COMMONWEALTH OF THE BAHAMAS

DEPARTMENT OF EDUCATION

SENIOR HIGH SCHOOL MATHEMATICS

CURRICULUM GUIDELINES

GRADES 10 – 12

TABLE OF CONTENTS

PREFACE

This document incorporates revisions of unpublished curricula produced during numerous curriculum development exercises conducted by the Department of Education over the past thirty years. The objectives and content outlined in the Curriculum Guidelines were formulated based on national goals, current research and best practices in mathematics, as well as entry-level requirements for programmes at the University of The Bahamas and other local, regional, and international colleges and universities.

The quest for a more coherent and relevant mathematics curriculum began after the National Council of Teachers of Mathematics (NCTM) officially released its *Curriculum and Evaluation Standards for School Mathematics (NCTM 1989).* The *Standards* provided a new vision and framework for strengthening the mathematics curriculum. It provided the impetus for revamping the Bahamian mathematics curriculum and producing a document to guide the improvement of teaching and learning mathematics in both public and private schools.

Principles and Standards for School Mathematics (NCTM 2000), Curriculum Focal Points for Pre-K–Grade 8 Mathematics: A Quest for Coherence (NCTM 2006) and other NCTM publications were also considered as the High School Mathematics Curriculum team created the Curriculum Guidelines. In keeping with NCTM's vision that is based on the assumption that all students are capable of learning mathematics, the Curriculum Guidelines provides a framework to foster an understanding of the 'whats', 'whys', and 'hows' of mathematics, and ensures alignment of the content within and across all the high school grade levels, from grade 7 to grade 12.

It is envisioned that teachers and parents, in home-school and homework settings, will use this document to guide their planning and teaching. The Scope and Sequence, Scope of Work, Strategies, and the suggested

supplementary activities from texts and other resources, can be used to develop a high-quality learning experience that will help students attain the goals and objectives outlined.

ACKNOWLEDGEMENTS

An extensive amount of collaboration, research, evaluating, writing and editing is credited for the creation of this document of national importance and magnitude. The development of the High School Mathematics Curriculum Guidelines could not have been made possible without the hard work, dedication, and commitment of the team of mathematics educators, Education Officers, clerical officers and Curriculum Supervisors. The Department of Education is grateful for the commitment, dedication, efficiency, and professionalism of the following persons who without them, this achievement would be unattainable.

Ms Sharon Poitier	Deputy Director, Curriculum & Instruction
Ms Serethea Clarke	Under Secretary, Ministry of Education
Theresa McPhee	Coordinator, Education Officer, High School Mathematics

Curriculum Development Team Members:

- Jennifer Bain-Miller Trained teacher, A. F. Adderley Junior High School
- Linda Butler-Rolle Trained teacher, R. M. Bailey Senior High School
- Helen Campbell Retired teacher
- Jacqueline Corlette Trained teacher, C. C. Sweeting Senior High School
- Greta P. Kemp Lecturer University of The Bahamas
- Juanita A. Knowles Trained teacher, Doris Johnson Senior High School
- Pavia Rolle Vice-Principal, Anatol Rodgers High School
- Verlyn M. Scavella Retired teacher
- Karen Smith Retired teacher
- Janet Sturrup Trained teache,r H. O. Nash Junior High School
- Betty Taylor Vice-Principal, Anatol Rodgers High School

Other Contributors

- Jennifer Forde-Clarke Retired teacher
- Terez Conliffe Trained teacher
- Krista Newbold Mathematics Coordinator
- Stameika Symonette Trained teacher

• Marsha McCardy	Trained teacher, Central Eleuthera High School	Prescott Johnson	Mathematics Coordinator
• Albertha Stubbs	Trained teacher, R. M. Bailey Senior High School	Abdalia Adderley	Senior Mistress
• Samantha Wilson	Education Officer, Technology Integration	Richlene Ellis	Trained teacher

INTRODUCTION

Mathematics is a vital component in the development of science, technology, industry and commerce, and as such, is essential in everyday life. Critical thinking, problem solving, and communicating ideas effectively are keys to success in a technology driven, information-based world.

The study of mathematics requires reasoning, applying, analyzing, and understanding of principles, ideas, and patterns in our environment. Studying mathematics equips students with the knowledge, skills, and mindset that are essential for meaningful participation in society.

A high-quality mathematics programme provides the foundation for understanding the world, adapting to rapid change in the digital age, and producing twenty-first century global citizens. All students need classroom experiences that will help them learn mathematics with understanding, make connections, and apply mathematics in other contexts. An effective mathematics programme also develops an appreciation for the beauty and power of mathematics, and a sense of enjoyment and desire to learn more about the subject.

The focus of the Mathematics High School Curriculum is the content knowledge, understanding, and skills needed to educate students to appreciate and utilize mathematics. It outlines the framework that mathematics educators can use to create yearly schemes, design unit and lessons plans, and produce materials that will enhance the

teaching and learning process, and ensure that their students become critical thinkers who can reason mathematically and solve problems.

OVERARCHING GOALS

The High School Mathematics Curriculum is designed to cultivate and develop students who are:

a) proficient in logical, critical and analytical reasoning;
b) proficient in using emerging technologies and other mathematical tools;
c) problem solvers, communicating mathematically, and working cooperatively;
d) able to connect classroom experiences and real life situations;
e) self-confident and value the importance and usefulness of mathematics.

SUB-GOALS

The curriculum framework outlined in this document, aims to have all students in The Bahamas achieve the following:

1. Demonstrate and apply knowledge and sense of numbers, including numeration, patterns, ratios, and proportions.

2. Estimate and understand the meaning, use, and connection between the four (4) basic operations; addition, subtraction, division and multiplication.
3. Use algebraic and analytical methods to identify and describe patterns and relationships in data, solve problems and predict results.

4. Make and use appropriate measurements of objects, quantities, and relationships and determine acceptable levels of accuracy.

5. Demonstrate spatial sense and use geometric methods to analyze, categorize, and draw conclusions about plane shapes and space figures.

6. Collect, organize, and analyze data using statistical methods: predict results; and interpret uncertainty-using concepts of probability.

To achieve these overarching goals and sub-goals, all students must have many and varied high-quality experiences, through which they read, write, discuss, make conjectures, and test solutions to practical problems.

HOW TO USE THE CURRICULUM GUIDELINES

Mathematics is a highly interconnected and cumulative subject. This Mathematics curriculum introduces skills and concepts in sequence, which contributes to and serves as building blocks for other concepts across grade levels. The curriculum also gives focus to important mathematics strands that will prepare students for continued study, and problem solving at school, home, and even work settings. Instead of seeing mathematics as a set of disconnected topics, students should be able to view, understand, and appreciate the relationships among mathematical skills and concepts. When students make connections and develop skills, their understanding deepens and expands.

The objectives at each grade level are divided into five content strands: Number and Operations, Algebra, Geometry & Spatial Sense, Measurement, and Statistics & Probability. While each of the five strands deals with a different area of mathematics at the respective grade levels, objectives from the strands should be integrated. For example, while teaching Statistics, it is natural to ask questions that will require students to compute data presented in graphical form.

Teachers are not expected to cover the content in the order the strands are presented in the scope and sequence. Instead, teachers are encouraged to use this curriculum guide to formulate a yearly plan in a manner that integrates the content of the strands in an effort to complete the annual learning goals for the particular grade level.

Please note that The Scope of Work does not list every possible specific objective for the concepts/topics of each content strand. It provides a guide to the level of content, activities and resources that should be integrated at each grade level.

GLOSSARY OF CURRICULUM TERMS

Content Strands – The five broad areas that organize the concepts and topics to be taught.

Learning Objectives – Specific statements of what the students will understand and learn to do.

Overarching Goals – Outline the intended purpose of the curriculum document. They define the overall intended outcomes of the High School Mathematics Curriculum.

Sub-goals – Indicate the main objectives for the various strands of the curriculum.

Scope and Sequence – A table outlining the objectives for each grade level, showing the progression and overview of the work to be accomplished.

Scope of Work – Outlines, for each grade level, suggested content, activities, assessments, and resources to facilitate and enhance the teaching and learning process.

OVERVIEW OF CONTENT STRANDS

The five content strands in this document are in line with those used by the National Council of Teachers of Mathematics (NCTM). For each of the content strands, the overarching goals and sub-goals are outlined in the objectives of the concepts/topics.

Number and Operations: This content area focuses on students' understanding the real number system, types of real numbers, and graphing real numbers. Proficiency with operating on whole numbers, fractions, decimals, and integers is emphasized. The relationship between fractions, decimals and percents; rounding, approximating and estimating are applied to real world situations. Students are also expected to recognize, describe, and extend special number patterns using arithmetic operations.

Algebra: Algebra provides the tools through which one communicates in the language of mathematics. It provides a way to explore, analyze, and represent mathematical concepts and ideas. The Algebra strand develops students' ability to recognize, represent, and solve problems involving relations, functions and equations. Students focus on constructing, evaluating and manipulating algebraic expressions, the distributive property and

factorization, solving linear and quadratic equations, solving linear inequalities, systems of linear equations and inequalities. Algebraic models are represented both symbolically and graphically. Senior high students also study linear and quadratic functions, matrix algebra and differentiation.

Geometry & Spatial Sense: Stresses the development of students' awareness of their physical environments through working with two- and three-dimensional shapes. Geometry is a natural content area for the development of students' reasoning and justification skills. They study attributes and angle properties of polygons, circles and compound shapes. Features prisms, pyramids, cylinders, cones and spheres are used to solve real-world problems of compound three dimensional objects. Students identify and perform geometric transformations. Recognize both line and rotational symmetry. Additionally senior high students study trigonometry and vectors. Understanding geometric concepts is essential for students to make sense of measurement.

Measurement: Students investigate concepts such as dimension, length, area, volume, capacity, time and temperature. They learn what attributes of a shape can be measured and how to measure by working with customary units and metric units. Students also become familiar with telling time using a twelve hour and twenty-four hour clock; and computing elapsed time. This content strand highlights connections within mathematics and connections between mathematics and other subject areas, such as Social Studies, Religious Studies, Science, Music, Art, and Physical Education.

Statistics and Probability: Emphasizes the collection, organization, and interpretation of data. The primary purpose of this strand is to develop students' ability to organize and analyze data intelligently, and use probabilities to describe the likelihood of events occurring. While junior high school students determine probabilities for simple/single events, senior high school students should solve problems involving compound events. Students display statistical data in the form of tables and graphs. Venn diagrams and tree diagrams are used as visual aids to solve probability problems. Statistics and Probability are also linked to other content areas such as sets, number and operations, geometry, and algebra.

COMMONWEALTH OF THE BAHAMAS

MINISTRY OF EDUCATION

SCOPE AND SEQUENCE

HIGH SCHOOL MATHEMATICS

GRADES 7 – 12

DEPARTMENT OF EDUCATION
JULY 2019

THE MINISTRY OF EDUCATION CURRICULUM DIVISION
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NUMBER & OPERATIONS						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
The Real Number System & Natural and Whole Numbers	Identify/locate the natural/counting and, whole numbers as points on the real number line. Define and identify odd, even, prime, composite Identify factors and multiples of whole numbers (apply divisibility rules). Use list of factors to find H.C.F., use list of multiples to find L.C.M. Prime factorization of whole numbers.	Use prime factorization to find H.C.F. & L.C.M., Multiply and divide whole numbers by powers of ten.	Cubes and cube roots . Use prime factorization to find cube roots. Use associative and commutative properties of addition and multiplication and the distributive property over whole numbers.	Revise types of numbers such as natural numbers, whole numbers, odd, even, prime, composite, square, and cube numbers. Estimating the results of arithmetic operations including powers and roots. Use of a scientific calculator to compute operations including powers and roots.	.	

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NUMBER & OPERATIONS						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
The Real Number System & Natural and Whole Numbers	Exponential/index notation (base, natural number exponent/index, power). Powers of whole numbers natural number exponents only. Define and identify, square, cube numbers Explore the powers of ten (natural number exponents only). Recognize and explain that our number system is a decimal (base ten) system. Write numbers in expanded form using powers of ten.	Squares and square roots. Use prime factorization to find square roots. Problem solving involving addition, subtraction, multiplication, and division, factors, multiples, H.C.F. and L.C.M., squares and square roots	Solve problems using H.C.F./ G.C.F., L.C.M, square roots and cube roots.	Use the commutative and associative properties of addition and multiplication and the distributive property of multiplication over addition to simplify computations with natural numbers. Use a scientific calculator to evaluate square roots and cube roots. More problem solving using H.C.F./ G.C.F., L.C.M, square roots and cube roots.	Understand that square roots of non-perfect squares and cubes are irrational numbers.	Understand that square roots of non-perfect squares and cubes are irrational numbers.

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NUMBER & OPERATIONS						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
The Real Number System & Natural and Whole Numbers ***cont'd***	Multiply whole numbers by powers of ten. Divide whole numbers by powers of ten, with reminders where necessary. Prime factorization using index form.					
Sequences	Problem solving involving addition, subtraction, multiplication, and division, factors multiples, HCF and LCM. Continue sequences of even, odd, multiples, squares, cubes and triangular numbers	Identify patterns in sequences of natural numbers to list more terms. Identify patterns in sequences of natural numbers, whole numbers, and integers to list more terms.	Identify patterns in sequences of natural numbers, whole numbers, integers, common and decimal fractions to list more terms.	Use simple algebraic expressions to generalize the pattern in sequences involving consecutive even/odd numbers; consecutive numbers; multiples; squares and cubes, triangular number and Fibonacci sequence.	Find the nth term in a sequence given the formula for the nth term. Determine and use a formula for the nth term in a number sequence**.** Solve problems involving sequences.	Determine a formula for the nth term of a sequence.

NUMBER & OPERATIONS						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Sequences ***cont'd***		Identify special sequences and list more terms *(even, odd, prime, triangular, square and cube numbers, Fibonacci Sequence).*		Use the general pattern to continue the sequence and to find missing term(s).		
Integers	Use integers to represent opposite situations. Identify/locate integers on the number line. Compare and order integers using the number line. Use of inequality symbols. Add and subtract integers using the number line. Problem solving involving addition, and subtraction.	Use the number line/rules derived to add, subtract, multiply and divide integers. Problem solving involving addition, subtraction, multiplication and division	Revise using the number line and rules for adding, subtracting, multiplying and dividing integers. Powers of integers. Problem solving using integers in practical situations	Use a scientific calculator to operate on integers. More problem solving using integers in practical situations	Identify pairs of integers with given products and sums.	Understand that the square root of a negative number is not a real number.

NUMBER & OPERATIONS						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Rational Numbers as Common Fractions	Define rational numbers as common fractions. Revise vocabulary of common fractions: fraction, numerator, denominator, proper & improper fractions, mixed numbers, equivalent fractions, reduce fraction, lowest terms. Identify/locate rational numbers on the real number line.	Order fractions in ascending and descending order with and without the number line. Addition, subtraction, multiplication and division of up to three fractions and/or mixed number and two operations. Problem solving involving addition, subtraction multiplication and division of up to three fractions and two operations.	More addition, subtraction, multiplication and division of up to three fractions and/or mixed numbers and two operations. More problem solving involving addition, subtraction multiplication and division of up to three fractions and two operations. Locate/graph points on a number line.	Use of the fraction key on calculators to add, subtract, multiply and divide fractions and mixed numbers. More challenging problem solving involving addition, subtraction, multiplication and division of up to three fractions and/or mixed numbers and two operations.	Understand that the denominator of a fraction cannot be zero.	Understand that the denominator of a fraction cannot be zero.

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NUMBER & OPERATIONS						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Rational Numbers as Common Fractions ***cont'd***	Compare & Order with and without the number line. Use of inequality symbols. Add, subtract, multiply and divide two fractions and/or mixed numbers. Problem solving involving addition, subtraction, multiplication, and division, of two fractions.					
Rational Numbers as Decimals	Rational numbers as decimals. Decimal place value: billions to thousandths Reading and writing decimal numbers.	Decimal place value: billions to ten thousandths. Change common fractions to decimals and vice versa.	Decimal place value: billions to millionths. Add, subtract, multiply and divide decimals.	Problem solving involving at least two of the operations, addition, subtraction multiplication and division.	Understand that rational numbers are terminating or repeating decimals.	Understand that irrational numbers are infinite, non-repeating decimals.

NUMBER & OPERATIONS						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Rational Numbers as Decimals *cont'd*	Writing decimal fractions as decimal numbers and vice versa. Identify/locate decimal numbers on the real number line. Compare & Order with and without the number line. Use of inequality symbols. Adding, subtracting decimals with and without regrouping. Multiply and divide decimals by powers of ten. Multiply and divide decimals by whole numbers. Multiply and divide decimals by a decimal. Solve problems using operations on decimals.	Identify rational numbers as terminating and recurring (repeating) decimals using the dot ($\cdot$) and bar ($\bar{}$) notation above single repeated digits and blocks of repeated digits. Comparing and ordering decimals with and without the number line. Add, subtract, multiply and divide decimals. Problem solving involving at least two of the operations, addition, subtraction multiplication and division				

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NUMBER & OPERATIONS						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Estimation, Approximation & Rounding	Rounding whole numbers to a given place value. Rounding decimals to a given place value and to a given number of decimal places, with and without the number line. Estimate sums, differences, products and quotients to check the reasonableness of their calculations.	Rounding decimals to a given place value and to a given number of decimal places, with and without the number line. Rounding decimal numbers to a given number of significant figures. Estimate the results of calculations to check the reasonableness of answers.	Rounding decimal numbers to a required place value, number of decimal places, and significant figures. Estimate the results of calculations to check the reasonableness of answers.	Make estimates of numbers and quantities. Approximate numbers by rounding to the nearest whole, to specified place value, numbers of decimal places and significant figures. Estimate the results of calculations to check the reasonableness of calculator answers.	Give answers to reasonable accuracy in the context of the given problem. Calculate the percentage error of the approximation/estimation. Find lower and upper bounds of derived values given the degree of accuracy.	Obtain appropriate upper and lower bounds to solutions of simple problems give data to a specified accuracy.

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NUMBER & OPERATIONS						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Order of Operations	Apply an order of operations mnemonic (BOMDAS)/(BODMAS) or "Bless My Dear Aunt Sally" to evaluate arithmetic expressions with two or more operations, involving whole numbers and common fractions. Identifying true arithmetic statements. Insert operations and/or brackets to obtain true statements.	Apply an order of operations mnemonic (BIMDAS)/(BIDMAS), "Please Excuse My Dear Aunt Sally" or (PEMDAS)/ (PEDMAS) to evaluate arithmetic expressions with two or more operations, involving integers, common fractions and decimals. Identifying true arithmetic statements. Insert operations and/or brackets to obtain true statements.	Use an appropriate order of operations mnemonic to evaluate arithmetic expressions with at least three operations, involving integers, common fractions and decimals. Identifying true arithmetic statements. Insert operations and/or brackets to obtain true statements.	Use an appropriate order of operations mnemonic and a scientific calculator to evaluate arithmetic expressions with at least three operations, involving integers, common fractions, decimals, powers and roots. Identifying true arithmetic statements. Insert operations and/or brackets to obtain true statements.	Apply the correct order of operations to evaluate arithmetic expressions,	Apply the correct order of operations to evaluate arithmetic expressions,

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NUMBER & OPERATIONS						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Percents and Percentages	Define percent (%) Compare and order percents. Convert percents to common fractions and vice versa. Convert percents to decimals and vice versa. Convert between common fractions, decimals and percents. Solving simple word problems involving percents. Expressing one quantity as a percentage of another. Problem solving: Expressing one quantity as a percentage of another.	Calculating a percentage of a number or quantity. Percentage increase/decrease	Percents greater than 100 and less than 1. Convert between common fractions, decimals and percents. Review expressing one quantity as a percentage of another. Review calculating a percentage of a number or quantity.	Review: Convert between common fractions, decimals and percents. Review: calculating a percentage of a number or quantity. Review: expressing one quantity as a percentage of another. Determine the increased/decreased amount as a percentage of the original.	Determining a final amount as a percentage of the original amount. Reverse percentages: finding the original amount given the final amount and the percentage.	Solve the three main percentage problems: • Expressing one number as a percentage of another • Calculating a percentage of a quantity. • Finding the original amount given final amount and the percentage increase or decrease.

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NUMBER & OPERATIONS						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Consumer Math	Convert between units of money for countries with decimal currency. Solving monetary word problems involving one of the four operations.	Solving monetary word problems involving at least two operations. Calculating profit and loss. Calculating percentage profit and profit loss and mark-up and mark-down. Calculating discounts. Calculating Value Added Tax (VAT)	Use $I = \frac{PRT}{100}$ to calculate interest, rate, time or principal. Loans and investments. Calculating wages/salaries, commission, bonuses and deductions, hire purchase. Calculating taxes and exchange rates Calculating the amount due on telephone and electricity bills, given the necessary information.	Find the selling price given the cost price and the percentage mark-up. Find the sale price given the original selling price and the percentage discount/mark-down. Foreign exchange: currency conversion.	Finding the cost price given the selling price and the percentage profit/mark-up.	Compound interest for up to a maximum of three time periods.

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NUMBER & OPERATIONS						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Ratios, Rates, Proportions & Variation	Demonstrate an understanding of the elementary ideas and notation of ratios. Use a ratio to compare two numbers or similar quantities. Determine equivalent ratios Write ratios in the form **1 : *a*** or ***a* : 1** **(**where ***a*** is a whole number). Divide a quantity in a given ratio. Determine the scale of a map. Use a map scale to calculate distance.	Use ratios to compare measurements with different units. Simplify ratios with fractional terms. Write ratios in the form **1 : *a*** or ***a* : 1** Share a quantity in a given ratio. Define the term proportion. Identify proportions. Solve proportions for missing terms Use proportions to find missing quantities.	Define unit rate Determine unit rates Problem solving involving quantities that are directly proportional Define rate Identify common rates Problem solving involving quantities that are indirectly proportional	Use ratios and proportions to represent quantitative relationships. Demonstrate an understanding of the basic ideas of ratios rates and proportions Solve problems involving ratios, rates and proportions	Increase and decrease a quantity in a given ratio. Distinguish between direct and inverse variation and represent graphically. Use a graph to illustrate the relationship between two quantities the vary directly or inversely. Read in interpret graphs represent the relationship between two quantities the vary directly or inversely	Direct and inverse variation: Use notation $y \propto x$ or $y = kx$ $y \propto \frac{1}{x}$ or $y = \frac{k}{x}$ Determine the constant of proportionality and unknown quantities. Word problems

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NUMBER & OPERATIONS						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Scientific Notation				Define standard form/scientific notation. Express numbers in standard form/scientific notation. Convert numbers from standard form to decimal form. Problems involving multiplication and division of numbers in standard form. Multiply and divide numbers expressed in standard form/scientific notation.	Compare and order numbers expressed in standard form. Add and subtract numbers expressed in standard form. Problems involving addition, subtraction, multiplication and division of numbers in standard form.	Powers and roots of numbers in standard form. Problem solving of numbers in standard form involving all operations.

