vocabulary & notation:
- the *Cartesian plane; x and y – axes, origin*
- an ordered pair as coordinates, (x, y), of a point represented pictorially /graphically on a Cartesian plane;
- graphs of sets of ordered pairs;
- use of an appropriate scale on each axis;

2.2
a) graphs of linear functions:
a.i) relationships such that the ordered pairs when joined form a straight line (1-1, 1-M);
a.ii) graphs given by equations of the form, $y = ax + b$ where a and b, are integers;
a.iii) interpretation and use of the notation, $\{(x , y) : y = ax + b\}$;
a.iv) identification of the x – *and y- intercepts;*

b) problem-solving requiring application of concepts and skills already introduced
b.i) representing a linear function on a Cartesian plane and reading and interpreting

RELATIONS, FUNCTIONS AND GRAPHS

the graph

b.ii)   representing 2 linear functions on the same coordinate plane and determining their point of intersection (graphical solution of simultaneous linear equations (2 variables)

STATISTICS AND PROBABILITY

Topic	Sub-topic

1.0   Data Collection Organisation and Storage

1.1
   a)   identification of important or interesting phenomena at the community level; the need for and use of *market research*
   b)   collection of data (in the community):
   b.i) concepts: *reliable data*, *representative* and / or *biased sample*
   b.ii)   preparation and use of short questionnaires;

2.0   Graphical Presentation and Interpretation of Data

2.1
   a)   **construction**, reading, interpretation of pictograms, bar charts, **line graphs, pie charts**
   b)   selection and use from the graphs already introduced the one(s) most suitable to represent a given set of data for a particular purpose.
   c)   interpretation of the information shown by the graphs already introduced such as:
   c.i) trends shown by a line graph;
   c.ii)   how a whole is divided as shown by the sectors of a pie chart; relation of the parts to the whole and to one another

3.0   Data Analysis and Interpretation

3.1
   a)   measures of central tendency, the *average:*
   a.i) computation of the mean, median, mode from frequency distribution tables (ungrouped data);
   a.ii)   use of the formula,
   $$X = \frac{\sum fX}{\sum f},$$ to find the mean from a frequency distribution table;

STATISTICS AND PROBABILITY

Topic	Sub-topic

CONSUMER ARITHMETIC

Topic   **Sub-topic**

2.0 The Consumer: Spending for Goods & Services

2.1
a) do shopping from a catalogue or via the internet
b) use ATM machines;
c) make payment by cheque, debit and/or credit card

2.2
a) buying and selling transactions/trading: computation of:
- selling price when cost and actual profit or loss or percentage profit or loss are known;
- cost price when selling price and actual profit or loss or percentage profit or loss are known;

2.3
a) use of money for utilities and services:
a.i) utility meters:
- use of dials or numbers to help determine consumption;
- average consumption over a period;
a.ii)   utility bills:
-           items that contribute to the total bill;
-      computation of cost per item and of total cost;
-scheduled payment date; sanctions for non-payment by due date
b) identification of type of services needed from tradesmen and farmers: estimated & actual cost

CONSUMER ARITHMETIC

Topic	Sub-topic
	(c) problems involving concepts and skills already introduced

GEOMETRY & TRIGONOMETRY

Topic	Sub-topic

3.0   Movement /Transformation

3.1
a) representation of plane shapes on a Cartesian coordinate plane (each vertex described as an ordered pair);
b) (viii) reflection of points (vertices) and lines (sides of the shape) across the x and y axes (lines of symmetry/ lines of reflection);
c) (ix) reflection of figures across lines other than the x and y axes, such as lines with equations: $y = x$, $y = x + 4$, $y = 2x – 1$;
d) identification of line of reflection when a figure and its image after reflection are given

3.2   transformation by translation or sliding:
a) related ideas & vocab.:
a.i) a slide, its distance and direction;
a.ii)   congruence of original shape and its image;
b) identification of the 'rule' that describes a given translation;
c) drawing the graph of a figure and of its image under translation when the rule describing the translation is given.
d) use of symbol, T, to denote translation

GEOMETRY & TRIGONOMETRY

Topic   **Sub-topic**

VECTORS & MATRICES

Topic   **Sub-topic**

4. 0 Vectors   **1.1**
a)   quantities with both size and quantity
          i) relation to scalars
          ii) use of arrows to indicate movement from one point/position to another
          iii)symbolic representation: magnitude and direction as ordered pair

b)   position vectors shown on the Cartesian plane:
          i) relationship between position vectors and coordinates
          ii) use of vector notation: (a column) to denote movement from (0,0) to (3, 5)
          iii) use of position vectors to define the vertices of shapes
          iv) discrimination between position vectors and displacement vectors