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ALGEBRA						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Algebraic Representation	Terminology & Notation: Define & Identify Constant, Variable, Term, Like Terms, Numerical Coefficient, Expression & Equation Writing basic expressions: Sums, differences, products, & quotients. Writing simple equations involving one operation.	Translate English phrases into algebraic expressions and vice versa: up to two operations without brackets. Translate English sentences into algebraic equations.	Translate/write/create algebraic expressions with brackets. Translate/write/create algebraic equations with brackets.	Translate/write/create expressions with more than two operations, including brackets and powers. Translate/write/create equations with more than two operations, including brackets	Translate/write/create expressions and equations with two variables. Translate/write/create expressions and equations with powers of the variable.	Translate/write/create expressions and eqautions with one or two variables and powers of the variable(s).

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ALGEBRA						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Basic Algebraic Operations	Operating on terms, each with one symbol: Adding & Subtracting like terms Multiplying & Dividing terms Simplifying expressions by collecting like terms.	Operating on terms, involving two or more symbols and powers. Simplify expressions by collecting like terms including terms with powers.	Identify expressions that can be simplified by collecting like terms. Multiply and divide monomials without powers. Multiply and divide monomials by expanding powers.	Use addition, subtraction, multiplication and division to simply expressions.		
Exponents/Indices/Powers	Squares, cubes and other powers of variables.	Identifying the base and exponent in algebraic expressions. Rewriting expressions involving powers.	Discover and apply the laws of indices for multiplying and dividing powers of the same base. (Constant and variable bases and natural number exponents).	Discover and apply laws of definitions for zero and negative integer exponents. Discover and apply laws of indices: product, quotient, power (power of a product, power of a quotient, and power of a power).	Discover and apply definitions for fractional exponents. Apply laws of indices Solve simple exponential equations.	Solve exponential equations using laws of indices.

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ALGEBRA						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Substitution	Evaluate algebraic expressions and formulae by substituting **whole numbers** for symbols.	Evaluate algebraic expressions and formulae by substituting **integers** for symbols.	Evaluate algebraic expressions and formulae by substituting **rational numbers** for symbols.	Evaluate algebraic expressions and formulae by substituting real numbers for symbols (including powers & roots).	Evaluate algebraic expressions and formulae by substituting real numbers for symbols (including fractional exponents).	
The Distributive Property	Verify the distributive property using natural numbers. Multiplying a sum by a natural number.	Multiplying sums and differences by integers and variables.	Expanding products and collecting like terms to simplify expressions.	Find the product of two binomials expressions using the distributive property and/or FOIL.	Identify the pattern for the product of two binomial expressions where the coefficient of the variable is one, the perfect square and the difference of two squares.	Identify the pattern for the product of two binomial expressions where the coefficient of the variable is not one, the perfect square and the difference of two squares.
Factorization	Rewriting numerical sums and differences as products.	Rewriting sums and differences of simple algebraic term as products.	Identifying factors of monomials to determine the H.C.F. Factoring simple binomials using the H.C.F.	Determine the H.C.F. of the algebraic terms/monomials Factorizing algebraic expressions using the highest common factor	Factorize algebraic expressions by grouping. Factorize quadratic expressions of the form $x^2 + bx + c$ Difference of two squares of the form $x^2 - k^2$	Factorize quadratic expressions of the form $ax^2 + bx + c$ Difference of two squares of the form $a^2x^2 - b^2y^2$

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ALGEBRA						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Factorization	Rewriting numerical sums and differences as products.	Rewriting sums and differences of simple algebraic term as products.	Identifying factors of monomials to determine the H.C.F. Factoring simple binomials using the H.C.F.	Determine the H.C.F. of the algebraic terms/monomials Factorizing algebraic expressions using the highest common factor	Factorize algebraic expressions by grouping. Factorize quadratic expressions of the form $x^2 + bx + c$ difference of two squares of the form $x^2 - k^2$	Factorize quadratic expressions of the form $ax^2 + bx + c$ difference of two squares of the form $a^2 x^2 - b^2y^2$
Algebraic Fractions		Multiplying and dividing simple algebraic fractions.	Add and subtract algebraic fractions with constant and variable denominators. Multiplication and division of algebraic fractions with monomial numerators and denominators	Find the L.C.M of Monomials. Add and subtract algebraic fractions with monomial denominators. Multiplying and dividing algebraic fractions with monomial numerators and denominators by expanding powers.	Find the H.C.F. of binomials and trinomials. Simplify an algebraic fraction by factoring its numerator and denominator and eliminating the common factor(s). Multiplying and Dividing Algebraic fractions	Find the L.C.M of Binomials and trinomials. Add and subtract algebraic fractions with binomial and trinomial numerators and denominators.

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Equations	The idea of simple linear equations. Create one step linear equations from word problems and solve by inspection. Solve one-step equations involving: addition, subtraction, multiplication, division using inverse operations, and balancing equations. Use one-step linear equations to solve word problems.	Solve two step equations. Solve simple linear equations involving brackets and equations with variables on both sides. Use two-step linear equations to solve word problems.	Review solution of simple linear equations involving brackets and equations with variables on both sides. Use linear equations to solve word problems.	Solve word problems using simple linear equations involving brackets and variables on both sides. Solve fractional equations with constant, variable and monomial denominators.	Solve simultaneous linear equations algebraically. Problem solving involving simultaneous linear equations. Solving $x^2 = k$ Solve quadratic equations given in the general form $x^2 + bx + c = 0$, by factorization. Solve quadratic equations given in the general form $ax^2 + bx + c = 0$, by formula. Problem solving involving quadratic equations.	Solving linear-quadratic simultaneous equations Solve quadratic equations given in the general form $ax^2 + bx + c = 0$, by factorization. Solve quadratic equations given in the general form $ax^2 + bx + c = 0$, by formula. Understand that the discriminate, $b^2 - 4ac$, determines the type of solution of the quadratic equation $ax^2 + bx + c = 0$

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CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Transposition of Formulae		Change the subject of simple formulae with one operation.	Change the subject of simple formulae with no more than two operations and the subject appearing once.	Change the subject of formulae, including squares and square roots, cubes, and cube roots and the subject appearing once.	Change the subject of formulae, including squares and square roots, cubes, and cube roots and the subject appearing more than once.	Change the subject of formulae including powers and roots and the subject appearing more than once.
Inequalities	Identify the solution sets of simple inequalities. Represent the solution sets of simple inequalities on the number line.	Describe and interpret sets of integer using inequality symbols.	Translating English phrases to inequalities and vice versa. Describe and interpret sets of real numbers using inequality symbols. Solving simple linear inequalities involving one operation. Illustrate the solution set on the number line. Graphing simple inequalities in the Cartesian plane.	Solving linear inequalities. Illustrate the solution set on the number line. Graphing linear inequalities in two variables.	Solve problems involving inequalities. Graphing systems of linear inequalities.	Graphing systems of linear inequalities. Describing shaded regions using systems of linear inequalities. Deriving linear inequalities that define shaded regions on a coordinate plane.

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CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Sets & Venn Diagrams	Define a set. Use upper case letters to name sets. Use set braces (curly brackets, $\{\ \}$) to indicate a set. List the elements of sets when given precise English descriptions of the sets. Identify descriptions that do not describe unique sets. Describe a set using words that indicate precisely which elements belong to the set.	Define and identify proper and improper subsets of given sets Identify and use the following symbols: $\subset$ is a proper subset of $\not\subset$ is not a proper subset of $\subseteq$ is a proper or improper subset of $\not\subseteq$ is not a proper nor improper subset of List all the subsets of sets with up to four elements. Show that the formula 2^n (where n is the number elements in a set) can be used to calculate the total number of different subsets for a given set.	Define and identify Equal and Equivalent sets. Define, identify and determine Complements of sets that are subsets of given universal sets. Define, identify, and determine unions and intersections of two sets. Draw Venn diagrams to illustrate up to two sets that are subsets of a given universal set.	Identify and use set language and notation for the following: • Set braces • Set names • Set membership • Number of elements in a set • The Empty set • Complement of a set • The Universal set • Is a proper and/or improper subset • Union and intersection • Finite and infinite sets • Equal and equivalent sets • Set builder notation	Use Venn diagrams to show relationships between three sets within a universal set Use set notation to describe and shade regions in Venn diagrams with up to three subsets of the universal set. Read, interpret, draw, and use Venn diagrams to solve problems involving up to three subsets of a universal set. Read, interpret, draw and use Venn diagrams to solve problems involving up to two subsets of the universal set.	Apply formulas or use Venn diagrams to determine cardinal numbers of complements, unions, and intersections of sets. Draw Venn diagrams and apply algebraic techniques to solve problems involving up to three subsets of a universal set.

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CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Sets & Venn Diagrams ***cont'd***		Draw Venn diagrams to illustrate sets and the relationship between two sets. Draw, shade and use Venn diagrams to determine unions and intersections of two sets. Read and interpret Venn diagrams showing cardinal numbers for up to three sets	Draw, shade and Use Venn diagrams to determine complements of sets, unions, and intersections of two sets. Draw and use Venn diagrams to solve simple problems involving universal sets that have one or two subsets.	Draw Venn diagrams to show relationships between two sets within the universal set. Use set notation to describe and shade regions in Venn diagrams with up to two subsets of the universal set. Read, interpret, draw and use Venn diagrams to solve problems involving up to two subsets of the universal set.		
Patterns, Relations and Functions	Define and recognize a relation. Describe a relation in words. Use arrow diagrams and sets of ordered pairs to represent relations.	Identify the domain and range of a relation from an arrow diagram or a set of ordered pairs.	Use tables, equations and graphs to represent relations.	Define a relation and describe types of relations. Draw and use arrow/mapping diagrams.	Define a function Use function notation. Evaluating functions	Determine the inverse of a one to one function. Determine and evaluate composite functions

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CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Patterns, Relations and Functions ***cont'd***		Identify the different types of relations: one to one, many to one and one to many. Identify types of relations from arrow diagrams.		Describe the relationship between two sets of numbers or identify the rule in a given mapping diagram.	Find the corresponding domain element given the range element.	
Coordinate Geometry & Graphs	Graphing and Identifying points in the Cartesian plane, integer coordinates only. Graphing and identifying horizontal and vertical lines. Determining lengths of horizontal and vertical line segments.	Construct/complete table of values for a linear function. Graphing lines from a table of values, integer coordinates only.	Construct/complete table of values for a linear function. Graphing lines from a table of values, including rational coordinates.	Construct/ complete tables of values for linear ($y = ax + b$), quadratic ($y = \pm x^2 + bx + c$) and simple reciprocal ($y = \frac{a}{x}$) , functions. Draw, identify and interpret the graphs of linear, quadratic and simple reciprocal functions. Determine whether a point lies on a graph with a given equation.	Find the gradient/slope of a straight line (a) By drawing a triangle to determine rise over run (b) Using the coefficient of x when the equation is written in the form $y = mx + c$ (c)	Construct/complete tables of values for quadratic functions of the form $y = ax^2 + bx + c$ Draw, identify and interpret the graphs of such functions. Determine the features of a parabola from its graph and its equation.

ALGEBRA						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Coordinate Geometry & Graphs ***cont'd***				Use the equation of a line to determine the x and y intercepts and sketch its graph.	(c) Using the coordinates of two points on the line $m = \frac{y_2 - y_1}{x_2 - x_1}$ Gradients of parallel and perpendicular lines Determine the equation of a line given (a) The gradient and y – intercept (b) Two points on the line (c) The graph of the line. Use the slope and the y-intercept to graph a line. Use graphical method to solve systems of linear equations.	Estimate the gradient of a curve at a given point by drawing a tangent at the point. Use the graphs to solve, or estimate the solutions of, associated equations.
Differentiation						Find the derivative of a function. (use of the rule $dy/dx = anx^{n-1}$ for $y = ax^n$) Derivatives of constant and linear functions

ALGEBRA						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Differentiation *cont'd*						Differentiating polynomial and other functions involving rational exponents. Calculate the gradient of a curve at a given point. Find the coordinates of a point where a curve has a given gradient. Calculate the maximum and minimum values of a function at turning points. Calculate the maximum and minimum values of a function at turning points. Derive the equation of a tangent line at a point on a curve.
Matrices				Use matrices to display data and solve problems. Identify and define types of matrices.	Multiply a row matrix by a column matrix Multiplying a square matrix by a column matrix.	Identify the operations that are similar to the properties of matrix operations that are similar to the properties of real numbers.

ALGEBRA						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Matrices *cont'd*				State matrix size/order and position of elements. Determine the compatibility of two matrices for addition and subtraction. Add and subtract matrices. Multiply by a matrix by a scalar. Solve simple matrix equations involving addition, subtraction, and scalar multiplication.	Multiplying compatible matrices. Verify the associative laws for matrix addition and multiplication. Solving matrix equations involving the multiplication of two matrices.	The identity matrix for matrix multiplication and inverse matrices. Find the determinant and the inverse of a non-singular matrix square matrix. Identify singular matrices. Use an inverse matrix to solve a matrix equation for an unknown matrix. Use matrices to solve simultaneous equations.

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GEOMETRY & SPATIAL SENSE						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Geometric Terminology & Notation	Define and Identify: • Plane • Plane figure • Point • Line • Line segment • Ray • Angle • Vertex • Space • Space figure • Types of Lines in a plane: - Intersecting - Perpendicular - Parallel Use 3 letters or a single letter to name an angle. Recognize physical examples of geometric objects.	Define and identify Complementary and supplementary angles. Define and identify angles at a point.	Define and identify adjacent angles and vertically opposite angles. Define and identify angles formed by parallel lines and a transversal: corresponding angles, alternate angles, co-interior angles.	Review basic geometrical terms: (point, line, plane, angle, angle types, parallel, perpendicular, etc.). Define bearings Define compass direction, bearings from north/south and three figure bearings.	Three figure bearings involving a change of direction Define back (reverse) bearings.	Define space Define and identify: Lines in space: • intersecting • perpendicular • parallel • skew Angle between two planes Angle between a line and a plane Normal lines Oblique lines

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GEOMETRY & SPATIAL SENSE						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Angle Properties	Describe and draw different types of angles as fractions of a revolution: • Revolution • Right • Straight • Acute • Obtuse • Reflex Define a degree Identify the different types of angles based on their degree measure. Recognize physical examples of angles. Draw and measure angles less than 180 degrees with a protractor and straight edge.	Review Measure and draw angles using a protractor and straight edge. Draw and determine the measure of a reflex angle. Determine complements and supplements of angles. Calculate the size of a missing angle at a point.	Identify and determine vertically opposite and adjacent angles. Identify and determine angles formed by parallel lines and a transversal – corresponding angles, Alternate angles, co-interior angles. Determine missing Adjacent complementary and adjacent supplementary angles	Sketching the position of one point from another using compass direction, bearing from north/south and three figure bearings. Determining the compass direction, north/south bearings and three figure bearings of one point relative to another from a diagram. Describe and apply angle properties related to: • Complementary & supplementary angles. • Angles on a line • Angles at a point • Vertically opposite angles • Angles between parallel lines and a transversal.	Sketching diagrams involving bearing from at least two points using compass direction, bearings from north/south and three figure bearings. Determine back (reverse) bearings using compass direction, bearings from north/south and three figure bearings.	Describe and identify relationships between lines, planes, lines in planes.

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GEOMETRY & SPATIAL SENSE						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Polygons: **Triangles, Quadrilaterals and Other Polygons**	Define polygon Identify and name polygons with up to ten sides Classify triangles according to angles and sides Angles: Acute, Right, Obtuse Sides: Scalene, isosceles, equilateral Classifying quadrilaterals according to angles and sides • Parallelogram • Rhombus • Rectangle • Square • Trapezium/trapezoid • Kite	Informally prove that the sum of the interior angles of any triangle is equal to 180°. Determine the size of a missing interior angle of a triangle. Properties on equilateral and isosceles triangles. Informally prove that the sum of the interior angles in any quadrilateral is equal to 360°. Determine the size of the missing interior angle of a quadrilateral.	Define an exterior angle of a polygon. Recognize that adjacent interior and exterior angles are supplementary. Informally prove that an exterior angle of a triangle is the sum of the remote interior angles. Informally prove that the sum of the exterior angles of any triangle and any quadrilateral is 360° Determine the size of missing angles of triangles and quadrilaterals.	Describe and use the properties of triangles and quadrilaterals. Identify and name polygons up to 12 sides Informally prove that the sum of the exterior angles of any polygon is 360° Determine the sum of the interior angles of polygons.	Define a regular polygon Define and identify isosceles trapezium/ trapezoid. Determine the size of an interior angle in a regular polygon Define a tessellation and determine which regular polygons tessellate the plane Properties of isosceles trapezium/ trapezoid Use interior and exterior angle properties of to solve problems involving regular or irregular polygons.	Define and identify convex and non-convex (re-entrant) polygons. Problem solving involving convex and non-convex polygons.

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GEOMETRY& SPATIAL SENSE						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Circles	Define a circle Define and identify parts of a circle: • Centre • Radius • Diameter • Circumference • Arc • Chord Explain the relationship between radius and diameter. Discover Pi as the ratio of a circle's circumference to its diameter. Determine the diameter given radius and vice versa	Define and identify parts of a circle: • Centre • Radius • Diameter • Circumference • Arc • Chord • Quadrant • Semi-circle	Define and identify parts of a circle: • Centre • Radius • Diameter • Circumference • Arc • Chord • Quadrant • Semi-circle • Sector • Segment	Define and identify parts of the circle - major and minor arcs, segments, and sectors - tangents. Drawing and measuring angles formed by chords or arcs: at centre and at circumference, at circumference in a semi-circle, at the circumference in the same segment. Drawing and measuring angles between tangents and radius, angles in cyclic quadrilaterals. Discover the relationships between angles subtended by chords or arcs. Discover the relationship between angles formed in circles.	Draw and measure angles to verify circle theorems. Apply circle theorem to find the size of angles: • At centre & circumference • At the circumference in a semicircle • In the same segment. • Between tangents and radius • In a cyclic quadrilateral.	Draw and measure angles between tangents and chords. Determine that the angle between a tangent and a chord is equal to the angle the chord forms in the alternate segment. Determine that the angle between a tangent and a chord is half the angle the chord subtends at the centre. Determine that from any point outside a circle just two tangents to the circle may be drawn and they are of equal lengths.

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GEOMETRY & SPATIAL SENSE						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Constructions & Scale Drawings	Construct circles of given radii and diameters using a pair of compasses.	Bisect line segments and angles using straight edge and compasses.	Construct and bisect angles of 60° and 90°. Construct triangles given: (1) One side and two angles (2) Two sides and an angle. (3) Three sides including equilateral	Use a pencil, ruler and a pair of compasses only to construct: • 90° angle at a point and 120° angles • Perpendicular bisector • A perpendicular from a point to a given line. • Construct triangles • Draw given diagrams of simple geometrical shapes to scale.	• A line through a point, parallel to a given line. • Construct quadrilaterals. • Draw or construct scale diagrams involving bearings	• Construct polygons. • Draw or construct scale diagrams involving bearings

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GEOMETRY & SPATIAL SENSE						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Solid Shapes	Identify and describe common solids shapes. • Cubes • Cuboids • Spheres • Cylinders • Cones • Prisms • Pyramids Recognize the nets of common solid shapes. Draw nets and make cubes and cuboids. Explain the similarities and differences between cubes and cuboids. State the number of faces, vertices and edges of cubes and cuboids.	Recognize the nets of common solid shapes. Draw nets and make cubes, cuboids, cylinders and cones. Recognize the nets of prisms and pyramids. Make pyramids and prisms from nets. Determine the number of faces, vertices and edges of prisms and pyramids. Discover Euler's formula for prisms and pyramids.	Recognize the nets of platonic solids. Determine the number of faces, vertices and edges of platonic solids. Make platonic solids from nets. Verify that Euler's formula holds for platonic solids.	Identify and sketch nets of cubes, cuboids, cylinders and other solids.	Identify and sketch nets of prisms and solids of uniform cross-section. Sketch cubes, cuboids, cylinders, and other solids of uniform cross-section.	Identify and sketch nets of pyramids and cones. Sketch cubes, cuboids, cylinders, and other solids.

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GEOMETRY & SPATIAL SENSE						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Similarity and Congruency	Define and recognize congruent figures.	Define and recognize similar figures.	Define and recognize congruent and similar figures. Determine the ratio of corresponding sides in similar figures	Define and recognize congruent and similar figures. Determine the ratio of corresponding sides in similar figures.	Identify and state properties of (a) Similar triangles (b) Congruent triangles (SSS, SAS, ASA, AAS, RHS) Use the properties of similar and congruent triangles to find the measure of missing sides and angles.	Determine the ratio of corresponding sides/area/volume of similar objects. Find: (a) the length of sides. (b) the area (c) volume of similar shapes and objects.
Vectors				Definition and notation Represent vectors as directed line segments and as column matrices Identify types of vectors: equal, parallel and opposite vectors. Add and subtract vectors Multiply vectors by scalar quantities.	Calculate the magnitude and determine the direction of a vector. Use the position vectors of a point relative to the origin. Unit vectors Express a vector as the sum or difference of two vectors.	Use the properties of vectors to determine the geometrical relationships between line segments. Identify the properties of vectors operations that are similar to the properties of real numbers. Express vectors in terms of other related vectors.

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GEOMETRY & SPATIAL SENSE						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Transformations & Symmetry	Define transformation Define reflection and mirror line Recognize and draw reflections in horizontal and vertical lines. Define line/reflective symmetry and the axis of symmetry Recognize and draw lines of symmetry so that a given horizontal/vertical line is the axis of symmetry. Complete a shape so that a given horizontal or vertical line is the axis of symmetry.	Recognize and draw reflections. Recognize and draw all the lines of symmetry in a given shape. Define rotation Recognize rotations of 90° and 180° clockwise and anticlockwise about a given point. Complete a shape so that a given line is the axis of symmetry.	Identify and draw reflections in the x-axis, y-axis and horizontal/vertical lines. Recognize and draw lines of symmetry of shapes in the Cartesian plane. Identify rotations about the origin. Define and identify translations. Describe the movement of a shape under translation Translate objects given the description of the movement.	Determine the properties of reflections. Identify reflections and reflect shapes in the Cartesian plane in the x-axis, y-axis and horizontal/vertical lines. . Recognize and complete shapes with reflective symmetry. Identify rotations and rotate objects about the origin through multiples of 90° clockwise and anticlockwise.	Identify the properties of each type of transformation. Identify, describe fully, and perform the following transformations: • Reflections in the x-axis, y-axis and horizontal/ vertical lines. • Rotations about the origin through multiples of 90^{0} , clockwise and anticlockwise. • Translations using column vectors • Enlargements centered at the origin, with natural number scale factor. Recognize shapes that have both line symmetry and rotational symmetry.	Identify, describe fully and perform the following transformations: • Reflections in lines inclined 45º to the axes. • Rotations about any point, through multiples of 90^{0}. • Translations using column vectors. • Enlargements centered at any point, including fractional and negative scale factors. Define point symmetry. Recognize shapes with point symmetry. Deduce the order of rotational symmetry in shapes that have point symmetry.

GEOMETRY & SPATIAL SENSE						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Transformations & Symmetry ***cont'd***		Complete a shape so that given horizontal and vertical lines are both axes of symmetry.	Complete a shape so that the x-axis, y-axis or a given horizontal or vertical line is the axis of symmetry. Complete a shape in the Cartesian plane so that the x-axis and y-axis or given horizontal and vertical lines are both axes of symmetry.	Define rotational symmetry and order of rotational symmetry, whole number scale factor. Recognize shapes with rotational symmetry and determine the order of rotational symmetry Complete a shape given its order of rotational symmetry. Recognize and perform a translation through a given vector. Develop the concept of enlargement. Enlargement from the origin by a positive.	Deduce the relationship between the number of lines of symmetry and the order of rotational symmetry of regular polygons. Complete shapes that have both reflective and rotational symmetry.	

GEOMETRY & SPATIAL SENSE						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Trigonometry				Standard notation for labeling vertices, sides and angles of right triangles. Verify the Pythagorean theorem in given right triangles. Apply Pythagoras' theorem to find a missing side in a right triangle.	Definitions and notations for the sine, cosine and tangent ratios of acute angles in right triangles. Use a scientific calculator to find: • Trigonometric ratios of acute angles. • Acute angles with given trigonometric ratios. *Determ*ine the sine, cosine and tangent of acute angles in right triangles. Use the sine, cosine or tangent ratios to calculate the length of a side or the size of an angle of a right triangle.	Use a scientific calculator to find the values of trigonometric ratios for θ such that $0^0 \le \theta \le 360^0$. Find two values for θ, $0^0 \le \theta \le 360^0$ that are solutions of basic trigonometric equations. Verify the sine rule and the cosine rule in given triangles. Use sine and cosine rules to find missing sides and angles in oblique triangles. Use the sine and cosine rules to solve problems involving lengths/distances, angles of elevation/depression and bearings.

GEOMETRY & SPATIAL SENSE						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Trigonometry ***cont'd***					Use trigonometric ratios to solve problems involving lengths/distances, angles of elevation/depression and bearings.	Use one of the following formulas to find the area of a triangle: - Given the base and the altitude, $A = \frac{1}{2} \times base \times height$ - given the three sides, $A = \sqrt{s(s-a)(s-b)(s-c)}$ $where\ s = \frac{1}{2}(a+b+c)$ -Given two sides and the included angle $Area = \frac{1}{2}ab\ \sin C$ $Area = \frac{1}{2}ac\ \sin B$ $Area = \frac{1}{2}bc\ \sin A$ Solve problems in three dimensions, including angle between a line and a plane.

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MEASUREMENT						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Units of Measurement	Define length, mass and capacity Define and determine benchmarks for imperial units of length, mass and capacity. Estimate and measure lengths using appropriate imperial units. Estimate mass and capacity using appropriate imperial units. Converting between imperial units of length, mass and capacity. Define and determine benchmarks for metric units of length, mass and capacity.	Convert units of time Adding and subtracting mixed units of time. Convert 12-hour time to 24-hour and vice-versa. Calculating elapsed time Problem solving involving calendars, schedules and time duration. Comparing temperatures in degrees Fahrenheit and Celsius. **SPEED:** Define and calculate average speed.	Converting between metric units of length, mass and capacity. Problem solving involving 12-hr and 24-hr time. Reading schedules Problem solving involving elapsed time. Interpret travel and conversion graphs. Converting from degrees Fahrenheit to degrees Celsius and vice versa.	Adding and subtracting mixed units of time. Calculating start time, elapsed time and end time.	Draw and interpret travel and conversions graphs. Draw and interpret distance-time speed-time graphs	Draw and interpret speed-time and distance-time graphs.

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MEASUREMENT						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Units of Measurement ***cont'd***	Estimate and measure lengths using appropriate metric units. Estimate mass and capacity using appropriate metric units. Converting between metric units of length, mass and capacity. Use rough equivalents to convert between imperial and metric units of capacity Define and convert between units of time. Reading calendars and schedules Read and illustrate time on the 12- hour and 24-hour clocks Elapsed time on the 12-hour clock. **R**eading thermometers marked in degrees Fahrenheit and/or Celsius.					

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MEASUREMENT						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Perimeter and Area	Define perimeter Calculate perimeter of polygons. Discover Pi as the ratio of a circle's circumference to its diameter Deduce an equation relating the circumference and diameter of a circle. Define area Determine area by counting squares. Calculate area of squares, rectangles and triangles.	Calculate perimeters of simple compound shapes involving squares, rectangles and triangles. Explore the value of pi. Calculate the circumference of circles. Apply formulas for areas of squares, rectangles, triangles and parallelograms.	Apply the formula for area of circle given the radius or the diameter. Include problems with semi-circles and quadrants. Apply the formula for computing the area of a trapezium. Calculate areas of borders including determining missing lengths. Calculate the perimeter and area of compound shapes composed of rectangles, triangles, parallelograms trapeziums and circles. Define surface area. Calculate the surface area of cubes and cuboids	Perimeters and areas of compound shapes, including semi-circles and quadrants. Calculate surface areas of cubes, cuboids and cylinders. Converting between metric units of area	Solve problems involving perimeters and areas of triangles, quadrilateral, circles and compound shapes. Solve word problems involving surface areas of cubes, cuboids, cylinders, prisms and other solids with uniform cross-sections. Converting between metric units of area	Calculate arc length and area of a sector. Calculate the area of segments. Surface area of spheres pyramids and cones. Converting between metric units of area

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MEASUREMENT						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Volume/ Capacity	Define volume Determine volume of cubes	Determine volume of cubes and cuboids.	Understand the difference between volume and capacity Define litre Calculate the capacity of containers that are cubes and cuboids. Converting cubic units and litres.	Volumes and capacity of cubes, cuboids and cylinders. Converting between metric units of volume	Solve word problems involving volumes and capacity of cubes, cuboids, cylinders, prisms and other solids with uniform cross-sections. Converting between metric units of volume	Volume and capacity of sphere, pyramids and cones Solve word problems involving volume and capacity. Converting between metric units of volume

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STATISTICS AND PROBABILITY						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Collecting, Organizing, and Analyzing Data	Read and interpret tables, pictograms, vertical and horizontal bar charts, line graphs, and pie charts. Define and identify raw data: categorical and discrete numerical. Conduct simple surveys to collect categorical and numerical data. Organize raw data (categorical and numerical) using tally charts. Representing data using frequency tables, vertical and horizontal bar graphs,	Define and calculate mean, median, mode and range of a data set. Solve problems involving mean, median, mode and range. Define and collect categorical discrete and continuous numerical data. Use tally charts and frequency tables including intervals to organize primary and secondary data. Draw and interpret pictograms, vertical and horizontal bar charts, line graphs. Define and construct pie charts. Read and interpret pie charts.	Interpret, select and draw an appropriate type of graph to display data. Calculate mean, median, mode and range from a set of data displayed in an ungrouped frequency table. Determine the modal interval and the interval containing the median from a grouped frequency table.	Define and explain the terms: data, raw data, and qualitative (categorical) data and quantitative (numerical): discrete and continuous data. Construct grouped and ungrouped frequency tables from secondary data. Draw histograms and frequency polygons from ungrouped frequency tables Interpret histograms and frequency polygons of ungrouped data.	Define and explain the terms: data, frequency table, class, lower/upper class limits, lower/upper class boundary, class interval, mid-point, class width. Construct grouped and ungrouped frequency tables from secondary data. Draw histograms and frequency polygons from grouped and ungrouped frequency tables Interpret histograms and frequency polygons of grouped and ungrouped data.	Construct and use cumulative frequency tables to estimate the mean, median and mode of grouped data. Draw cumulative frequency curves (ogives). Estimate median, upper and lower quartiles as well as interquartile range from cumulative frequency curves. Estimate percentiles (multiples of 10, the 25^{th} and 75^{th}) from cumulative frequency curves.

STATISTICS AND PROBABILITY						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Collecting, Organizing, and Analyzing Data ***cont'd***	Draw bar charts, and pictograms to display data.			Calculate the measures of central tendency (mean, median, mode) and range from ungrouped frequency tables.	Estimate the measures of central tendency (mean, median, and mode) and the range from grouped and ungrouped frequency tables Calculate the measures of central tendency (mean, median, mode) and the range from a frequency distribution of ungrouped and grouped data. Make deductions about data, given one or more measures of central tendency and the range. Construct and interpret histograms from equal and unequal intervals.	

THE MINISTRY OF EDUCATION CURRICULUM DIVISION
SCOPE AND SEQUENCE
JULY 2019

STATISTICS AND PROBABILITY						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Probability	Define and explain the terminology associated with probability: experiment, outcomes, event, chance, likely, unlikely, certain, impossible, odds. Assign a value from 0 to 1 for the likelihood of given events. Identify values that represent probabilities. Determine the set of all possible outcomes for the following experiments with equally likely outcomes: tossing a coin, rolling a die, selecting/drawing a letter/number/object from a set of letters/ numbers/ objects, spinning a spinner.	Express probabilities of single events as common fractions, decimals, and percents. Determine the probability that an event does not happen. Deduce the following relationship for complementary events: $P(\text{event } A \text{ happens}) + P(\text{event } A \text{ does not happen}) = 1$ Calculate the probability that an event does not happen using: $P(\text{event } A \text{ does not happen}) = 1 - P(\text{event } A \text{ happens})$	Distinguish between Experimental and Theoretical Probabilities. Compare experimental and theoretical probabilities for the following experiments: tossing a coin, rolling a die selecting/drawing a letter/number/object from a set of letters/numbers/objects, spinning a spinner.	Determine probabilities of single events and their complements, writing results as a fraction, decimal or percent. Constructing tables to represent possibility spaces and determine probabilities from them. Multiply probabilities of single events to calculate probabilities of compound events: $P(A \text{ and } B) = P(A) \cdot P(B)$ Compare probabilities obtained possibility spaces with those obtained by multiplying.	Draw and interpret 2 stage probability tree diagrams for the following experiments: tossing two coins, rolling a pair of dice, selecting/drawing letters/numbers/objects from two sets of letters/numbers/objects, tossing a coin twice, rolling a die twice, spinning a spinner twice, tossing a coin and rolling a die, etc. Apply the sum and product laws. $P(A \text{ or } B) = P(A) + P(B)$ $P(A \text{ and } B) = P(A) \cdot P(B)$	Determining if given events are: (a) mutually exclusive, (b) independent, (c) dependent. Determine conditional probabilities when drawing without replacement. Draw and interpret tree diagrams with more than 2 branches and more than 2 branches per stage and at most three stages. Solving word problems involving selecting/drawing objects with or without replacement.

STATISTICS AND PROBABILITY						
CONCEPTS/ TOPICS	**7**	**8**	**9**	**10**	**11**	**12**
Probability ***cont'd***	Use the following definition and notation to express probabilities as common fraction: $P(E) = \frac{\text{Number of Event Occurrences}}{\text{Total Number of Observations}}$ Using odds versus probabilities to describe the chances of events occurring.	Use probabilities to estimate the number of times an event is likely to happen when experiments are repeated.	Drawing tables to represent possibility spaces for the following experiments: tossing two coins, rolling a pair of dice, selecting/drawing letters/ numbers/ objects from two sets of letters/ numbers/ objects, tossing a coin twice, rolling a die twice, spinning a spinner twice, tossing a coin and rolling a die, etc. Determining probabilities from tables representing probability spaces.			

COMMONWEALTH OF THE BAHAMAS

MINISTRY OF EDUCATION

SCOPE OF WORK

SENIOR HIGH SCHOOL MATHEMATICS

GRADES 10 – 12

DEPARTMENT OF EDUCATION

JULY 2019

GRADE

10

SCOPE OF WORK
GRADE: 10
UNIT: NUMBER & OPERATIONS

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
THE REAL NUMBER SYSTEM	**Basic Number Theory** Define, identify and use real numbers (Natural, whole, integers, rational, irrational and real). Recognize relationships between sets of numbers. Compute powers and roots on the magnitudes of quantities. Recognize exponential and scientific notation; and appropriately use the calculator.	**Natural Numbers** are counting numbers. That is, N = {1, 2, 3, ...}. **Whole Numbers** are the natural numbers and zero. That is, W = {0, 1, 2, ...}. **Integers** are positive and negative numbers and zero. That is, Z = {..., -1, 0, 1 ...}. **Rational numbers** are numbers that can be written as fractions and decimals. That is, Q = $\{\frac{3}{5}, \frac{8}{9}\}$ **Irrational Numbers** are numbers that cannot be written as fractions or decimals. That is, Q' = $\{\sqrt{\frac{5}{4}}, \pi, \sqrt{3}\}\}$ **Real numbers** are rational and irrational numbers. That is, $R = Q \cup Q'$, $N \subset W \subset Z \subset Q \subset R$, $Q' \subset R$, $R = Q \cup I$, $Q \cap Q' = \emptyset$ **Even and odd numbers:** A number is even if it is a multiple of two, and is odd otherwise.	From the set {1, 2, 5, 6, 9, 10} list the prime numbers. From the set {-4, -1½, 0, 0.7, √2, 3}. List the: a) natural numbers, b) integers, c) rational numbers, d) irrational numbers, e) real numbers Rewrite the numbers in ascending order: {1, -2, 0.5, 0.34, 4, -3} Evaluate: $3 + 2 \times 7 - 1$ Place the appropriate sign =, > or <between the pairs of numbers. a) 3 4 b) 24 ÷ 3 8	Mathematics A Complete Course With CXC Questions Volume 1 STP Caribbean Mathematics Book 3 Glossary	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
GRADE: 10
UNIT: NUMBER & OPERATIONS

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
THE REAL NUMBER SYSTEM *cont'd*	Identify, define and use: odd, even, prime, composite, square, cube, and triangular numbers. Identify and use inequality symbols to compare and order real numbers. **Properties of Real Numbers** Identify the properties of real numbers: commutative, associative, distributive, identity and density properties. (Note: numerical examples only) Use the associative and commutative properties of addition and multiplication, and the distributive property of multiplication over addition to simplify computations with integers, fractions, and decimals. Use and apply the correct order of operations to evaluate expressions. Use a scientific calculator to compute operations including powers and roots.	**Prime numbers** are numbers above 1 which cannot be divided by anything (other than 1 and itself) to give an integer. **Composite number:** A number that can be factored into a product of smaller integers. Every integer greater than one is either prime or composite. A **square number** is the number we get when we multiply a number by itself. **Square numbers** are numbers which can be represented by a pattern of dots in the shape of a square. **Cube numbers** are numbers which can be obtained by multiplying another number by itself three times. A **triangular number** or **triangle number** are numbers which can be represented by a pattern of dots in the shape of an equilateral triangle. Commutative Property of Addition: $a + b = b + a$; $2 + 3 = 3 + 2$	Create personal graphic organizers with definitions and examples for each type of number. From the set {1, 2, 3, 4, 5}, list the: a. Prime number(s) b. Even number(s) c. Square number(s) Identify all Prime Numbers between 1 and 100 using the Sieve of Eratosthenes. List the set of Prime numbers between 50 and 60.	Glossary	

SCOPE OF WORK
GRADE: 10
UNIT: NUMBER & OPERATIONS

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
THE REAL NUMBER SYSTEM *cont'd*		Commutative Property of Multiplication: $a \times b = b \times a$; $2 \times 3 = 3 \times 2$ Associative Property of Addition: $a + (b + c) = (a + b) + c$; $2 + (3 + 4) = (2 + 3) + 4$ Associative Property of Multiplication: $a \times (b \times c) = (a \times b) \times c$; $2 \times (3 \times 4) = (2 \times 3) \times 4$ Distributive Property: $a \times (b + c) = a \times b + a \times c$; $2 \times (3 + 4) = 2 \times 3 + 2 \times 4$ Additive Identity Property: $a + 0 = a$; $3 + 0 = 3$ Multiplicative Identity Property: $a \times 1 = a$; $3 \times 1 = 3$ Additive Inverse Property: $a + (-a) = 0$; $3 + (-3) = 0$ Multiplicative Inverse Property: $a \times \left(\frac{1}{a}\right) = 1$; $3 \times \left(\frac{1}{3}\right) = 1$			

SCOPE OF WORK
GRADE: 10
UNIT: NUMBER & OPERATIONS

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
THE REAL NUMBER SYSTEM *cont'd*		Zero Property: $a \times 0 = 0$; $5 \times 0 = 0$ Division by zero is a meaningless operation. Zero divided by any other number is 0. The density property tells us that we can always find another real number that lies between any two real numbers. For example, between 5.61 and 5.62, there is 5.611, 5.612, 5.613 and so forth. **Order of Operations** **B**rackets **E**xponents **D**ivision and **M**ultiplication **A**ddition and **S**ubtraction In solving problems dealing with mixed operations we need to follow the order of arithmetic operations defined by BEDMAS.	Create graphic organizer outlining the steps for the correct order of operations. P E M D A S Solve the following using the correct order of operations: a. $6 + (3 \times 2) + 1$ b. $40 - 3 \times 8$ c. $3^3 \div (6 + 3)$ Work out, using a calculator: a. $\sqrt{95.7} \times 41.2$ b. $\frac{(8 - 0.111111)^2}{4.71^2 + 0.64}$	Mathematics A Complete Course with CXC Questions Complete Mathematics for GCSE and Standard Grade	

SCOPE OF WORK
GRADE: 10
UNIT: NUMBER & OPERATIONS

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
NATURAL AND WHOLE NUMBERS	Define and determine the L.C.M. or H.C.F. of two or more natural numbers by: (i) listing factors and (ii) using prime factorization. Use the G.C.D. or H.C.F. to solve word problems. Define and determine the L.C.M. of two or more natural numbers by: (i) listing multiples and (ii) using prime factorization. Use the L.C.M. to solve word problems Determine the squares and cubes of natural numbers. *(Use calculators).* Determine the square root and cube root of natural numbers using: (i) prime factorization and (ii) a calculator.	The **factors** of a number are those numbers, including 1 and itself, which can divide exactly into the number. A **multiple** of a number is k times the number, where k is a natural number or a counting number. The **highest common factor (H.C.F.)** is the greatest of the common factors of two or more positive integers. The **lowest common multiple (L.C.M.)** is the lowest of the common multiples of two or more positive integers. **Prime Factorization** is writing a number as a product of prime numbers. A **square number** is the number we get when we multiply a number by itself. A **cube number** is a number multiplied by itself three times.	Express 108 as a product of prime factors. Calculate the H.C.F./L.C.M. of 23 and 42. Evaluate: a) $\sqrt[3]{1728}$ b) 13^2 c) $\sqrt{484}$ d) 5^3	Mathematics A Complete Course With CXC Questions Vol. 1	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
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UNIT: NUMBER & OPERATIONS

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
NATURAL AND WHOLE NUMBERS *cont'd*		The **square root** of a number is a number which multiplied by itself, gives the original number. The **cube root** of a number is a number which multiplied by itself three times, gives the original number.			
SEQUENCES OF NATURAL NUMBERS	Identify patterns in sequences of natural numbers to list more terms. Identify special sequences and list more terms (even, odd, prime, triangular, square and cube numbers, Fibonacci Sequence). Generalize sequence patterns involving consecutive even/odd numbers; consecutive numbers; multiples; squares and cubes. Use the pattern to continue the sequence and to find missing term(s). Use calculators to check work.	A **sequence** of numbers is a set of numbers, separated by commas, that follows a mathematical rule.	List the next two terms of the sequence: a) 2, 4, 7, 11, … b) 64, 32, 16, 8, … c) 1, 4, 9, 16, __, ___ d) 0, 1, 8, 27, __, ___	Mathematics A Complete Course With CXC Questions Vol. 1 General Mathematics: Revision and Practice	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
GRADE: 10
UNIT: NUMBER & OPERATIONS

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
DIRECTED NUMBERS	Use integers in practical real-world situations. Compare and order integers using the number line and inequality symbols. List integers in ascending and descending order. Perform the basic operations with integers: addition, subtraction, multiplication, division, squaring, and cubing. Identify and apply the correct order of operations to evaluate expressions involving two or more operations. Use calculators to check work. Solve word problems involving integers.	**Integers** are positive and negative natural numbers and zero. Natural numbers greater than zero are positive and are to the right of zero on the number line. Natural numbers less than zero are called negative integers and they are to the left of zero on the number line.	The temperature was -10°C. It is now +12°C. Calculate the change in temperature. Calculate the value of: a) $15 \div (-3) + 2$ b) $7 - (-2) + 4$	STP Caribbean Mathematics Book 3 Complete Mathematics for GCSE and Standard Grade General Mathematics: Revision and Practice	B.G.C.S.E. Worksheets End of Term Exam Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets

SCOPE OF WORK
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UNIT: NUMBER & OPERATIONS

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
FRACTIONS	List fractions in ascending and descending order. Add, subtract, multiply and divide fractions and mixed numbers. Identify and apply the correct order of operations to evaluate expressions involving two or more operations. Express the equivalence between vulgar and decimal fractions and percentages in simple cases. Compare and order decimals and/or fractions and/or percents Use calculators with fraction key to check work. Solve word problems involving fractions.	A **fraction** is part of a whole. It is a measure of how the whole is divided. A **common fraction** (or vulgar fraction) is a number written in the form $\frac{n}{d}$, where n is a term called the numerator, d is a term called the denominator, $n \in N$ and $d \in N$. All **improper fraction** can be written as mixed numbers. A mixed number consists of a whole number and a proper fraction. In solving problems dealing with mixed operations we need to follow the order of arithmetic operations defined by BODMAS.	Simplify: a) ¼ + 1½ × $^{2}/_{3}$ b) $3^{5}/_{8}$ - 1¾ ÷ $^{5}/_{8}$ Express $^{7}/_{20}$ as a a) decimal b) percentage What fraction of an hour is 25 minutes? My school bag contains 9 books that each weighs $\frac{2}{9}$ kg and 5 folders that weigh $\frac{7}{25}$ kg. What is the total weight of the items in my school bag?	Mathematics A Complete Course With CXC Questions Vol. 1 STP Caribbean Mathematics Book 3 General Mathematics: Revision and Practice	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
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UNIT: NUMBER & OPERATIONS

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
DECIMALS	Identify and apply the correct order of operations to evaluate expressions involving two or more operations. Compare and order decimals and/or fractions and/or percents Use calculators to check work. Solve word problems involving decimals	A **decimal fraction** is a way of expressing a proper fraction as a number in base 10, using the place value system. A **decimal number** consists of a whole number and a decimal fraction. Decimal numbers are similar to mixed numbers. In solving problems dealing with mixed operations we need to follow the order of arithmetic operations defined by BODMAS.	Express 0.45 as a a) percentage b) fraction A ball of string contains 13.7 metres. Lengths of 2.3m, 1.8m and 2.37m are cut off. Calculate the length of string remaining. In a hardware store I bought 5 screws costing 20 cents each and 3 light bulbs costing $3.99 each. If I paid with a $10 bill, how much change did I receive?	Mathematics A Complete Course With CXC Questions Vol. 1 STP Caribbean Mathematics Book 3 General Mathematics: Revision and Practice	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam
PERCENTAGES	Express the equivalence between vulgar and decimal fractions and percentages in simple cases.	A **percentage** is a fraction whose denominator is 100. To convert a fraction or decimal to a percentage, we multiply either value by 100. Profit = Selling Price – Cost Price	Jason earned 30 of the 40 marks on an exam. Calculate his percentage. Jason earned 80% on a test of 40 marks. Calculate the number of marks obtained. Jane buys 200 oranges for $70 and sells them for 40¢ each. Calculate her profit/loss and her percentage profit/loss.	Mathematics: A Complete Course With CXC Questions Vol. STP Caribbean Mathematics Book 3	Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam Quizzes

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GRADE: 10
UNIT: NUMBER & OPERATIONS

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
PERCENTAGES *cont'd*	Compare and order percents, fractions, and decimals using inequality symbols. Calculate a percentage of a quantity. Express one quantity as a percentage of another. Calculate percentage increase/decrease. Calculate profit and loss, including percentage profit and loss. Make money calculations, including shopping bills, sales, discounts, and comparison-shopping. Solve realistic problems related to: budgeting, wages/salaries, hire purchase, simple interest, customs duties, sales tax, profit, loss, discount and convert currencies.	$\%\text{Profit} = \frac{\text{Profit}}{\text{CostPrice}} \times 100\%$ Selling Price = Cost Price + Profit Loss = Cost Price – Selling Price $\%\text{Loss} = \frac{\text{Loss}}{\text{CostPrice}} \times 100\%$ Selling Price = Cost Price – Loss If a quantity is increased or decreased by x% of itself, then the new percentage is $(100 \pm x)\%$. Gross Annual Salary = Gross Salary × 12 Gross Monthly Salary = Gross Annual Salary ÷ 12 Net Monthly Salary = Gross Salary – monthly deductions Net Annual Salary = Net Monthly Salary × 12 Basic Wage = Basic Rate × Basic Week or Fortnight	Sodas are on sale at 2 for 89¢. What is the price of 6 sodas? Jane buys 200 oranges for $70 and sells them for 40¢ each. Calculate her profit/loss. Jack works 7 hours each day from Monday to Friday. He earns $5.20 per hour. Calculate his wage. A motorcycle cost $3,600. Credit terms are: 25% deposit plus 36 monthly payments of $95. Calculate: a) the deposit b) the total credit price c) the savings when paying cash.	Mathematics Today General Mathematics: Revision and Practice	Questioning Techniques End of Unit Test Projects

SCOPE OF WORK
GRADE: 10
UNIT: NUMBER & OPERATIONS

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
PERCENTAGES *cont'd*	Read and interpret consumer related tables, charts and timetables. Use calculators to check work.	Overtime Wage = Overtime Rate × Overtime Worked Gross Wage = Basic Wage + Overtime Wage Commission = x% of the total value of the product sold Gross Wage = Basic Wage + Commission Discount = x% of the selling price Discounted Price = Selling Price – Discount Hire Purchase Price = Down Payment + Amount Payable Amount Payable = Outstanding Balance + Interest Charged $\text{Simple Interest} = \frac{\text{PRT}}{100}$			
RATIO, PROPORTIONS & RATE	Divide a quantity in a given ratio. Make equivalent ratios. Identify and use direct and inverse proportion.	A **ratio** is a relation that is used to compare the sizes of two or more quantities. The ratio of one quantity of measure **n** units to another quantity of measure **d** units is written in the form n:d, where $n \in N$ and $d \in N$. The ratio of n:d can be expressed as the fraction $\frac{n}{d}$.	Simplify the ratio: a) 16:24 b) \$1:25¢ Divide \$45 in the ratio 4:5	Mathematics: A Complete Course With CXC Questions Vol. 1	Projects Math Journals B.J.C. Worksheets B.G.C.S.E.

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GRADE: 10
UNIT: NUMBER & OPERATIONS

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
RATIO, PROPORTIONS & RATE *cont'd*	Use scales to find measures (maps and dials, practical situations). Use common measures of rate.	Two quantities are said to be in **proportion** when corresponding pairs of values are always in the same ratio. Two quantities are said to be in **direct proportion** if they increase or decrease using a constant multiplier. One quantity is said to be **inversely proportional** to another quantity, if when the first quantity is doubled, then the second quantity is halved.	In a club the ratio of boys to girls in 3:5. There are 21 boys. How many girls are there? BAH$1= TT$4.25. Calculate the amount of Trinidad and Tobago dollars that would be exchanged for BAH$50.	STP Caribbean Mathematics Book 3	End of Term Exam Quizzes Questioning Techniques End of Unit Test Worksheets
ESTIMATION/ APPROXIMATION	Round numbers to a required: a) place value; b) number of decimal places; c) significant figures.	An **approximation** is a stated value of a number that is close to, but not equal to, the exact value of the number. In approximating a number, we have to look at the digit value of the number that comes directly afterwards. If the digit value in the first decimal place is 5 or more, then we add 1 to the whole number part. If the digit is less than 5, we leave the whole number part alone.	Write 1.2685 correct to: a) two decimal places b) two significant figures	Mathematics: A Complete Course With CXC Questions Vol. 1 General Mathematics: Revision and Practice	B.G.C.S.E. Worksheets End of Term Exam Quizzes Questioning Techniques End of Unit Test

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GRADE: 10
UNIT: NUMBER & OPERATIONS

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
ESTIMATION/ APPROXIMATION *cont'd*		The first **significant figure** of a number is the first non-zero digit that occurs in the number, reading from left to right.			Projects Math Journals B.J.C. Worksheets
SCIENTIFIC NOTATION	Define and identify numbers in standard form/ scientific notation. $a \times 10^n$ where $1 \leq a < 10$ and $n \in \mathbb{Z}$ Write numbers in standard form/scientific notation. Convert numbers from standard form/scientific notation to decimal form. Make appropriate use of the memory function of a scientific calculator. Use a calculator to operate on real numbers and write answer in standard form/ scientific notation.	A rational number which is written in the form $a \times 10^n$, where $1 \leq a < 10$ and $n \in Z$ is said to be written in **standard form**.	Express each of the following numbers in standard form correct to 3significant figures: a) 1964 b) 768500 c) 0.06347 d) 0.0004376	Mathematics: A Complete Course With CXC Questions Vol. 1 General Mathematics Revision and Practice Complete Mathematics for GCSE and Standard Grade STP Caribbean Mathematics Book 3	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
GRADE: 10
UNIT: ALGEBRA

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
INDICES	Evaluate/manipulate terms expressed in index form.	When a number or algebraic quantity is multiplied by itself repeatedly, then it can be expresses as a base to a power or index. $\mathbf{2^5}$ means $2 \times 2 \times 2 \times 2 \times 2$ and reads '2 to the power 5'; where 2 is the base and 5 is the index. $\boldsymbol{a^m \times a^n = a^{m+n}}$ $\boldsymbol{a^m \div a^n = a^{m-n}}$ $\boldsymbol{(a^m)^n = a^{m \times n} = a^{mn}}$ $\boldsymbol{a^0 = 1}$ $\boldsymbol{a^{-m} = \frac{1}{a^m}}$ ***E.g. Simplify*** $\boldsymbol{3x^{-3} \times 4xy}$	**Problem:** Rewrite the problems below using negative indices. a) $\frac{3x^{-1}}{y^5}$ b) $\frac{a^{-1}b^{-2}}{b^5}$ c) $\left(\frac{3}{8}\right)^{-2}$ d) $\left(\frac{5a^2}{b^{-5}}\right)^2$	Mathematics: A Complete Course With CXC Questions Volumes 1 & 2 General Mathematics Revision and Practice Complete Mathematics for GCSE and Standard Grade	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam
ALGEBRAIC REPRESENTATION	Identify types of expressions. Use letters to represent numbers in mathematical statements. Construct algebraic expressions.	**Algebra** is the generalization and representation in symbolic form of meaningful results and patterns in arithmetic and other areas of mathematics. A **monomial** is a single term algebraic expression. **E.g.** $\boldsymbol{12x}$		STP Caribbean Mathematics Books 1 & 3 Mathematics: A Complete Course With CXC Questions Volume 1	Quizzes Questioning Techniques End of Unit Test Projects

SCOPE OF WORK
GRADE: 10
UNIT: ALGEBRA

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
ALGEBRAIC REPRESENTATION *cont'd*		A **binomia**l is an algebraic expression consisting of two terms. **E.g.$5x + 7$** A **trinomial** is an algebraic expression consisting of three terms. **E.g.$-3x^2 + 4x - 7$** A **polynomial** is an algebraic expression consisting of two or more terms. **E.g.$5x + 7$ and $-3x^2 + 4x - 7$** Word statements can be translated to algebraic statements using symbols. Any symbol can be used from the English alphabet to represent a quantity, unless otherwise stated: E.g. Let two numbers be x and y, such that $x > y$, then the four basic operations can be represented as:	**Problem:** Match each expression below with its algebraic expression. (Some expressions are not used). a) 5 times a number 1. $n - 5$ b) 5 more than a number 2. $5n$ c) A number divided by 5 3. $5 - n$ d) 5 less than a number 4. $5 + n$ 1. $\frac{n}{5}$ 6. $\frac{5}{n}$	Complete Mathematics for GCSE and Standard Grade	Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

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CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
ALGEBRAIC REPRESENTATION *cont'd*		The **sum** of the two numbers = $x + y$ The **difference** of the two numbers = $x - y$ The **product** of the two numbers = xy The **quotient** of the numbers = $\frac{x}{y}$; if the quotient is greater than 1 The **quotient** of the numbers = $\frac{y}{x}$; if the quotient is less than 1.			
BASIC ALGEBRAIC OPERATIONS	Add, subtract, multiply and divide algebraic expressions.	**Addition and subtraction of algebraic terms** can only happen if the terms are like algebraic terms. **Like algebraic terms** are defined as those terms which are represented by the same algebraic symbol regardless of the magnitude or sign of their coefficients. E.g. $3x, -4x, \frac{1}{2}x, 0.6x, \frac{-3}{5}x, -0.7x$ **Unlike algebraic terms** are defined as those terms which are represented by different algebraic symbols. E.g. $4x^2, -3x^2, \frac{3}{4}x^2, 0.65x^2, \frac{-1}{2}x^2$	**Problem:** Two pairs of numbers below are similar terms. Name them, and then rewrite the pairs of numbers that are not similar so that they are similar terms. a) $3x,\ 4x$ b) $7x^2,\ 4x^3$ c) $8y,\ 8y^2$ d) $-x,\ 1x$	STP Caribbean Mathematics Books 1 & 3 Mathematics: A Complete Course With CXC Questions Volumes 1 & 2	Quizzes Questioning Techniques End of Unit Test Assignments Homework Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

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UNIT: ALGEBRA

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
BASIC ALGEBRAIC OPERATIONS *cont'd*		The addition /subtraction of like terms correspond to the addition /subtraction of their coefficients. Commutative law holds **for multiplication of real numbers and algebraic terms**. $x \times y = y \times x$ That is, $xy = yx$ Therefore, the order in which we multiply algebraic terms is not important. When **dividing algebraic terms**, once there is a product in the numerator and the denominator, cancellation of the common factors occurs. **Cancelling** is equivalent to dividing both the numerator and the denominator by the same quantity. E.g. $\frac{3xy}{4xy^2} = \frac{3\times\cancel{x}\times\cancel{y}}{4\times\cancel{x}\times\cancel{y}\times y} = \frac{3}{4y}$	**Problem:** Simplify the expressions below. If you simplified correctly, you will find a relationship between some of the answers. Describe the relationship. a) $3x - 4y - (-6x) + 4y + 7y + 6x$ b) $3 + x - 2y + 7 + 3x + 4y - 5y$ c) $x - (-3y) + 4x - x - 6y + 8 + 2$ d) $7y - 4x - 10x + 21x - 2x$ e) $8x - 3y + 4y - 9x + 10$		

SCOPE OF WORK
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UNIT: ALGEBRA

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
SUBSTITUTION	Substitute a numeral in an algebraic expression and formulae. (include powers and roots)	**Substitution** of a numeral for a symbol in an algebraic expression is the process whereby each symbol in an algebraic expression is replaced by a given number in order to simplify and determine the particular numerical value of the expression. **Rules for Powers of Numbers** $5^2 = 5 \times 5 = 25$ $3^4 = 3 \times 3 \times 3 \times 3 = 81$ $a^2 = a \times a$ $5a^2b = 5 \times a \times a \times b$ $4(mn)^2 = 4 \times mn \times mn$ $= 4 \times m \times n \times m \times n$ $4mn^2 = 4 \times m \times n \times n$	**Problem:** Evaluate the expression $a^2b + cd$, if $a = 12, b = 13, c = 43$ and $d = 2$, to find the year the Barbie doll was first produced. Using the formulae y = mx + c, determine the value of y when m = 5, x = 0.5 and c = 7.	STP Caribbean Mathematics Book 2 Complete Mathematics for GCSE and Standard Grade Mathematics A Complete Course With CXC Questions Vol. 1 General Mathematics: Revision and Practice	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam
BRACKETS (EXPANSION)	Simplify an expression by 'removing' the brackets.	Distributive Law states: $x(a + b) \equiv xa + xb$ where ***a***, ***b*** and ***x*** are variables. Each term inside the brackets is multiplied by the term directly outside.		STP Caribbean Mathematics Books 1, 2 & 3	Quizzes Questioning Techniques End of Unit Test Projects Math Journals

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CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
BRACKETS (EXPANSION) *cont'd*	Find the product of two binomial expressions using the distributive property and/or FOIL.	If the term outside the brackets is **positive**, then the signs of the terms inside the brackets are **unchanged**. If the term outside the brackets is **negative**, then the signs of the terms inside the brackets are **all changed.** E.g. Simplify $3x(2x + 3)$ Ans. $3x(2x + 3) = 6x^2 + 9x$	**Problem:** One or more terms are missing below. Fill in the blanks using the Distributive Law. a) $4(11 - 2x) = 44 - \_\_\_\_\_$ b) $-2(3x + 1) = \_\_\_\_\_ - 2$ c) $5(8 - k) - 8k = \_\_\_\_ - 5k - 8k = \_\_\_\_ - \_\_\_\_$ d) $9 - 3(-4 + \_\_\_\_) + 12x = 9 + \_\_\_\_ - 6x + 12x = 21 + 6x$	Mathematics A Complete Course With CXC Questions Vol. 1 Complete Mathematics for GCSE and Standard Grade General Mathematics Revision and Practice	B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam
FACTORIZATION	Find the H.C.F. of algebraic terms. Factorize expressions in the form *ax + ab.* Factorize expressions in the form *ax² + bx.*	The highest common factor of a set of numbers is the greatest number that divides exactly into each of them. The **<u>highest common factor of a set of algebraic terms</u>** is the highest expression that is a factor of each of the given terms.	**Problem:** Match the pairs of monomials with the highest common factor. a) $8x,\ 2xy$ — 1. 1 b) $14x^3y^2,\ 21x^3y^3$ — 2. $2x^2y^7$ c) $2x^2,\ 3y$ — 3. xy d) $4x^2y^7,\ 6x^5y^{10}$ — 4. $2x$ e) $15x^2y^3,\ 10x^2y^3$ — 5. $7x^3y^2$ f) $12x^3y^2,\ 5xy$ — 6. $7x^2y^3$	Mathematics A Complete Course With CXC Questions Vol. 1 STP Caribbean Mathematics Book 3 Complete Mathematics for GCSE and Standard Grade	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets

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CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
FACTORIZATION *cont'd*		The **H.C.F. of a set of algebraic terms** is obtained by simply taking the lowest power of each quantity that is common to each of the terms and multiplying them together. The H.C.F. of $\boldsymbol{x^2y^5}, \boldsymbol{xy^3}$, and $\boldsymbol{x^4y^2}$ is $\boldsymbol{xy^2}$. Factorize an algebraic expression be expressing them as the product of some of their factors. When the distributive law is used to insert brackets in an expression, it is said to be factorizing. $\boldsymbol{ax + bx = x(a + b) = (a + b)x}$ Where $\boldsymbol{x}$ and $(\boldsymbol{a + b})$ are factors of $\boldsymbol{ax + bx}$. To factorize algebraic expressions using this method, you first determine the highest common factor (H.C.F.) of the algebraic expression. You then determine the second factor by dividing each algebraic term by the H.C.F. and placing the quotient in brackets, due care being taken to obtain the correct signs. E.g. Factorize $10x^3y^2 + 5x^2y^5 - 15xy^3$ Ans. $10x^3y^2 + 5x^2y^5 - 15xy^3$ $\underline{= 5xy^2(2x^2 + xy^3 - 3y)}$	**Problem:** Factorize completely: a) $4a^2b - ab^2c$ b) $5x^3y^2 + 10x^2y^2 - 5xyz$	General Mathematics Revision and Practice	B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
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UNIT: ALGEBRA

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
ALGEBRAIC FRACTIONS	Add and subtract algebraic fractions with numerical denominators. Multiply or divide two algebraic expressions. Find the LCM of a set of algebraic expressions.	When multiplying algebraic fractions, first multiply the numerators together, then multiply the denominators together in order to form a single algebraic fraction. Once there is a product in the numerator and the denominator, cancellation of the common factors occurs. **Cancelling** is equivalent to dividing both the numerator and the denominator by the same quantity. **E.g. Simplify** $\frac{p^3x}{qr} \div \frac{py}{q^2r}$ **Ans.** $\frac{p^3x}{qr} \div \frac{py}{q^2r}$ $= \frac{p^3x}{qr} \times \frac{q^2r}{py}$ $= \frac{p \times p \times p \times x \times q \times q \times r}{q \times r \times p \times y}$ $= \frac{p^2qx}{y}$	**Problem:** Write as a single fraction in simplest form: (i) $\frac{36y}{7z^2} \div \frac{3xy}{2z}$ (ii) $\frac{2x}{3} - \frac{x-5}{2}$	STP Caribbean Mathematics Books 1 & 3 Mathematics A Complete Course With CXC Questions Volumes 1 & 2	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
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UNIT: ALGEBRA

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
EQUATIONS	Solve simple linear equations involving brackets and variables on both sides. Solve fractional equations.	An **equation** is a statement using an equals sign. It is a statement of an equality relationship between two quantities or expressions. A **linear equation** with one unknown can be written in the form: $\boldsymbol{ax + b = 0}$. In solving a linear equation with one unknown, we usually take all the unknowns to one side of the equation and all the numbers to the other side of the equation. Solving a linear equation with one unknown, take all the unknown to one side and the numbers to the other. E.g. Solve: $5x - 3 = 2x + 9$ When the equation contains brackets, use the distributive law to remove brackets and then solve. E.g. Solve: $2(3x - 5) = 8$ To solve word problems using equations, you first have to form a linear equation with one unknown from the English statements given. Then solve the constructed linear equation to determine the magnitude of the unknown quantity.	**Problem:** Fill in the blanks in each step below. Then check your answers. $-10 + 4(3a + 10) = 18$ $-10 + 12a + \_\_\_ = 18$ $12a + \_\_\_\_ = 18$ $12a = \_\_\_\_$ $a = \_\_\_\_$ **Problem:** Which solutions to the problems below are even numbers? What are these solutions? a) $9n = 7n + 16$ b) $12n - 84 = 5n$ c) $5(2 + n) = 3(n + 6)$ d) $5(2n + 3) - (1 - 2n) = 2(6 + 7n)$ Solve: $\frac{3x}{5} - \frac{x}{2} = 9$	STP Caribbean Mathematics Book 3 Mathematics A Complete Course With CXC Questions Volume 1 Complete Mathematics for GCSE and Standard Grade General Mathematics Revision and Practice	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

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CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
EQUATIONS *cont'd*		E.g. Determine three consecutive even numbers whose sum is 42. To solve equations containing fractions, we first find the LCD of the denominators, then multiply each term by the LCD and solve. $\frac{x}{5} - \frac{3}{7} = \frac{1}{5}$ **Multiply each term by 35.** $35(\frac{x}{5}) - 35(\frac{3}{7}) = 35(\frac{1}{5})$ $7x - 15 = 7$ $7x = 22$ $x = \frac{22}{7}$			
TRANSPOSITION	Change the subject of a given formula.	A formula is a general equation showing the connection between two or more related quantities. **'Changing the subject of the formula'** or **'transposing the formula'** refers to the process whereby the formula is rearranged so that another given symbol becomes the subject. In transposing, all the rules are obeyed as in the solution of equations.	**Problem:** Identify each formula below. Then solve for the variable after the semicolon. a) $C = 2\pi r;\ \ r$ b) $V = \frac{Bh}{3};\ \ h$ c) $C = \frac{5}{9}(F - 32);\ \ F$ $P = 2(l + w);\ \ l$	Mathematics A Complete Course With CXC Questions Volumes 1 & 2 STP Caribbean Mathematics Books 2 & 3 General Mathematics: Revision and Practice	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets

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CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
INEQUALITIES	Describing range of values using inequality symbols and interpreting range as an inequality. Identify open and closed intervals. Solving simple linear inequalities in one unknown. Illustrate the solution on the number line.	An **<u>inequation (or inequality)</u>** is a mathematical statement showing that one quantity is not equal to another quantity, that is, one quantity is greater or less than another quantity. An inequality can be represented by a region on a graph. A number line is similar to the x-axis. All inequalities can be represented on a number line. A linear inequation with one unknown can be written as: $ax + b < 0$, $ax + b \leq 0$, $ax + b > 0$, $ax + b \geq 0$ Where ***a*** and ***b*** are constants and ***x*** is the unknown value. ***If an inequality is multiplied or divided by a negative number, then its sense is changed*** E.g. Solve the inequation: $\mathbf{3(2x - 1)} > 6$	Some inequality signs are listed below: $<$ means "is less than" $\leq$ means "is less than or equal to" $>$ means "is greater than" $\geq$ means "is greater than or equal to" $\neq$ means "is not equal to" **Problem:** Explain what you think $\not>$ means? Write an inequality using this symbol. **Problem:** Supply the missing inequality symbol in each inequality. a) $3(x + 5) > -18$ $3x + 15\_\_\_\_ - 18$ $3x\_\_ - 33$ $x\_\_\_ - 11$	STP Caribbean Mathematics Book 2 Mathematics A Complete Course With CXC Questions Volume 1 General Mathematics Revision and Practice	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets

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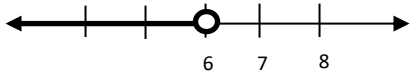
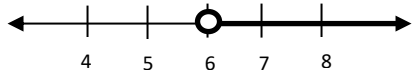
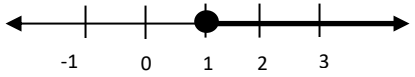
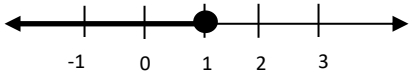
CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
INEQUALITIES *cont'd*		To solve word problems using inequations, you first have to form a linear inequation with one unknown from the English statements given. Then solve the constructed linear inequation to find the solution set. From the solution set we can then determine a particular solution to the given problem. E.g. The area of a rectangle must not be more than 198 cm². If the length of the rectangle is 18cm, calculate the greatest possible value of its width.	b) $3x + (-4x) + 4 < 8$ $-x + 4 \_\_\_\_ 8$ $-x \_\_\_\_ 4$ $x \_\_\_\_ 4$ c) $-3(-x + 8) - 14x \geq -2$ $3x - 24 - 14x \_\_\_ - 2$ $-11x \_\_\_ 22$ $x \_\_ - 2$ **Problem:** Solve each inequality. Than match the solutions with its graph on the number line. a) $3(x - 4) \leq -9$ b) $5x < 4x + 6$ c) $7(2 - x) \geq -(x - 8)$ d) $1 + 2x > 7 + x$ 1.  2.  3.  4. 		

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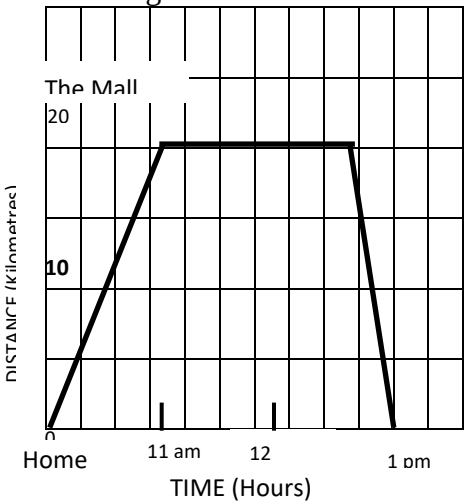
CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
PRACTICAL GRAPHS	Read from a distance- time graph, the distance or time of motion of a moving object. Draw distance-time graphs using suitable scales. Calculate the distance traveled in a given time, by an object moving at a constant speed. Calculate the time taken to travel a given distance at a constant speed. Calculate the average speed of a body, given the distance traveled and time taken. Calculate the average speed for a body covering different distances at different speeds. Read information from a distance-time graph. Plot points from a given table of values.	**AverageSpeed** $= \frac{\text{total distance trav}}{\text{total time take}}$ E.g. A model train travels 75 m at a constant speed of 30 m/s. Calculate the time taken for the journey. E.g. A train travels 100 km at a constant speed of $66\frac{2}{3}$ km/h, 75 km at a constant speed of $37\frac{1}{32}$ km/hand a further 25 km at a constant speed of $16\frac{2}{3}$ km/h. a) Draw a distance-time graph to represent the journey. b) Hence, determine the average speed for the entire journey.	**Problem:** The travel graph shows Marian's car trip from Home to The Mall and back again.  Using information from the graph, calculate: a) the distance from her home to the mall b) the time she arrived at the mall, c) the average speed of her journey to the mall, d) the length of time she spent at the mall, e) the average speed for the entire trip.	STP Caribbean Mathematics Book 2 Mathematics A Complete Course With CXC Questions Volume 2	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

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CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
PRACTICAL GRAPHS ***cont'd***	Use a graph to find values corresponding to given values of a second variable. Use graphs to convert from one unit to another.				
RELATIONS AND FUNCTIONS	Describe the relationship between numbers/identify the rule of a given mapping diagram. Recognize a relation. Describe a relation as a set of ordered pairs. Use arrow diagrams to show relations. Identity the domain and range in a relation. Define a function as a one-to-one or many-to-one relation. Use functional notation.	A **relation** is defined as a set of ordered pairs that obey a particular rule. The notation $x \rightarrow 3x + 5$ means 'x is mapped onto $3x + 5$. A relation can be shown on a graph or relation diagram or mapping diagram. A **function** is defined as a relation in which each element in the domain is mapped onto one and only one element in the range. All one–to–one relations and many –to–one are functions. The relation one – to – many is NOT a function.		STP Caribbean Mathematics for CXC Book 4 Mathematics A Complete Course With CXC Questions Volume 1 General Mathematics Revision and Practice	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

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CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
GRAPHS OF FUNCTIONS	Draw the graph of a line $y = mx + c$. State the equations of lines drawn parallel to the coordinate axes. Draw lines of the form $y = k$ and $x = h$ where h and k and constants. Draw a line with equation $y = mx + c$, by finding points on the line. Use the equation of a line to calculate the value of y for a given x.	The equation of the x-axis is $y = 0$. The equation of the y-axis is $x = 0$. The line $x = p$ is a straight line parallel to the y-axis. The line $y = q$ is a straight line parallel to the x-axis. The general form of a linear function is: $\boldsymbol{f: x \rightarrow mx + c}$ $\boldsymbol{f(x) = mx + c}$ $\boldsymbol{y = mx + c}$ $\boldsymbol{\{(x, y): y = mx + c\}}$ where $\boldsymbol{m}$ = gradient of the straight line representing the linear function; and $\boldsymbol{c}$= the intercept of the straight line on the $\boldsymbol{f(x) - axis or y - axis}$. Note that {(x, y): ... }means 'The set of all ordered pairs x and y such that'. The minimum number of points that is sufficient to draw an accurate linear graph is 3. Three methods of drawing a linear graph is a) using the table of values; b) substituting and solving various functions; and c) using the intercepts on the $x - axis$ and the $y - axis$.	**Problem:** Explain how locating a seat in a theater or stadium is similar to plotting points on a coordinate plane. **Problem:** Write an explanation of why a horizontal line has a slope of 0. Choose two points on a horizontal line to support your reasoning. Then write an explanation of why the slope of a vertical line is undefined, and choose two points on a vertical line to support your reasoning.	STP Caribbean Mathematics Books 2 & 3 Mathematics A Complete Course With CXC Questions Volume 2 General Mathematics Revision and Practice Complete Mathematics for GCSE and Standard Grade	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

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CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
MATRICES	Arrange a set of data in a rectangular array. State the size of a given matrix. Write down the entry in a matrix, given its row and column. Identify a square matrix. Identify unit and zero matrices. Determine the compatibility of two matrices for addition and subtraction. Add and subtract two or more matrices. Multiply a matrix by a constant (scalar). Multiply two matrices.	A **matrix** is a rectangular array of numbers held together by curved brackets. Each item is called an **entry** or **element**. A matrix can have any number of rows and columns; rows go across and columns go down. The **size of a matrix** is determined by the amount of rows by columns. To **add or subtract matrices** they must be the same size. Then we add the entries in corresponding positions. To **multiply a matrix by a scalar** quantity we multiply every entry by the number in front of the brackets. *Matrix E =* $\begin{pmatrix}3 & 4\\ 5 & 1\end{pmatrix}$ *is called a* ***square matrix*** because it consists of the same number of rows as columns.	**Problem:** Add or subtract the matrices, using the answer to each problem as the next link in the chain. Then answer the question at the end. 1. $\underset{A}{\begin{pmatrix}2 & -3 & 4\\ 6 & 1 & 2\end{pmatrix}} + \underset{B}{\begin{pmatrix}3 & 0 & 5\\ 2 & 7 & -4\end{pmatrix}} = \underset{C}{\begin{pmatrix} & & \\ & & \end{pmatrix}}$ 2. $\underset{C}{\begin{pmatrix} & & \\ & & \end{pmatrix}} - \underset{D}{\begin{pmatrix}1 & 4 & 2\\ 10 & 4 & -1\end{pmatrix}} = \underset{E}{\begin{pmatrix} & & \\ & & \end{pmatrix}}$ 3. $\underset{E}{\begin{pmatrix} & & \\ & & \end{pmatrix}} - \underset{F}{\begin{pmatrix}2 & -4 & 8\\ -7 & -1 & -3\end{pmatrix}} = \underset{G}{\begin{pmatrix} & & \\ & & \end{pmatrix}}$	STP Caribbean Mathematics Book 3 Mathematics A Complete Course With CXC Questions Volume 2	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

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UNIT: ALGEBRA

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
MATRICES *cont'd*	Determine if two matrices are compatible for multiplication. Solve simple matrix equations of the form $A + X = B$, where A, X and B are matrices (addition, subtraction, and scalar).	*Matrix F =* $\begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$ *is a* ***null matrix, or zero matrix***, because all the elements are zero. This is the identity matrix for addition of a 2×2 matrix. ***Matrix Multiplication or Row-Column Multiplication*** is multiplying every row in the first matrix by every column in the second matrix. $\begin{pmatrix} a & b \\ c & d \end{pmatrix}\begin{pmatrix} e & f \\ g & h \end{pmatrix} =$ $\begin{pmatrix} a \times e + b \times g & a \times f + b \times h \\ c \times e + d \times g & c \times f + d \times h \end{pmatrix}$ ***Matrices have to be compatible in order to be multiplied.*** *(m × n) (n × p) = (m × p)* *same number it is compatible* — *size of resultant matrix*	4. $\underset{H}{\begin{pmatrix} -3 & 2 & 4 \\ -6 & 0 & -3 \end{pmatrix}} + \underset{G}{\begin{pmatrix} & & \\ & & \end{pmatrix}} = \underset{I}{\begin{pmatrix} & & \\ & & \end{pmatrix}}$ 5. $\underset{I}{\begin{pmatrix} & & \\ & & \end{pmatrix}} - \underset{M}{\begin{pmatrix} -3 & 2 & -1 \\ -7 & 4 & -3 \end{pmatrix}} = \underset{K}{\begin{pmatrix} & & \\ & & \end{pmatrix}}$ Which matrices are equal?		
VECTORS	Define a vector. Differentiate between a vector and a scalar. Represent a vector by a straight line.	***Physical quantities*** are divided into two types: scalar and vector. A ***scalar quantity*** has a magnitude (or size) only. For example: mass, density, volume, length, distance, speed and time.	**Problem:** Given that $\boldsymbol{a} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$ and $\boldsymbol{b} = \begin{pmatrix} -1 \\ 0 \end{pmatrix}$. a) Find in vector matrix form $\boldsymbol{2a + b}$	Mathematics A Complete Course With CXC Questions Volume 2	Quizzes Questioning Techniques End of Unit Test Projects

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GRADE: 10
UNIT: ALGEBRA

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
VECTORS *cont'd*	Write a vector as an ordered pair in a column. Find the end point/starting point of a vector represented in column form given the starting/end point. Represent a vector by a directed line segment. Denote a vector with initial point A and final point B by AB. Determine when two vectors are equal. Identify inverse/negative vectors. Classify vector as equal, parallel or inverse/negative.	A **vector quantity** has both a magnitude and direction. For example: weight, displacement, velocity, acceleration, force and momentum. To represent a vector quantity, simply draw a straight line in the same direction with a length directly proportional to its magnitude. An arrow is used to indicate the direction of movement of the vector. A ⟶ B Vectors can be used to describe translations. Any point $\mathbf{P}(\mathbf{x},\mathbf{y})$ can be represented by a column vector $\begin{pmatrix} x \\ y \end{pmatrix}$. Starting Point + Vector = **Ending Point** Ending Point – Vector = **Starting Point** End Point – Starting Point = **Vector** The magnitude of a vector is found using Pythagoras' Theorem. That is, if $\overrightarrow{AB} = \begin{pmatrix} x \\ y \end{pmatrix}$ then $/\overrightarrow{AB}/ = \sqrt{x^2 + y^2}$.	b) The point $\boldsymbol{P(2,1)}$ is translated to the point $\boldsymbol{Q}$ by the vector $\begin{pmatrix} \mathbf{-1} \\ \mathbf{5} \end{pmatrix}$. Find the coordinates of $\boldsymbol{Q}$. **Problem:** Given that $\bar{\boldsymbol{a}} = \begin{pmatrix} \mathbf{2} \\ \mathbf{-3} \end{pmatrix}$ and $\bar{\boldsymbol{b}} = \begin{pmatrix} \mathbf{-1} \\ \mathbf{0} \end{pmatrix}$ Find: (i) $\boldsymbol{a - \bar{b}}$ (ii) $\mathbf{3}\bar{\boldsymbol{b}}$ (iii) The vector $\bar{\boldsymbol{x}}$ is parallel and twice as long as the vector $\bar{\boldsymbol{a}}$ and runs in the opposite direction. Give $\bar{\boldsymbol{a}}$ in column vector form.	STP Caribbean Mathematics Book 2 STP Caribbean Mathematics for CXC Book 4 General Mathematics: Revision and Practice	Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

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UNIT: ALGEBRA

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
VECTORS *cont'd*	Find the vector sum/difference of two or more vectors given in column form. Multiply a vector by a scalar.	**Vector $\overrightarrow{AB}$** Two vectors are said to be **<u>equal</u>** if they both have the same magnitude and direction. $\overrightarrow{AB} = \begin{pmatrix}2\\3\end{pmatrix}\ \overrightarrow{PQ} = \begin{pmatrix}2\\3\end{pmatrix}$ $\therefore \overrightarrow{AB} = \overrightarrow{PQ} = \begin{pmatrix}2\\3\end{pmatrix}$ When two vectors have the same magnitude, but opposite directions, one vector is said to be the **<u>inverse</u>** of the other. $\overrightarrow{AB} = \begin{pmatrix}2\\3\end{pmatrix} \overrightarrow{XY} = \begin{pmatrix}-2\\-3\end{pmatrix}$ $\therefore \overrightarrow{AB} = -\overrightarrow{XY} = \begin{pmatrix}2\\3\end{pmatrix}$ or $-\overrightarrow{AB} = \overrightarrow{XY} = \begin{pmatrix}2\\3\end{pmatrix}$ When a vector is **<u>multiplied by a scalar</u>**, each component of the vector is multiplied by the scalar. $\overrightarrow{RS} = \begin{pmatrix}6\\3\end{pmatrix} \overrightarrow{PQ} = \begin{pmatrix}2\\1\end{pmatrix}$ $\therefore \overrightarrow{RS} = 3\overrightarrow{PQ} = 3\begin{pmatrix}2\\1\end{pmatrix} = \begin{pmatrix}6\\3\end{pmatrix}$ or $\frac{1}{3}\overrightarrow{RS} = \overrightarrow{PQ} = \frac{1}{3}\begin{pmatrix}6\\3\end{pmatrix} = \begin{pmatrix}2\\1\end{pmatrix}$			

SCOPE OF WORK
GRADE 10
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
GEOMETRICAL TERMS AND PROPERTIES	Define and use basic geometric terms: • Point • Line • Plane • Angle • Angle types • Bearing • Parallel • Perpendicular Use geometrical instruments to draw and measure line segments and angles. Describe and apply angle properties related to: • Angles on a line • Angles at a point • Vertically opposite angles • Angles between parallel lines and a transversal. *(Corresponding, alternate, co-interior angles, etc.).*	**Geometry** is the branch of Mathematics that deals with points, lines, surfaces and solids. It examines their properties, measurement and mutual relations in space. A **point** is a position. It has no length, width or height. Points can be used to show the position of towns, buildings or even pinpoints. Points maybe represented by dots. A **line segment** is part of a straight line between two given points. A **line** has no end point. It goes on forever in both directions. It has length, but no width. Lines are named by writing capital letters for two points on the line. A **ray** is a straight line extending from a point called the origin. A **plane** is a flat surface that goes on forever in all directions. It is a flat surface with no thickness.	Students will make a list of all types of geometric terms and examples of these terms using real life examples. Example: - i. Point – center edge of the door ii. Line segment – edge of the door iii. Plane – chalkboard iv. Angle – corner of the desk v. Ray – one hand of the clock	Mathematics A Complete Course With CXC Questions Vol. 1 STP Caribbean Mathematics Books 1 & 2	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
GRADE 10
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
GEOMETRICAL TERMS AND PROPERTIES *cont'd*		When two straight lines meet at a point an **angle** is formed. **Types of Angles** a) *Right Angle* – an angle of 90°. b) *Straight Angle* **–** an angle of 180°. c) *Acute Angle* –an angle greater than 0° but less than 90°. d) *Obtuse Angle* –an angle greater than 90° but less than 180°. e) *Reflex Angle* – an angle greater than 180° but less than 360°. f) *Complementary Angles* **–** two angles are said to be complementary if their sum is equal to 90°. g) *Supplementary Angles* –two angles are said to be complementary if their sum is equal to 180°.	Have students raise their right arm to shoulder height, then: -let their hand fall into the shoulder to demonstrate an acute angle; -hold their hand in a vertical position to show a right angle; -let their hand fall out to show an obtuse angle; -hold their arm straight out to show a straight angle.		

SCOPE OF WORK
GRADE 10
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
GEOMETRICAL TERMS AND PROPERTIES *cont'd*		The position of an object relative to another object is called its **bearing**. The **bearing** of an object is the angle measured in a clockwise direction from north to the object. **Bearings** are always written using three digits in the whole number part. Two lines are said to be **parallel** if they are always the same distance apart and they never intersect. Their gradients are equal. That is, $\mathbf{m_1 = m_2}$ Two lines are said to be **perpendicular** if they meet at right angles. The product of their gradients is equal to negative one. That is, $\mathbf{m_1 \times m_2 = -1}$			
TRIANGLES	Describe and use the properties of triangles.	A **triangle** is a plane shape (or figure) bounded by three straight lines.		Mathematics A Complete Course With CXC Questions Vol. 1 Pg. 442	Quizzes Questioning Techniques End of Unit Test

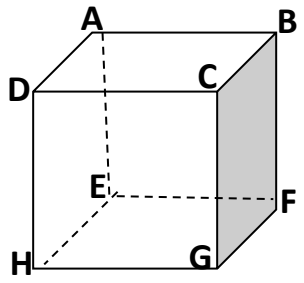
SCOPE OF WORK
GRADE 10
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
TRIANGLES *cont'd*	To discover the relationship among the interior opposite angles and the exterior angle. Describe and apply angle properties related to angles in triangles.	**Types of Triangles** a) Scalene Triangle b) Isosceles Triangle c) Equilateral Triangle d) Acute-Angles Triangle e) Obtuse-Angled Triangle f) Right-Angled Triangle The *sum of the interior angles* of a triangle is equal to 180° (or 2 right angles). If one side of a triangle is longer than another side, then the angle opposite the longer side is greater than the angle opposite the shorter side. If one angle of a triangle is greater than another angle, then the side opposite the greater angle is longer than the side opposite the smaller angle. If any side of a triangle is produced, (i.e. extended) then the exterior angle so formed is equal to the sum of the two interior opposite angles. The *sum of the three exterior* angles of a triangle is equal to 360°.	**Problem:** **1)** Classify the triangles as equilateral, isosceles, or scalene if the sides are as follows: a) 3 ft., 3 ft., 1 yd. b) 1.5 ft., 1 ft., 12 in. c) 30 cm, 30 cm, 30 mm d) 1 yd., 4 ft., 5 ft. **2)** Classify the triangles as equiangular, acute, right or obtuse: a) 60, 20, 100 b) 60, 60 c) 90, 30, 60 d) 120 e) 45, 45, 90 f) 80, 80, 20 Construct ΔABC with $BC = 8cm, \angle ABC = 60°$ and $\angle ACB = 70°$. 1. Measure $\angle BAC$. Produce each side to form exterior angles. Measure and find the sum of the exterior angles.	STP Caribbean Mathematics Book 1	Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
GRADE 10
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
POLYGONS	Identify and use the properties of polygons. Describe and use the properties of quadrilaterals. Identify and name polygons up to 12 sides. Describe and apply angle properties related to angles in quadrilaterals. Determine and use the formula to find the sum of the interior angles of any polygon. Determine and use the sum of the exterior angles of any polygon. Calculate the number of sides of a polygon.	A **polygon** is defined as a plane shape (or figure) bounded by three or more straight lines. The line segments are called sides of the polygon. A polygon is **regular** when all sides and all angles are equal. A **quadrilateral** is a plane shape (or figure) bounded by four straight lines. **Types of Quadrilaterals** a) Trapezium b) Isosceles Trapezium c) Kite d) Parallelogram e) Rhombus f) Rectangle g) Square The *sum of the four interior angles* of a quadrilateral is equal to 360°. The *sum of the four exterior angles* of a quadrilateral is equal to 360°.	Identify shapes by naming the number of sides. State the names of each polygon. **PAPER FOLDING** **Materials:** Paper and a pair of scissors. Try the following Problems. You must not use a ruler, a pen or pencil or anything to draw with. After experimenting explain in words what you have done. Try to be brief and clear. Use small diagrams to help your explanation if you like. **EXPERIMENT 1** Make a triangle of any shape and show that the lines that bisect its angles cross each other at the same point. **EXPERIMENT 2** Show that the angles of a triangle together make a straight angle. (i.e. total 180°).You must not cut the angles off to show this!	NTCM: Mathematics teaching in the MIDDLE SCHOOL April 2010 pp. 438 Vol. 15, No. 8 Mathematics A Complete Course With CXC Questions Vol. 1 Mathematics for Caribbean Schools Book 2 Mathematics in the Making Book 4 Middle School Math Course 2	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
GRADE 10
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
POLYGONS *cont'd*		The *sum of the interior angles* of an *n*-sided polygon is $(2n-4)$ right angles or $90°(2n-4)$ or $180°(n-2)$. The *sum of the exterior angles* of an *n*-sided polygon is 4 right angles or $360°$. *n-sided regular polygon* = $\frac{S}{n} = \frac{180°(n-2)}{n}$ or $\frac{360°}{size\ of\ exterior\ \ angle}$	**EXPERIMENT 3** Show that the area of a triangle is half that of the rectangle into which it just fits. **EXPERIMENT 4** Make a circle of paper by drawing round a circular object and show anything you like about circles by folding. **ACTIVITY**: You can only travel along a straight edge of the cube. a) How many different paths can be traveled from A to G using this minimum number of vertices? b) What are those paths? 	STP Caribbean Mathematics Book 3	

SCOPE OF WORK
GRADE 10
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
POLYGONS *cont'd*			**INDIVIDUAL ACTIVITY** Materials: worksheet, rulers, pencils Procedure • Have students join one vertex to all the other vertices in each polygon (this divides the polygons into triangles) • How many triangles are in the heptagon and octagon? • Can you now write in words the procedure for finding the sum of the interior angles of any polygon? • Now can you write this procedure as a formula? Calculate the interior angles of the following polygons: a) 9 sides b) 12 sides c) 20 sides d) 15 sides e) 18 sides		

SCOPE OF WORK
GRADE 10
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
CIRCLES	Describe and use the properties of circles.	A **circle** is defined as a plane curve formed by the set of all points which are a given fixed distance from a fixed point. The **circumference of a circle** is used to mean both the boundary line of a circle, and the length of the boundary line (i.e. the perimeter of the circle or the distance around the circle). A **radius of a circle** is a straight line drawn from the centre to any point on the circumference. A **diameter of a circle** is any straight line that joins two points on the circumference and passes through the centre. A **chord of a circle** is a straight line joining any two points on the circumference.	**Problem:** A symbol is something that has meaning beyond itself. Throughout history circles have always been powerful symbols. Even today, many businesses and organizations use circles in their logos. *List at three places a circle is used as a symbol. Why do you think circles are used as symbols?*	Mathematics A Complete Course With CXC Questions Vol. 1	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam
CONSTRUCTIONS	Use geometrical instruments to draw and measure line segments and angles.	The **perpendicular bisector of a line segment** cuts it at right angles and divides the line segment into two halves.		Mathematics A Complete Course With CXC Questions Vol. 1	Quizzes Questioning Techniques End of Unit Test

SCOPE OF WORK
GRADE 10
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
CONSTRUCTIONS *cont'd*	Use a pencil, ruler and a pair of compasses only to construct: (i) line and angle bisectors. (ii) angles: *(60^o,120^o,30^o, 90^o,45^o).* (iii) triangles given: *(SSS, SAS, ASA).* (iv) simple geometrical figures: *(up to 5 sides).* (v) a line perpendicular to a given line from a point not on the given line. (vi) line through a point, parallel to a given line. Interpret and produce scale drawings.	The bisector of an angle divides the angle into two halves. To construct an angle of 90°, we construct a perpendicular from a point which is situated on a line segment or from a point which is not situated on the line. First draw a line segment AB of line *l*. Open the compass to a suitable separation. Using A as centre, construct an arc to intersect the line *l* at X and Y. Open the compass to more than half the distance XY. Using X and Y as centres, construct two arcs to intersect above the line *l* at C. Draw a straight line passing through the points A and C. To construct an angle of 45°, bisect the 90° angle. To construct an angle of 22.5°, bisect the 45° angle.		STP Caribbean Mathematics Books 1& 2 STP Caribbean Mathematics for CXC Book 4 General Mathematics: Revision and Practice	Assignments Homework Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
GRADE 10
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
CONSTRUCTIONS *cont'd*		To construct an angle of 60°, draw a line segment AB of line *l*. Using A as a centre and a suitable compass separation, construct an arc above the line *l* to intersect the line segment AB at X. With X as centre and the same compass separation, construct a second arc to intersect the first arc at C. Now draw a straight line passing through the points A and C. To construct an angle of 30°, bisect the 60° angle. To construct an angle of 15°, bisect the 30° angle.			
PLATONIC SOLIDS	Identify the nets of simple solids (cubes, cuboids, cylinders, prisms, pyramids) Describe and use the properties of polygons and simple solids and their nets.	A solid is defined as a shape that occupies space. Types of solid figures: a) Polyhedra (singular: polyhedron) whose flat surfaces are polygons b) Solid figures whose surfaces are curved.	Activity: Materials: cubes, cuboids, cones, cylinders, prisms, pyramids, scissors, pencils, plain sheets of paper (one sheet per net per group), rulers. Working in groups of about 4 to 6 students, with each group with 6 solids and paper to draw nets.	The Math Teacher's Book of Lists Caribbean Maths Connect Book 2	Quizzes Questioning Techniques End of Unit Test Projects Math Journals

SCOPE OF WORK
GRADE 10
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
PLATONIC SOLIDS *cont'd*	Create models	A net is a two-dimensional diagram that is used to illustrate a solid.	• Solids are opened to produce nets. Outline of shapes are traced on paper. • List the various shapes that make up the nets.	Mathematics A Complete Course With CXC Questions Vol. 1 STP Caribbean Mathematics Book 2	B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam
SYMMETRY	Define: *symmetry; line/axis of symmetry: vertical, horizontal, oblique; order; 'maps onto'; a complete revolution; rotate*. Recognize and determine: line/reflective and rotational symmetry of plane figures. Draw and complete symmetrical shapes/figures. State the order of rotational symmetry of simple geometric shapes/figures. Complete shapes/figures given the order of rotational symmetry.	Symmetry is the kind of pattern that a shape has. It deals with the exact matching of a position or form about a point, line or plane. Types of Symmetry a) Translational symmetry b) Line (reflective) symmetry c) Rotational symmetry A plane figure is said to have translational symmetry if it can be translated and still look the same.	Problem: Five letters of the words LINE SYMMETRY have line symmetry. Which are they? What word(s) or what 2-digit number(s) have line symmetry.	Mathematics A Complete Course With CXC Questions Vol. 1 STP Caribbean Mathematics Book 1 General Mathematics: Revision and Practice	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
GRADE 10
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
SYMMETRY *cont'd*	Use properties of triangles, quadrilaterals and circles directly related to their symmetries.	The line of symmetry (or the axis of symmetry) of a plane figure is a line which can be used as a fold, so that one half of the shape covers the other half exactly. A plane figure can have one or more lines of symmetry. A plane figure is said to have rotational symmetry of a certain order, if the plane figure maps onto itself under rotations through stated angles about a common centre.			
TRANSFORMATIONS	Determine the properties of reflections. Reflect about horizontal and vertical lines. Recognize and perform a translation through a given vector. Rotate objects about a point through multiples of 90° clockwise and anticlockwise.	A **transformation** is said to describe the relation between any point and its image point. It is a one-to-one relation off all points on the object onto corresponding points on the image. Basic Types of Transformations a) Translation b) Reflection c) Rotation d) Enlargement e) Shear f) Stretch	T ranslation – ONE Detail E nlargement – TWO Details R otation – THREE Details R eflection – ONE Detail Y 1) Use the name TERRY to remember the 4 types. 2) You must always specify all the details for each type.	Mathematics A Complete Course With CXC Questions Vol. 1 STP Caribbean Mathematics Book 2	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets

SCOPE OF WORK
GRADE 10
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
TRANSFORMATIONS *cont'd*	Develop the concept of enlargement. Enlargement from the origin by a positive whole number scale factor. Identify the properties of each transformation.	A **translation** is a transformation in which a plane figure slides along a straight line and changes its position without turning. Vector $T = \begin{pmatrix} x_1 \\ y_1 \end{pmatrix}$, $P(x, y) = P'(x + x_1, y + y_1)$ Results for Translations • The object and image are congruent there is no turning. • All points move the same distance and in the same direction • There are no fixed points Translations can be represented by vectors and added by the triangle law. A **reflection** is a way of transforming a shape as a plane mirror does. In the *x*-axis , $P(x, y) = P'(x, -y)$ In the *y*-axis , $P(x, y) = P'(-x, y)$ In the line $x = b$, $P(x, y) = P'(2b - x, y)$ In the line $y = c$, $P(x, y) = P'(x, 2c - y)$	3) It'll help if you remember which properties remain <u>unchanged</u> in each transformation, too Give students a worksheet with three triangles drawn on a coordinate plane. Put e.g. object in quadrant (IV) and one image in quadrant (II) and quadrant (I). Have the students specify the one detail associated with <u>translation</u>.	GCSE Mathematics The Revision Guide Higher Level	B.G.C.S.E. Worksheets End of Term Exam <u>The Acid Test:</u> Learn the names of the Four Transformations and the details that go with each. When you think you know it, turn over and write it all down.

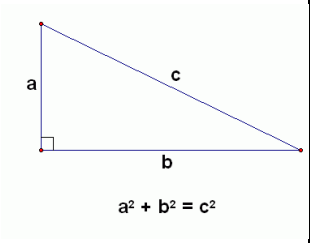
SCOPE OF WORK
GRADE 10
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
TRANSFORMATIONS *cont'd*		**Results of Reflections** • Object & Image are congruent. • The object and image are of equal distance from the mirror line. Each image point lies on the same line which is perpendicular to the mirror line. • Each object and corresponding image points are equi-distance from the mirror line. • All points on the mirror line remain fixed by the reflection a) Invariant Point b) Finding the mirror line. A **rotation** is a transformation in which every point turns through the same angle about the same centre in the same direction. About the Origin 270° Clockwise or 90° Anticlockwise $P(x, y) = P'(-y, x)$ 180° Clockwise or Anticlockwise $P(x, y) = P'(-x, -y)$ 0° Clockwise or 270° Anticlockwise $P(x, y) = P'(y, -x)$	Have students determine what takes place when a translation occurs. That is, ALL that changes in a translation is the POSITION of the object - <u>everything else</u> remains <u>unchanged.</u> *A similar worksheet related to reflection, rotation and enlargement can be done to highlight the terms in the acronym TERRY.*		

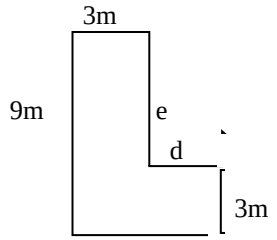
SCOPE OF WORK
GRADE 10
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
TRANSFORMATIONS *cont'd*		**Results of Rotation** • The object and image are congruent. • There is just one fixed point which is the centre of a rotation. An **enlargement** is a transformation which maps a shape onto a similar shape, from a centre of enlargement using a scale factor *k*. $P(x, y) = P'(kx, ky)$ **Results of Enlargement** • The image is similar to the object • Angles are unchanged • All lengths in the object are multiplied by the same factor for the image (i.e. the scale factor) • Every line in the image are parallel to its corresponding line in the object • If the scale factor (k) is 3, the area of the image is 3^2 is (9) [k^2] times the area of the object. • Fractional enlargements produce smaller images nearer the centre. • Negative enlargements produce an image on the opposite side of the centre of enlargement.			

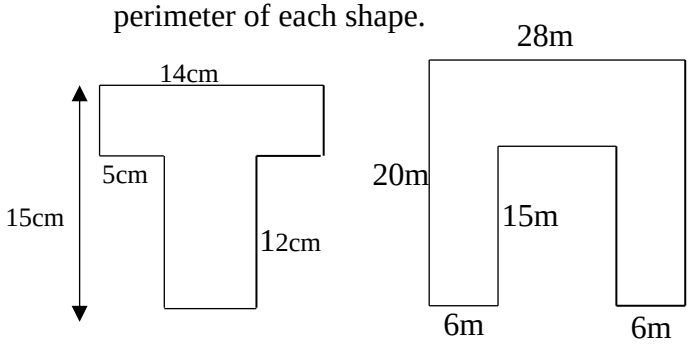
SCOPE OF WORK
GRADE 10
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
PYTHAGORAS' THEOREM	Identify the parts of the right angled triangle: *leg/arm and hypotenuse.* Derive the Pythagorean theorem. Identify Pythagorean Triples - 3: 4: 5; 5: 12: 13; 8: 15: 17. Apply the theorem of Pythagoras to solve real-life problems. Solve problems involving Pythagoras theorem and the square of the binomial expression. Use graphs in practical situations. Draw and interpret travel and conversions graphs Currency conversions	Pythagoras' Theorem states that in any right-angled triangle, the square on the hypotenuse is equal to the sum of the squares on the two other sides.  	**Problem:** Write down the sign of: (a) The tangent of every acute angle. (b) The cosine of every obtuse angle (c) The sine of every reflex angle **Problem:** A Pythagorean triple is a set of integers, a, b, and c, that could be sides of a right triangle if $a^2 + b^2 = c^2$. The steps below show how to generate Pythagorean triples: 1. Square an odd integer that is greater than 1. 2. Find two consecutive integers whose sum is equal to the square of the number in step 1. The number you squared and the other two numbers are a Pythagorean triple. *Choose a number and generate a Pythagorean triple. Substitute it into the Pythagorean Theorem to check your results.*	Mathematics A Complete Course With CXC Questions Vol. 1 STP Caribbean Mathematics Book 3 MATHS in Action 4B General Mathematics: Revision and Practice	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
GRADE 10
UNIT: MEASUREMENT

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
PERIMETER AND AREA	Perimeters of compound shapes. Area of compound shapes.	*Area of Triangle* $A = \frac{1}{2}bh$ $A = \sqrt{s(s-a)(s-b)(s-c)}$ *Area of Kite* $A = \frac{1}{2}d_1d_2$ *Area of Square* $A = l^2$ *Area of Rectangle* $A = lb$ *Area of Rhombus & Parallelogram* $A = bh$ *Area of Trapezium* $A = \frac{1}{2}(a+b)h$ *The Circle* $Area = \pi r^2 = \frac{1}{4}\pi d^2$ *Circumference* $= 2\pi r = \pi d$	1. This L-Shaped corridor is 3m wide.  i. Calculate the length of d and e. ii. Calculate the perimeter of the corridor. Cozy carpet needs to know its area in order to calculate the cost of carpet for it. By drawing the dotted line; they make two rectangles. iii. Calculate the area of each rectangle. iv. The total area of carpet required. 2. The wheel of a can has an outer radius of 28cm. Calculate. (i) How far the can has traveled after one complete turn of the wheel. (ii) How many times the wheel turns for a journey of 2km.	https://www.worksheetworks.com/math/geometry/measuring-figures/perimeter-area.html Mathematics: A Complete Course with CXC Question Volume 1 Squared Paper STP Caribbean Mathematics Books 1 & 2 Complete Mathematics	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

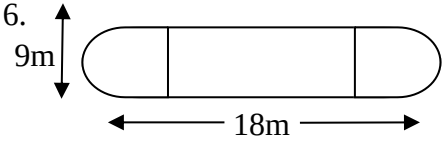
SCOPE OF WORK
GRADE 10
UNIT: MEASUREMENT

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
PERIMETER AND AREA *cont'd*			3. (i) Calculate the missing length then find the perimeter of each shape.  (ii) Calculate the areas of the shapes by sketching them and dividing then into suitable rectangles. 4. Copy and complete this table of rectangle calculations.		

Length (cm)	7	5		9	
Breadth (cm)	10		12		40
Perimeter (cm)		18	54		
Area (cm)				90	200

5. If the wheel of a bicycle has a diameter of 65cm. Calculate how far a cyclist will have traveled after the wheel has stated 100 times.

SCOPE OF WORK
GRADE 10
UNIT: MEASUREMENT

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
PERIMETER AND AREA *cont'd*			6.  A garden is made up of a rectangular path of grass and two semicircular vegetable patches. (see diagram) Calculate a) The perimeter of the garden b) The area of the garden.		
SURFACE AREA	Review the surface area of cubes and cuboids. Find the surface areas of cereal and detergent boxes. Calculate the surface area of cylinders.	**The Cylinder** - $CSA = 2\pi rh$ $TSA = 2\pi rh + 2\pi r^2 = 2\pi r(h + r)$ **The Cube** - $TSA = 6l^3$ **The Cuboid** - $TSA = 2bh + 2lb + 2lh$	1. Draw a net of a cube and a cuboid to clearly show the area of each face. 2. Calculate the surface area of each net. 3. Illustrate how the surface area of each came to be SA cube = $6l^2$ SA cuboid = 2l w + 2l h + 2wh Sketch the different faces of the cylinder with their dimensions.	http://www.prometheanplanet.com/en/Resources/Item/166524/5th-grade-singapore-unit-5-lesson-1-perimeter-area-surface-area#.Vz9K8JErLIV http://www.shodor.org/interactivate/activities/SurfaceAreaAndVolume/	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E.

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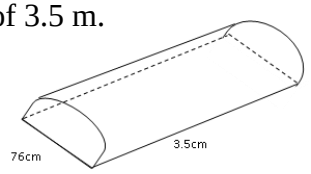
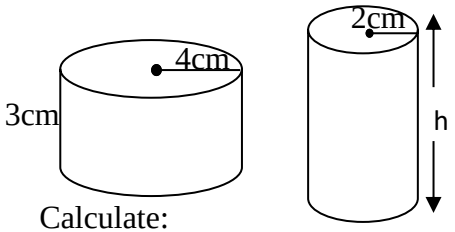
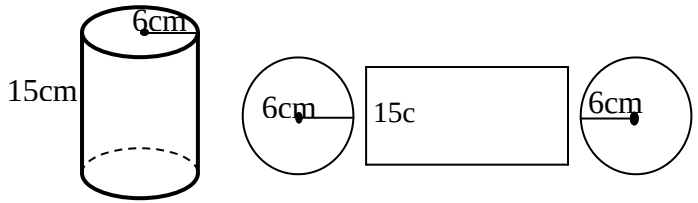
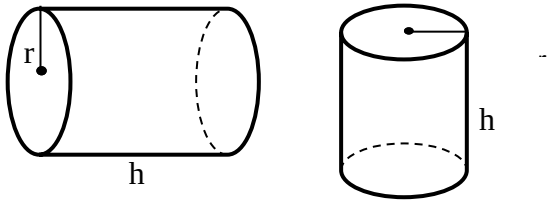
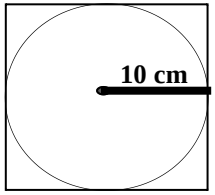
GRADE 10
UNIT: MEASUREMENT

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
SURFACE AREA *cont'd*			4. (i) A rug in front of a fire place is in the shape of a semi-circle. It has a diameter which is 1.6m wide. Using $\pi = 3.14$ calculate the area of the rug to 3 s.f. (ii) The rug in (i) is to have non-slip braid attached around its perimeter to stop it moving. How many meters of braid will be required to do the job? (to 3 s.f.) 5. A child's sand pit is circular, and made from hand PVC. It has a depth of 12cm and diameter of 460mm. ($\pi = 3.14$) a. Calculate the surface area of the sandpit's floor both in mm^2 and on m^2 to 2dp. b. A blue stripe is to be painted all the way around the inside face of the sandpit. How long would the strip be in mm? c. If the stripe were to be 25mm wide, what area of blue strip would be visible? d. A blue stripe is to be painted all the way around the inside face of the sandpit. How long would the strip be in mm? e. If the stripe were to be 25mm wide, what area of blue strip would be visible? 6. The figure has a semicircular cross-section with a diameter of 76 cm and a length of 3.5 m. a) Find the cross sectional area b) Hence find the volume 	https://illuminations.nctm.org/Lesson.aspx?id=2009 Mathematics: A Complete Course with CXC Questions Vol. 1	Worksheets End of Term Exam

SCOPE OF WORK
GRADE 10
UNIT: MEASUREMENT

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
SURFACE AREA *cont'd*			7. A cube and a cylinder have the same surface area. If the cube has a length of 6cm and the cylinder a radius of 2cm. Calculate: a). the surface area of the cubes b). the height of the cylinder. 8. Two cylinders have the same surface area.  Calculate: i. the surface area of the shorter cylinder ii. the height of the table cylinder.		
VOLUME/ CAPACITY	Calculate the volume of cylinders.	***The Cylinder*** - *Volume* = $\pi r^2 h$	 1. Show the cylinder as a circular prism to derive the formula. V = A of cross section x length = A of circular end x length	http://www.shodor.org/interactivate/activities/SurfaceAreaAndVolume/ https://illuminations.nctm.org/Lesson.aspx?id=2009	Quizzes Questioning Techniques End of Unit Test Projects Math Journals

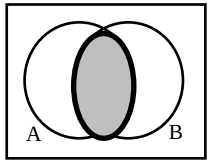
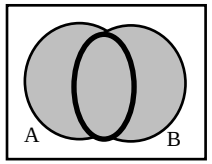
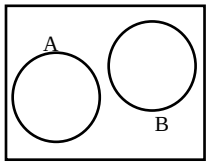
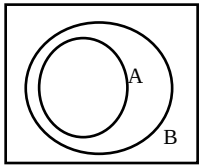
SCOPE OF WORK
GRADE 10
UNIT: MEASUREMENT

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
VOLUME/ CAPACITY *cont'd*			 $V = \pi r^2 \times h \quad = \pi r^2 h$ 2. For each cylindrical objects (i) write measure and write down the radius and heights tomatoes paste, cream, tuna, spaghetti, corn, peas can and salt box. (ii) calculate the volumes. 3.  The diagram shows a view of a cylinder inside a box the shape of a cube. If the radius of the cylinder is 10cm, calculate. a) The height of the cube b) The volume of the cube c) The volume of the cylinder d) The percentage volume of the cube not occupied by the cylinder.		B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

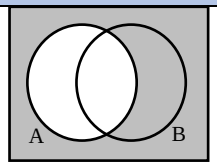
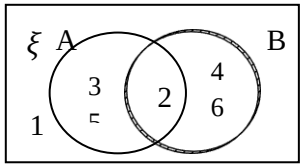
SCOPE OF WORK
GRADE: 10
UNIT: SETS

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
VOLUME/ CAPACITY *cont'd*			4. A cuboid and a cylinder have the same volume. The radius and height of the cylinder are 3.5 and 8cm respectively. If the length and width of the cuboid are each 5cm, calculate its height to 1d.p.		
SETS	Review: Define a set, elements of a set, finite and infinite sets, a null set, a universal set, a subset, equal and equivalent sets, disjoint sets. Read and write the set builder notations. Recognize and use set language and set notation, namely: - use of brackets - indicating set membership - number of elements in a set - empty set - complement of a set - universal set - subset - union and intersection	A **set** is a collection of items, usually of the same kind. Each item in a set is called an **element or member**. $\in$ means **"is an element of"** and $\notin$ means **"is not an element of"** In a **finite set** it is possible to count and name all the elements in the set. In an **infinite set** it is impossible to count or name all the elements in the set. A **null set or empty set** contains no elements. Its symbol is{ }or$\emptyset$.	A = {2, 3, 4, 6} and$B$ = {3, 6}. State whether true or false. a) $A \supset B$ b) $6 \in A$ c) $A \cap B = 0$ d) $n(A) = 4$ e) $A \cup B = A$ f) $5 \notin B$ X = {2, 4, 7, 9} Y = {3, 4, 5} Calculate: a) X $\cup$ Y b) X $\cap$ Y c) n(X) ξ= {1, 2, 3, ..., 10} A= {2, 3, 5, 7} Give the complement of A.	Mathematics: A Complete Course with CXC Question Volume 1	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
GRADE: 10
UNIT: SETS

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
SETS *cont'd*	Recognize and use set language and set notation, namely: - finite and infinite sets - equal and equivalent sets Use set notation.	The **universal set** is the set from which all the elements are taken. The symbol is **ξ** or ξ. A **subset** is a set within a set. The symbol ⊂ means **"is a subset of"**. The symbol ⊄ means **"is not a subset of"**. Two sets are **equal** if they both have the same elements. Two sets are **equivalent** if they both have the same number of elements. The **complement** of a set is all the elements that do not belong to that set. A′ means **"A complement"**. **Union** of sets is all the members of the sets. The symbol is ∪. **Intersection** of sets is the members that are common to the sets. The symbol is ∩.			
VENN DIAGRAMS	Determine the elements in the complement, union and intersection of two sets using Venn diagrams. Draw suitable Venn diagrams to represent information given.	**Venn diagrams** are used to show relationships between sets.  **A intersects B**  **A union B**  **Disjoint Sets**  **Subset**	ξ= {1, 2, 3, ..., 10}, M = {multiples of 3}, N = {factors of 12} Represent this in a Venn diagram.	Mathematics: A Complete Course with CXC Question Volume 1	Quizzes Questioning Techniques End of Unit Test Projects

SCOPE OF WORK
GRADE: 10
UNIT: SETS

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
VENN DIAGRAMS *cont'd*	Describe regions on Venn diagrams using set notation. Calculate the number of elements in two intersecting sets.	 **De Morgan's Law** relates the three basic set operations to each other; the union, the intersection, and the complement. $(\mathrm{A} \cup \mathrm{B})' = \mathrm{A}' \cap \mathrm{B}'(\mathrm{A} \cap \mathrm{B})' = \mathrm{A}' \cup \mathrm{B}'$	List the sets: a) $A \cup B$ b) $(A \cup B)'$ c) $A \cap B$ 		Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam
PROBLEM SOLVING	Calculate the number of elements in a given subset of two intersecting sets. Use Venn diagrams to solve word problems.	**Venn diagrams** can be very useful in finding the number of elements in certain subsets of two intersecting sets. $\mathbf{n(B)}$ means **"number of elements in set B"** For two sets: $\mathbf{n(A \cup B) = n(A) + n(B) - n(A \cap B)}$ And $\mathbf{n(U) = n(A \cup B) + n(A \cup B)'}$ **A only** $\mathbf{n(A \cap B') = n(A) - n(A \cap B)}$ **B only** $\mathbf{n(A' \cap B) = n(B) - n(A \cap B)}$	**Problem:** Of 100 athletes, 31 like to run, 65like to walk, and 22 neither like to walk nor run. Determine the number of athletes who like: a) both to run and walk, b) to run only c) to walk only **Problem:** $n(U) = 45, n(A) = 20,$ $n(B) = 18, n(A \cup B)' =$ 15 and $n(A \cap B) = x.$ Calculate: a) x b) b)$n(A \cap B)'$ c) c) $n(B \cap A)'$	Mathematics: A Complete Course with CXC Question Volumes 1 & 2 General Mathematics: Revision and Practice	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
GRADE: 10
UNIT: DATA MANAGEMENT

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
ORGANIZING AND ANALYZING DATA	Define and explain the terms: population, sample, data, qualitative data and quantitative: discrete and continuous data. Collect, classify and tabulate data. Construct and analyze pictograms, tables, vertical and horizontal bar charts, line graphs, pie charts, frequency distributions. Read interpret and draw inferences from basic statistical diagrams. Identify, define and calculate the measures of central tendency (mean, median, mode) and range from individual and discrete data and distinguish between the purpose for which they are used.	The mean of a set of numbers is the sum of the numbers divided by the number of numbers. An estimate of the mean of grouped data can be calculated by assuming that the average of each group is the halfway value for that group. The mode of a set of numbers is the number that occurs most often. If the numbers are grouped, the group with the highest frequency is called the modal grouped. The median of a list of n values is the $\frac{(n+1)}{2}$ value when the values are in order of size.	Heights of pupils in class. Weight of people in the class. Cost of journey to school this morning. Times of journeys to school (in minutes). Ages of students (in months)	STP Caribbean Mathematics Book 3 General Mathematics: Revision and Practice	Quiz Worksheets End of unit test Group projects

SCOPE OF WORK
GRADE: 10
UNIT: PROBABILITY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
PROBABILITY	Write down the set of outcomes of an experiment. State the number of possible outcomes of an experiment. Calculate the probability of an event, *A*, happening. State the probability of a. certainty b. impossibility Calculate the probability that an event, *A*, does not occur. Estimate the number of times an event might occur. Perform experiments, collect data and hence calculate required probabilities. Recognize problems that involve the process of combining events.	List of outcomes in the form of a set or a sample space: e.g. tossing a coin = {head, tail}; throwing a dice = {1,2,3,4,5,6} Assume all possible outcomes are equally likely. p(*A*)= $\frac{\text{the number of ways in which A occurs}}{\text{the totally number of equally likely outcomes}}$ The probability of an event occurring is always defined as $0 < P < 1$. a. P (impossibility) = 0 b. P (certainty) = 1 P (*A* not occurring) = 1 – p (*A* does occur)	In class experiments – e.g. probability of girls vs. boys Outdoor experiments – e.g. probability of car vs. van vs. truck passing. Outdoor experiments – e.g. probability of not green vehicle vs. green vehicle, etc. http://www.learn-with-math-games.com/probability-games-middle-school.html http://www.ehow.com/way_5280564_middle-school-probability-activities.html http://www.libraryvideo.com/guides/B2112.pdf	STP Caribbean Mathematics Book 1 Complete Mathematics http://www.ict-teacher.com/Mathstutor/Probability.html http://www.onlinemathlearning.com/math-probability.html http://www.stats.gla.ac.uk/steps/glossary/probability.html http://cosmologist.info/teaching/STAT/CHAP1.pdf http://www.uic.edu/classes/upp/upp503/sanders4-5.pdf http://www-math.bgsu.edu/~albert/m115/probability/outline.html	Test glossary of terms. Answer questions based on experiments done and data collected. Exercises calculating probability of events occurring or not occurring. Concept Quiz Exercises to identify combined probability problems from a variety probability problems.

SCOPE OF WORK
GRADE: 10
UNIT: PROBABILITY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
PROBABILITY *cont'd*	Apply the multiplication law (also known as the **AND** law) for independent events (event which has no effect on subsequent events). Apply the addition law (also known as the **OR** law) for mutually exclusive events (combined events which cannot happen at the same time). Draw a possibility space for two events and use it to find probabilities. Construct and use tree diagrams to find probabilities. Estimate the probability of certain events by experiment.	Combined events are two or more events occurring together or one right after the other; e.g. tossing a coin and throwing a dice. If the probability P_1 of one event is independent of the probability P_2 of a second event, then the probability of both events is $P_1 \times P_2$. The probability of the outcome of one event OR another (or both) occurring is obtained by adding the probabilities. Possibility space (or probability diagram) is a more organized way to display the outcomes of more complex experiments.	http://www.math4success.com/pdf/8thgrade.pdf http://yteach.com/index.php/resources/random_process_event_outcome_probability_elementary_page_7.html Search on www probability combined events activities. Construct possibility spaces. http://www.cimt.plymouth.ac.uk/projects/mepres/book8/y8s10os.pdf, sections 10.2 – 10.4 Construct tree diagrams Outdoor experiments – record data of events happening to predict	Nelson Caribbean Mathematics, Book 3 Mainstream Mathematics Book 3 Complete Mathematics STP Caribbean Mathematics Book 2, New Comprehensive Mathematics for 'O' Level http://www.onlinemathlearning.com/probability-diagram.html http://mathebook.net/dict/pdict/pspace.htm http://mathebook.net/dict/tdict/treedia.htm http://www.elateafrica.org/elate/mathematics/probability/possibilityspace.html	Exercises on AND law Exercises on OR law Concept quiz comprising both AND and OR laws Exercises to construct a possibility space (probability diagram). Exercises to answer questions interpreting possibility space. Exercise to construct probability tree. Exercise to answer questions interpreting probability trees. Estimation exercise

GRADE

11

SCOPE OF WORK
GRADE: 11
UNIT: NUMBER & OPERATIONS

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
THE REAL NUMBER SYSTEM	**Properties of Real Numbers** Identify the properties of real numbers: commutative, associative, distributive, identity and density properties.	Commutative Property of Addition: $a + b = b + a$; $\begin{pmatrix}2 & 4\\3 & 5\end{pmatrix} + \begin{pmatrix}1 & 2\\3 & 4\end{pmatrix} = \begin{pmatrix}1 & 2\\3 & 4\end{pmatrix} + \begin{pmatrix}2 & 4\\3 & 5\end{pmatrix}$ Associative Property of Addition: $a + (b + c) = (a + b) + c$; Distributive Property: $a \times (b + c) = a \times b + a \times c$; $2\begin{pmatrix}2 & 4\\3 & 5\end{pmatrix} = \begin{pmatrix}2 \times 2 & 2 \times 4\\2 \times 3 & 2 \times 5\end{pmatrix}$ Additive Identity Property: $a + 0 = a$; $\begin{pmatrix}2 & 4\\3 & 5\end{pmatrix} + 0 = 0 + \begin{pmatrix}2 & 4\\3 & 5\end{pmatrix}$ Multiplicative Identity Property: $a \times 1 = a$; $\begin{pmatrix}2 & 4\\3 & 5\end{pmatrix}\begin{pmatrix}1 & 0\\0 & 1\end{pmatrix} = \begin{pmatrix}2 & 4\\3 & 5\end{pmatrix}$ Zero Property: $a \times 0 = 0$; $\begin{pmatrix}2 & 4\\3 & 5\end{pmatrix}\begin{pmatrix}0 & 0\\0 & 0\end{pmatrix} = \begin{pmatrix}0 & 0\\0 & 0\end{pmatrix}$	https://math.boisestate.edu/wp-content/uploads/2013/02/wkst-F14-025-2.pdf https://www.teacherspayteachers.com/Product/Real-Numbers-Sort-and-Match-Activity-FREEBIE-307593	http://www.math.com/school/subject2/lessons/S2U2L1DP.html http://www.math-aids.com/Properties/Property_Identifying.html	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
GRADE: 11
UNIT: NUMBER & OPERATIONS

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
SQUARES & SQUARE ROOTS, CUBES & CUBE ROOTS	Calculate x^n and $\sqrt[n]{x}$ in general. Making appropriate use of the power and root functions of a scientific calculator.	A **square number** is a number multiplied by itself. A **cube number** is a number multiplied by itself three times. The **square root** of a number, multiplied by itself, equals the number. The **cube root** of a number, multiplies by itself three times, equals the number.	Workout: $\left(\frac{8.53 + 7.07}{6.04 - 4.32}\right)^4$	Complete Mathematics	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam
SEQUENCES OF NATURAL NUMBERS	Find the nth term in a sequence given the formula for the nth term. Determine and use a formula for the nth term in a number sequence. Use calculators to check work.	**Special Sequences:** **Arithmetic Sequence** In an **Arithmetic Sequence** the difference between one term and the next is a constant. General Rule: $\mathbf{x_n = a + d(n - 1)}$ Where: **a** - is the first term **d** - is the difference between the terms (called the common difference)	Here is a sequence of numbers: **4, 10, 16, 22, 28** a) Write down the next two terms of the sequence. b) Write down an expression for the n^{th} term of this sequence. c) Work out the 50^{th} term of the sequence.	Mathematics: A Complete Course with CXC Question Volume 1 http://www.coolmath4kids.com/math_puzzles/w1-whatsnext1.html	Quizzes Questioning Techniques End of Unit Test Projects Math Journals

SCOPE OF WORK
GRADE: 11
UNIT: NUMBER & OPERATIONS

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
SEQUENCES OF NATURAL NUMBERS *cont'd*	Solve problems involving sequences.	**Geometric Sequence** In a **Geometric Sequence** each term is found by multiplying the previous term by a constant. General Rule: $\mathbf{x_n = ar^{(n-1)}}$ Where: **a** - is the first term **r** - is the factor between the terms (called the common ratio) **Triangular Numbers** - $\mathbf{x_n = \frac{n(n+1)}{2}}$ **Square Numbers** - $\mathbf{x_n = n^2}$ **Cube Numbers** - $\mathbf{x_n = n^3}$ **Fibonacci Sequence** - $\mathbf{x_n = x_{n-1} + x_{n-2}}$	You visit the Grand Canyon and drop a penny off the edge of a cliff. The distance the penny will fall is 16 feet the first second, 48 feet the next second, 80 feet the third second, and so on in an arithmetic sequence. What is the total distance the object will fall in 6 seconds? A culture of bacteria doubles every 2 hours. If there are 500 bacteria at the beginning, how many bacteria will there be after 24 hours?	New Comprehensive Mathematics for 'O' Level	B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam
PERCENTAGES	Finding an unknown quantity when a percentage of the quantity is known.	**Percent Increase** and **Percent Decrease** are measures of Percent Change. $\text{Percent Change} = \frac{\text{New Value} - \text{Old Value}}{\text{Old Value}} \times 100$ -By "change" we could mean all sorts of things such as Profit, loss, appreciation, depreciation, increase, decrease , error, discount, etc.	A car costing $24,000 is reduced in price by 10%. Find the new price.	Mathematics: A Complete Course With CXC Questions Vol. 1	Quizzes Questioning Techniques End of Unit Test

SCOPE OF WORK
GRADE: 11
UNIT: NUMBER & OPERATIONS

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
PERCENTAGES *cont'd*	Calculating original values when increased/decreased values and percent change are known (reverse percentage). Solve consumer math problems: utility bills; mortgages; bank loans; real property tax; property and personal insurance. Use calculators to check work.	A **reverse percentage** is where you need to go back in time to find the original amount. First, you will need to identify that the question is a reverse percentage question. Look out for questions like what did the item cost before the sale? Once this is done, you need to add the percentage to 100 if the question is a percentage increase question or take the percentage off 100 if it's a percentage decrease question. Make this percentage equal to the amount in the question. All you need to do next is work out the value of 100% as this is the original amount. Do this by working out 1% and then multiplying by 100.	The sale price of an article marked at 25% down was $175. Calculate the original price. A car depreciates by 30% to $14,350. What was it worth before?		B.G.C.S.E. Worksheets End of Term Exam Projects Math Journals
RATIO, PROPORTIONS & RATE	Increase and decrease amounts by a ratio.	If the ratio of a new quantity to an old quantity can be expressed as an improper fraction, then the new quantity is greater than the old quantity. Applying this ratio to the old quantity is known as **increasing the old quantity in a given ratio**.	At a school party, 15 sandwiches are provided for every 8 students. How many sandwiches are required for 56 students?	Mathematics: A Complete Course With CXC Questions Vol. 1 STP Caribbean Mathematics for CXC Book 4	Quizzes Questioning Techniques End of Unit Test Projects Math Journals

SCOPE OF WORK
GRADE: 11
UNIT: NUMBER & OPERATIONS

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
RATIO, PROPORTIONS & RATE ***cont'd***		If the ratio of a new quantity to an old quantity can be expressed as a proper fraction, then the new quantity is less than the old quantity. Applying this ratio to the old quantity is known as **decreasing the old quantity in a given ratio**.	Decrease $73.35 in the ratio 5:9.	Mathematics For Caribbean Schools Book 4 http://www.mathsteacher.com.au/year8/ch06_ratios/03_inc/dec.htm	B.G.C.S.E. Worksheets End of Term Exam
ESTIMATION/ APPROXIMATION	Find lower and upper bounds of numbers given the degree of accuracy. (Limits of accuracy/Use of $\pm$ symbol). Calculate percentage error.	When a number is rounded off, the **lower bound** is the smallest possible value that the number could have been, and the **upper bound** is the highest possible value that the number could have been. **Percentage Error** is all about comparing a guess or estimate to an exact value $\%\ \text{Error} = \frac{\text{Error}}{\text{Exact Value}} \times 100$	A crowd of people was estimated to be 1000. The actual number was 925. Calculate the percentage error. Find the percentage error in rounding 3.452 to 3.5. Give your answer to 2 decimal places.	Heinemann Mathematics for CXC	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.G.C.S.E. Worksheets End of Term Exam
INDICES	Evaluate/manipulate terms expressed in index form, including terms with fractional indices.	$(\boldsymbol{a^m})^{\boldsymbol{n}} = \boldsymbol{a^{m\times n}} = \boldsymbol{a^{mn}}$ $\boldsymbol{a^0 = 1}$ $\boldsymbol{a^{-m} = \frac{1}{a^m}}$	**Problem:** Determine the value of x^6 when $x = 5^{-\frac{1}{3}}$.	Mathematics: A Complete Course with CXC Question Volumes 1 & 2	Quizzes Questioning Techniques

SCOPE OF WORK
GRADE: 11
UNIT: ALGEBRA

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
INDICES	Solve equations where the variable is an exponent.	$a^{\frac{1}{n}} = \sqrt[n]{a}$ & $a^{\frac{m}{n}} = \sqrt[n]{a^m}$ E.g. Evaluate: $\left(x^{\frac{1}{6}}\right)^3 \times \sqrt{x^5}$ E.g. Solve the following: $a)\ 64^x = 16$ $b)\ 625^{p-2} = 5^{1+p}$	**Problem:** Solve: $\frac{2^{x-1}}{4} = 64$		End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam
SCIENTIFIC NOTATION	Compare and order numbers expressed in standard form. Add and subtract numbers expressed in standard form. Solve word problems using standard form. Make appropriate use of the reciprocal function of a scientific calculator.	When **adding and subtracting numbers written in standard form**, we must first convert each number to the highest power of ten given, (so they have the same power) before proceeding to adding and subtracting. Double check to ensure the final answer is in standard form – sometimes, a little adjustment is necessary.	Calculate, giving your answer in stand form: $(6.2 \times 10^5) + (3.7 \times 10^{-4})$	Mathematics: A Complete Course With CXC Questions Vol. 1 General Mathematic: Revision and Practice D Rayner	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
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CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
BRACKETS (EXPANSION)	Calculate the product of expressions in two brackets each of which contains two terms. Square an expression of the form (ax + b).	A binomial expression consists of two terms. The product: $(x + a)(x + b)$ $\equiv x(x + b) + a(x + b)$ $\equiv \boldsymbol{x^2 + ax + bx + ab}$ In finding the product of two binomial expressions, we: (i). use the distributive law twice, then (ii). simplify the expression by adding like terms. Expand and simplify: a) $(3x + 2)(4x + 5)$ b) b) $8(2x - 5)(3x + 4)$ ***Perfect Square*** $(a + b)^2 \equiv (a + b)(a + b)$ $\equiv a(a + b) + b(a + b)$ $\equiv a^2 + ab + ab + b^2$ $\equiv \boldsymbol{a^2 + 2ab + b^2}$ E.g. Expand and simplify: a) $(3x + 2)(3x - 2)$ b) $(1 - 7x)(1 + 7x)$	**Problem:** match each binomial with its product. a) $(x + 7)(x + 2)$ 1. $x^2 - 5x - 14$ b) $(3x - 1)(3x + 1)$ 2. $x^2 + 9x + 14$ c) $(9x + 5)(x - 4)$ 3. $9x^2 - 1$ d) $(x - 7)(x + 2)$ 4. $9x^2 - 31x - 20$	STP Caribbean Mathematics Book 3 Mathematics: A Complete Course with CXC Question Volume 2 General Mathematics: Revision and Practice	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
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CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
BRACKETS (EXPANSION) *cont'd*		***Difference of Two Squares*** $(a+b)(a-b)$ $\equiv a(a-b)$ $+\ b(a-b)$ $\equiv a^2-ab+ab-b^2$ $\equiv \boldsymbol{a^2-b^2}$ E.g. Expand and simplify: a) $(x-p)^2$ b) b) $(2x-5)^2$			
FACTORIZATION	Factorize expressions in the form *ax + ay + bx + by* Factorize expressions in the form $ax^2 + bx + c$ Factorize expressions in the form $a^2x^2 - b^2y^2$	To **factorize by grouping**, first group algebraic terms in pairs, then for each pair of terms find the highest common factor. The highest common factor is then used to factorize each pair of terms. A common factor is then found for the pair of factorized terms. Group the common terms in one bracket and the highest common factors in another bracket. The process of factorization is completed.	**Problem:** Explain why $(3a-5)(3a+5)$ is a binomial but $(3a-5)(3a-5)$ is a trinomial. How would you factor $9a^2-25$? **Problem:** The areas of four squares are listed below. Find the length of the side. Then find the perimeter. a) $a^2+8a+16$ b) $a^2-10a+25$ c) $49a^2-56+16$ d) $36a^4-12a^2b^3+b^6$	STP Caribbean Mathematics Book 3 Mathematics: A Complete Course with CXC Question Volume 2 General Mathematics: Revision and Practice	Quizzes Questioning Techniques End of Unit Test Assignments Homework Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

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CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
FACTORIZATION *cont'd*		E.g. Factorize $mx + nx - my - ny$ Ans. $mx + nx - my - ny$ $= x(m + n) - y(m + n)$ $\equiv (m + n)(x - y)$ The product: $(x + a)(x + b) \equiv x^2 + ax + bx + ab$ $\equiv x^2 + (a + b)x + ab$ according to the distributive law. Thus: $x^2 + (a + b)x + ab \equiv x^2 + ax + bx + ab$ $\equiv x(x + b) + a(x + b)$ $\equiv (x + a)(x + b)$ according to the distributive law. Hence, the factorization of $x^2 + (a + b)x + ab \equiv (x + a)(x + b)$	**Problem:** Find the missing binomial. a) $2(x + y) - y(x + y) = (\_\_\_\_\_)(x + y)$ b) $x + 3y - a(3y + x) = (\_\_\_\_\_)(x + 3y)$ c) $6a - 3ax + 7x - 14 = 3a(\_\_\_\_\_) + 7(\_\_\_\_\_) = (3a - 7)(\_\_\_\_\_)$ d) $4y^2 + 8xy - y - 2x = y(\_\_\_\_\_) + 2x(\_\_\_\_\_) = (y + 2x)(\_\_\_\_\_)$		
ALGEBRAIC FRACTIONS	Reduce a given algebraic fraction to its lowest form. Add or subtract two algebraic fractions.	The method used to add and subtract algebraic fractions is as follows: a) First, find the lowest common denominator (LCD); that is, the lowest common multiple of the denominators of the algebraic fractions.	**Problem:** Write as a single fraction in lowest terms. $\frac{3x + 1}{3} - \frac{2x - 3}{4} - \frac{7}{12}$	STP Caribbean Mathematics Book 3 Mathematics: A Complete Course with CXC Question Volume 2	Quizzes Questioning Techniques End of Unit Test Assignments

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CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
ALGEBRAIC FRACTIONS *cont'd*	Solve simple equations containing algebraic fractions.	b) Then express each algebraic fraction in terms of the LCD. c) The distributive law is then used to remove all brackets in the numerator if there are any. d) Like terms in the numerator are grouped together and then added and subtracted. e) Finally, reduce the fraction to its lowest terms, if possible. **E.g. Simplify:** $\frac{3}{x}+\frac{4}{3x}-\frac{5}{4x}$ Ans.: $\frac{3}{x}+\frac{4}{3x}-\frac{5}{4x}$ $=\frac{3\times 12+4\times 4-5\times 3}{12x}$ $=\frac{36+16-15}{12x}$ $=\frac{37}{12x}$	**Problem:** Solve for x. $\frac{1}{x}+\frac{1}{2x}-\frac{1}{3x}$ $=2\frac{1}{3}$	General Mathematics: Revision and Practice	Homework Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam
EQUATIONS	Solve a pair of simultaneous equations by a) the method of elimination	Two linear equations with two unknown values can be solved simultaneously, and the solutions for both equations can be obtained the same time. There are many ways to solve simultaneous equations. Two methods are by elimination and substitution.		STP Caribbean Mathematics Book 3	Quizzes Questioning Techniques End of Unit Test Assignments

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CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
EQUATIONS *cont'd*	b) the substitution method Solve problems using simultaneous equations. Solve quadratic equations of the form *(ax + b) (cx + d) = 0.* Solve quadratic equations by factorization. Form quadratic equations to solve given problems. Solve quadratic equations using the quadratic formula.	In using the method of elimination, we make the magnitude of the coefficients of one of the unknown values equal in order to get rid of it. If the signs are both the same – subtract; otherwise add. **E.g. Solve: $3x + y = 18$** **$2x - y = 7$** In using the method of substitution, use one linear equation to substitute in the other linear equation for one of the two unknown values. **E.g. Solve: $5x + 3y = 31$** **$2x + y = 12$** To solve word problems using equations, you first have to form a simultaneous equation with one unknown from the English statements given. Then solve the constructed simultaneous linear equations to determine the magnitude of the unknown quantity.	**Problem:** Manuel received a score of 75% on his quiz on solving system s of equations using the elimination method. His work is shown below. Explain how you think his teacher graded the quiz. a) $4x - y = 0$ $x + y = 10$ $5x = 10$ $x = 2$ $y = 8$ b) $3y - x = 0$ $5y - x = 18$ $-2y = -18$ $y = 9$ c) $2x - 37 = 17$ $2x + 3y = -12$ $4x = 16$ $x = 4$ $y = -3$ d) $2x - 5y = 14$ $x + 3y = 10$ $-8y = 4$ $y = -\frac{1}{2}$ $x = 16\frac{1}{2}$	General Mathematics: Revision and Practice Mathematics: A Complete Course with CXC Question Volumes 1 & 2	Homework Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

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CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
EQUATIONS *cont'd*		E.g. Ramona bought 5 hamburgers and 3 pizzas for \$167.75. If, however Ramona had bought 4 hamburgers and 4 pizzas then she would have paid \$193. Calculate the price Ramona paid per hamburger and per pizza, correct to the nearest cent. The general form of the quadratic equation is $ax^2 + bx + c = 0$, $a \neq 0$ and a, b, c ∈ R. If the product of two factors is equal to zero, then one or both of the factors is equal to zero. $(ax + b)(cx + d) = 0$ i.e. $ax + b = 0$ $cx + d = 0$	**Problem:** Two of the problems below are correct and two are partially correct. Identify the problems that are partially correct and correct them. a) $(n + 17)(n + 7) = 0$ $n = -17$ $n = -7$ b) $x^2 - 13x + 36 = 0$ $(x - 9)(x - 4) = 0$ $x = -9$ $x = -4$ c) $y^2 - y = 6$ $y^2 - y - 6 = 0$ $= 0$ $(y - 3)(y + 2) = 0$ $= 0$ $y = 3$ $y = -2$ d) $m^3 - 4m = 0$ $m(m^2 - 4)$ m $m = 4$ **Problem:** Match each equation in the first column with the correct solution in the second. a) $x^2 + 3x + 1 = 0$ b) $x^2 + 4x = 6$ c) $4x^2 + 5x + 1 = 0$ d) $3x^2 + 4 = 7x$ 1. $-1, \ -\frac{1}{4}$ 2. $\frac{-3+\sqrt{5}}{2}, \ \frac{-3-\sqrt{5}}{2}$ 3. $\frac{4}{3}, \ 1$ 4. $-2 + \sqrt{10}, \ -2 - \sqrt{10}$		

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CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
EQUATIONS *cont'd*		*The equation:* $x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$ is called the quadratic formula and can be used to solve any quadratic equation.			
TRANSPOSITION	Change the subject of formulae including powers and roots and the subject appearing more than once.	'Changing the subject of the formula' or 'transposing the formula' refers to the process whereby the formula is rearranged so that another given symbol becomes the subject. In transposing, all the rules are obeyed as in the solution of equations. **When a subject appears more than once, it becomes necessary to factorize a set of terms before changing the subject of a formula.** To do this group the like terms on one side of the formula, factorize the group; then change the subject of the formula	**Problem:** Transpose the formula $\boldsymbol{l = \frac{p+mN}{m}}$ to make $\boldsymbol{m}$ the subject	Mathematics: A Complete Course with CXC Question Volume 2 General Mathematics: Revision and Practice	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam
INEQUALITIES	Solve inequalities algebraically. Represent inequalities on a diagram.	A linear relationship between two variables *x* and *y*, is one that can always be represented graphically by a straight line which can be written in the forms $\boldsymbol{y < mx + c}$, $\boldsymbol{y > mx + c}$ $\boldsymbol{y \leq mx + c}$ $\boldsymbol{y \geq mx + c}$		STP Caribbean Mathematics Book 2	Quizzes Questioning Techniques End of Unit Test

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CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
INEQUALITIES *cont'd*	Write down inequalities to describe a region. Represent inequalities involving two variables in the *x* - *y* plane. Draw diagrams to represent regions in the *x* - *y* plane defined by a set of inequalities.	A linear inequality can be written in one of the forms: $y < mx + c$ $y > mx + c$ $y \leq mx + c$ $y \geq mx + c$ Each linear inequality can be represented on a graph, by a region which is either shaded or unshaded. When two or more linear inequalities are drawn simultaneously on graph paper, using the same scales and axes, then their common solution lies in the area where the region representing the inequations intersect.	**Problem:** Given that ***x*** is an integer, find the solution set of ***x*** for the inequality. $5 \leq 2x + 1 < 11$	STP Caribbean Mathematics for CXC Book 4 General Mathematics: Revision and Practice	B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam Projects Math Journals
RELATIONS AND FUNCTIONS	Find the value for a variable for which a given function will produce a required solution.	A **relation** is defined as a set of ordered pairs that obey a particular rule. A **function** is defined as a relation in which each element in the domain is mapped onto one and only one element in the range.		STP Caribbean Mathematics for CXC Book 4 Mathematics: A Complete Course with CXC Question Volume 1	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

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<tr>
<td>GRAPHS OF FUNCTIONS</td>
<td>Draw the graph of quadratic functions.

Calculate the gradient of a line, given two points on the line.

Solve linear simultaneous equations graphically.

State the gradient of a line whose equation is given.

Determine if two lines whose equations are given are parallel.

Determine if two lines whose equations are given are perpendicular.</td>
<td>The function $f: x \rightarrow ax$ is called the <u>linear function</u>. It is a straight line that passes through the origin.

The function $f: x \rightarrow ax^2$ is called the <u>quadratic function</u>. It is a smooth curve that passes through the origin which is symmetrical about the y-axis.

This smooth curve is called a <u>parabola</u>.

The general form of the equation of a straight line is $y = mx + c$, where m = the gradient of the straight line.

$m = \frac{\textbf{the vertical rise}}{\textbf{the horizontal shift}} = \frac{y_2 - y_1}{x_2 - x_1}$</td>
<td>Problem: Determine whether the points below are on the same line. Then find the slope. If a point is not on the line, correct it so that it is on the same line. Then find the slope.
a) $(-1, 8), (-2, 10), (-3, 12), (-5, 16)$

b) $(0, 0), (3, 3), (4, 4), (7, 7)$

c) $(8, -3), (7, -4), (5, -5), (3, -8)$

Problem:
The following is a table of values for a curve.

<table>
<tr><td>x</td><td>-1</td><td>0</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>6</td><td>7</td></tr>
<tr><td>y</td><td>12</td><td>5</td><td>0</td><td>-3</td><td>-4</td><td>-3</td><td>0</td><td>9</td><td>12</td></tr>
</table>
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<td>STP Caribbean Mathematics Books 2 & 3

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SCOPE OF WORK
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CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
GRAPHS OF FUNCTIONS *cont'd*	Write the equation of a line given its gradient and intercept on the y-axis. Write the equation of a line through two given points.	And *c = the intercept of the straight line on the y-axis*. To find the equation of a straight line without actually having to calculate the value of the intercept on the y-axis, $\boldsymbol{c}$; use $\boldsymbol{y_2 - y_1 = m(x_2 - x_1)}$. Given the $\boldsymbol{x}$-intercept $(\boldsymbol{a}, \boldsymbol{o})$ and $\boldsymbol{y}$-intercept $(\boldsymbol{o}, \boldsymbol{c})use\boldsymbol{y = -\frac{c}{a}x + c}$ *Two lines are **parallel** if their gradients are equal. That is,* $\boldsymbol{m_1 = m_2}$ *Two lines are **perpendicular**, if the product of their gradients is equal to negative one. That is,* $\boldsymbol{m_1 \times m_2 = -1}$ A point of intersection is a point where at least two lines or two curves or a line and a curve meet. For this method: draw the graphs representing a linear function $f(x) = ax + c$ and a constant function $f(x) = q$ or the two linear equations on the same graph paper, using the same scales and axes. The solution is then given by the point of intersection of the two straight lines.	a) Use a scale of 2 cm = 1 unit on the x axis and 1 cm = 1 unit on the y axis to draw the graph of the curve. b) The curve is a parabola. Therefore, one of the points of the graph is incorrect. c) Write the coordinates of: (i) the incorrect point (ii) the corrected point d) Using the solutions for $\boldsymbol{y = 0}$, or otherwise, write and simplify the equation of the parabola. e) (i) Draw the tangent to the curve at the point $(\boldsymbol{2}, \boldsymbol{-3})$. (ii) Calculate the gradient at this point.		

SCOPE OF WORK
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CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
MATRICES	Calculate the determinant of a square matrix. Find the inverse of a square matrix. Identify a given matrix which has no inverse.	Given the non-singular *2 × 2 matrix* $A = \begin{pmatrix} a & b \\ c & d \end{pmatrix}$ then, the inverse of the *matrix A,* $\boldsymbol{A^{-1}} = \begin{pmatrix} a & b \\ c & d \end{pmatrix}^{-1}$ $= \frac{1}{\lvert A \rvert} \times \boldsymbol{Adjoint}$ $= \frac{1}{ad-bc}\begin{pmatrix} \boldsymbol{d} & \boldsymbol{-b} \\ \boldsymbol{-c} & \boldsymbol{a} \end{pmatrix}$	**Problem:** $2\begin{pmatrix} 3 & \boldsymbol{x} \\ 4 & 2 \end{pmatrix} + \begin{pmatrix} 3 & 4 \\ 2 & \boldsymbol{y} \end{pmatrix} - \begin{pmatrix} -1 & 8 \\ 14 & 1 \end{pmatrix} = 3$. Solve for $\boldsymbol{x}$ and $\boldsymbol{y}$. **Problem:** **A** = $\begin{pmatrix} \boldsymbol{2} & \boldsymbol{1} \\ \boldsymbol{2} & \boldsymbol{3} \end{pmatrix}$. Calculate: a) the determinant of A b) the inverse of A **Problem:** Solve using matrices: $\boldsymbol{2x + 3y = 4}$ $\boldsymbol{4x + 7y = 10}$	STP Caribbean Mathematics Book 3 Mathematics: A Complete Course with CXC Question Volume 2 General Mathematics: Revision and Practice New Comprehensive Mathematics for 'O' Level 2nd Edition	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam
VECTORS	Find the sum or difference of two vectors using the triangle law. Calculate the magnitude (length) and direction of a given vector. Give the position vector of a point (*x*, *y*).	The addition of vectors is commutative. That is, $\underline{\boldsymbol{a}} + \underline{\boldsymbol{b}} = \underline{\boldsymbol{b}} + \underline{\boldsymbol{c}}$. The addition of vectors is associative. That is, $(\underline{\boldsymbol{a}} + \underline{\boldsymbol{b}}) + \underline{\boldsymbol{c}} = \underline{\boldsymbol{a}} + (\underline{\boldsymbol{b}} + \underline{\boldsymbol{c}})$.	**Problem**: Partition the list of quantities into scalars and vectors: mass, velocity, speed, distance, force. **Problem**: Draw the directed line segment which represent **AB** = $\begin{pmatrix} 3 \\ 4 \end{pmatrix}$	STP Caribbean Mathematics for CXC Book 4 Mathematics: A Complete Course with CXC Question Volume 2	Quizzes Questioning Techniques End of Unit Test Projects Math Journals

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UNIT: ALGEBRA

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
VECTORS *cont'd*		The subtraction of vectors is non-commutative. That is, $\underline{\boldsymbol{a}}-\underline{\boldsymbol{b}}\neq\underline{\boldsymbol{b}}-\underline{\boldsymbol{c}}$. If two vectors are both going in a clockwise direction or counter clockwise direction, then we can find the sum of the two vectors by completing a triangle. The sum of the two vectors is called the resultant vector. Given vectors $\overrightarrow{AB}$ and $\overrightarrow{BC}$, we complete the triangle ABC. $\overrightarrow{\boldsymbol{AC}} = \overrightarrow{\boldsymbol{AB}} + \overrightarrow{\boldsymbol{BC}}$ where $\overrightarrow{AC}$ is the resultant vector of $\overrightarrow{AB}$ and $\overrightarrow{BC}$. Note that $\overrightarrow{\boldsymbol{AB}} + \overrightarrow{\boldsymbol{BC}} = \overrightarrow{\boldsymbol{BC}} + \overrightarrow{\boldsymbol{AB}}$ The magnitude of a vector is found using Pythagoras' Theorem. That is, if $\overrightarrow{\mathrm{AB}} = \begin{pmatrix} x \\ y \end{pmatrix}$ then $/\overrightarrow{\mathrm{AB}}/ = \sqrt{x^2 + y^2}$.	**Problem**: $\underline{\mathbf{a}} = \begin{pmatrix} 4 \\ 3 \end{pmatrix}$, $\underline{\mathbf{b}} = \begin{pmatrix} -2 \\ 1 \end{pmatrix}$. Calculate $\underline{\mathbf{a}} + \underline{\mathbf{b}}$ **Problem**: $\underline{\mathbf{a}} = 4\mathbf{i} + 3\mathbf{j}$, $\underline{\mathbf{b}} = -2\mathbf{i} + \mathbf{j}$. Calculate $\underline{\mathbf{a}} - \underline{\mathbf{b}}$ **Problem**: AB = $2\underline{\mathbf{a}} + 3\underline{\mathbf{b}}$, CD = $-4\underline{\mathbf{a}} - 6\underline{\mathbf{b}}$. State two geometrical properties that relate to AB and CD.	General Mathematics: Revision and Practice	B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
GRADE 11
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
CIRCLE	.		Research parts of a circle: *major/minor segment, major/minor arc, tangent, etc.*	STP Caribbean Mathematics Book 2	Pre-Test on defining and identifying parts of the circle: *major/minor segment, major/minor arc, tangent, etc.*
ANGLE PROPERTIES	Find the magnitude of angles in circles by applying circle theorem. Namely: (a) Angles in semicircle (b) Angles in the same segment. (c) Angles at centre/ circumference. (d) Angles in a cyclic quadrilateral. (e) Angles between tangent and radius/diameter. (f) Alternate angle segment theorem.	The **angle in a semicircle** is a right angle. Angles at the circumference of a circle standing on the same arc (or chord) are equal. That is, angles in the **same segment** of a circle are equal. The **angle at the centre of a circle** is twice the angle at the **circumference** standing on the same arc (or chord). The opposite angles in a **cyclic quadrilateral** are supplementary. The exterior angle of a **cyclic quadrilateral** is equal to the interior opposite angle.	http://www.transum.org/Software/SW/Starter_of_the_day/Similar.asp?ID_Topic=3 http://www.greatmathsteachingideas.com/tag/angle/ http://www.mathworksheets4kids.com/angles.php	Mathematics A Complete Course With CXC Questions Vol. 2 STP Caribbean Mathematics Book 3 General Mathematics: Revision and Practice	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
GRADE 11
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
ANGLE PROPERTIES *cont'd*	Use interior and exterior angle properties of polygons to solve related geometric problems (regular or irregular). Apply algebraic methods to the solution of geometric problems.	The **radius** of a circle drawn to a point of contact of a **tangent** is perpendicular to the tangent. The **tangents** to a circle from an **external point T** are equal in length. The **angle between a tangent to a circle and a chord** at the point of contact is equal to the angle in the **alternate segment** of the circle.			
CONSTRUCTIONS	Draw scale diagrams involving bearing and use these diagrams to calculate distance and relative bearing.	The scale is given as the ratio of a length on the map to the actual distance on the ground.	http://www.mathopenref.com/worksheetlist.html http://www.transum.org/Software/SW/Starter_of_the_day/Similar.asp?ID_Topic=61	Mathematics A Complete Course With CXC Questions Vol. 1 Heinemann Mathematics for CXC STP Caribbean Mathematics Book 2	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
GRADE 11
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
TRANSFORMATIONS	Describe a translation using column vectors. Identify, describe fully and perform the following transformations by identifying the properties of each transformation: a) reflect objects in the: i) *x*- axis ii) y-axis iii) line *x* = n *(where n is an integer).* iv) line y = n *(where n is an integer).* b) translate objects through a displacement vector. c) rotate objects about the origin through multiples of 90^o clockwise and anti-clockwise. d) enlarge objects from the origin given a positive whole number scale factor.	A **translation** can be represented by a column matrix $\boldsymbol{T} = \begin{pmatrix} \boldsymbol{x} \\ \boldsymbol{y} \end{pmatrix}$, where $\boldsymbol{x}$ is the horizontal shift and $\boldsymbol{y}$ is the vertical rise or fall. A **reflection** in the origin, in the line $\boldsymbol{y - axis}$, in the line $\boldsymbol{x - axis}$, in the line $\boldsymbol{y = n}$, or in the line $\boldsymbol{x = n}$. **Rotation**, angle of rotation, direction – clockwise or anticlockwise, centre of rotation – origin or (x, y). **Enlargement**, scale factor $\boldsymbol{k}$, centre of enlargement – origin or (x, y).	http://www.transum.org/Software/SW/Starter_of_the_day/Similar.asp?ID_Topic=56 http://www.math-aids.com/Geometry/Transformations/ http://www.softschools.com/math/geometry/transformations/	Mathematics A Complete Course With CXC Questions Vol. 1 Heinemann Mathematics for CXC STP Caribbean Mathematics Book 2 General Mathematics: Revision and Practice	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

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UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
PYTHAGORAS THEOREM AND TRIGONOMETRY	Define and identify: *trigonometric ratios: sine, cosine and tangent; adjacent and opposite angles in a right angled triangle.* Define: *bearings, angles of elevation and depression, altitude of the sun, scale drawing, etc.* Use trigonometric functions to convert angles to numerical values. Use inverse functions to convert numerical values to angles. Determine the sine, cosine and tangent of acute angles in right angled triangles.	**Trigonometry** is the branch of Mathematics concerned at its simplest level, with the measurement of triangles. Trigonometrical ratios such as **sine**, **cosine** and **tangent** are used to calculate unknown angles or lengths. $Sine\ \theta = \frac{side\ opposite\ to\ the\ angle}{hypotenuse}$ $Cosine\ \theta = \frac{side\ adjacent\ to\ the\ angle}{hypotenuse}$ $Tangent\ \theta = \frac{side\ opposite\ to\ the\ angle}{side\ adjacent\ to\ the\ angle}$ The position of an object relative to another object is called its **bearing**. The **bearing** of an object is the angle measured in a clockwise direction from north to the object.	http://www.learnnc.org/lp/pages/3650 http://www.transum.org/Software/SW/Starter_of_the_day/Similar.asp?ID_Topic=47 **ACTIVITY** **Materials:** Ruler, pencil, graph paper. 1. Draw a right angled triangle ABC with angle C = 90°, AC = 3cm and angle A = 53°. Label this Δ 1. 2. Draw three more right angled triangles similar to Δ1 using different lengths for side AC. Call the triangles Δ2, Δ3, Δ4. 3. Use a ruler to measure the lengths of the sides of each triangle.	Mathematics A Complete Course With CXC Questions Vol. 1 Heinemann Mathematics for CXC Heinemann Mathematics for CXC STP Caribbean Mathematics Books 2 & 3 Integrated Mathematics 1 General Mathematics: Revision and Practice	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
GRADE 11
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

<table>
<tr><th>CONCEPTS/ TOPICS</th><th>OBJECTIVES</th><th>CONTENTS</th><th>ACTIVITIES</th><th>RESOURCES</th><th>ASSESSMENTS</th></tr>
<tr>
<td>PYTHAGORAS THEOREM AND TRIGONOMETRY
cont'd</td>
<td>Apply the sine, cosine or tangent to the calculation of a side or an angle of a right-angled triangle.

Apply trigonometric ratios to solve problems in two dimensions involving angles of elevation/depression and bearing.

Use three figure bearings to solve problems.

Draw scale diagrams involving bearing and use these diagrams to calculate distance and relative bearing.

Calculate reciprocal bearing.</td>
<td>Bearings are always written using three digits in the whole number part.</td>
<td>4. Find the ratios $\frac{AC}{AB}$ and $\frac{BC}{AB}$and complete a table like the one below.
<table>
<tr><td></td><td>AC</td><td>BC</td><td>AB</td><td>AC/ AB</td><td>BC/ AB</td></tr>
<tr><td>Δ1</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Δ2</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Δ3</td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Δ4</td><td></td><td></td><td></td><td></td><td></td></tr>
</table>
5. Do you see any pattern in the ratios $\frac{AC}{AB}$? in the ratios $\frac{BC}{AB}$?

6. Suppose you draw any size right-angled triangle ABC with angle A = 53°, Predict the ratios AC/AB and BC/AB for the triangle.

Activity:
Draw a diagram displaying names of students to represent the places of the compass point.
Let the diagram show the directions in which several students are travelling. Work out the bearing for each student</td>
<td></td>
<td></td>
</tr>
</table>

SCOPE OF WORK
GRADE 11
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
PYTHAGORAS THEOREM AND TRIGONOMETRY *cont'd*	Interpret and use three figure bearings to solve problems. Apply Pythagoras' theorem and trigonometric ratios to calculate the bearing of one point from another.	A bearing along the reverse direction of a line. Also known as reciprocal bearing. Add or subtract 180° from your forward bearing to get your back bearing. You want the result to fall between 0 ° *and* 360°, *so if the f* *add* 180°to it, and if its greater than 180°, *subtract* 180	**Activity:** Have students identify and determine the three key words to find or plot a bearing. Key words 1) "FROM" - Find the word from in the question and put your pencil on the diagram you are going from. 2) "NORTHLINE" - at the point you are going FROM, draw in a NORTHLINE. 3) "CLOCKWISE" - Now draw in the angle CLOCKWISE from the northline to the line joining the two points. This angle is the required bearing.		
SIMILARITY AND CONGRUENCY	Define similar and identify similar figures/objects. State and apply the properties of similar figures.	**Similar shapes** have the same shape and are equi-angular.	**ACTIVITY** **Materials:** Protractor, metric ruler, graph paper. 1. On your paper, draw a small "house" with five sides. Measure the length of each segment.	Mathematics A Complete Course With CXC Questions Vol. 1	**ACTIVITY:** Critical Thinking Do you think two quadrilaterals can have four pairs of congruent angles but not be similar?

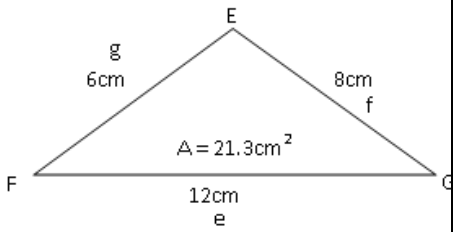
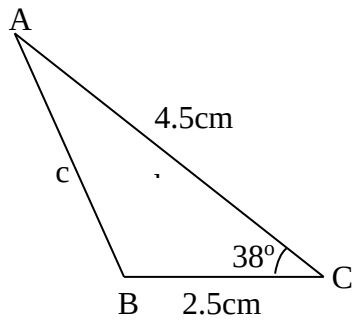
SCOPE OF WORK
GRADE 11
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
SIMILARITY AND CONGRUENCY *cont'd*	Use the properties of similar and congruent figures to find the measure of missing sides and angles. Define congruent. State the necessary and sufficient conditions for congruency *(SSS, ASA, AAS, SAS, RHS).* Identify congruent figures/objects. Use the properties of congruent figures to determine the measure of missing sides and angles.	When shapes are similar: (i) the length of a side of one shape is k times the corresponding length of the side of the similar shape. K is a constant called the scale factor. (ii) the area of one shape is k^2 times the area of the similar shape. (iii) the square of the length of a side of one shape is k^2 times the square of the corresponding length of the side of the similar shape. Two triangles are **congruent** if they have the same size and shape. This means that the three sides and angles of one triangle must be identical to the three sides and angles of another triangle.	2. Add 3cm to each length, then draw another house with the new dimensions (Make sure both the slanted sides are the right length) 3. Draw a third house, adding another 4cm to each segment in the second house. Do your houses have the same shape? 4. Measure the angles in your houses. What do you notice? Now draw a fourth house by doubling each length in the original house. Does the house have the same shape as the original house? Measure the angles in the fourth house. What do you notice now?	Heinemann Mathematics for CXC STP Caribbean Mathematics Book 2 Middle School Math Course 2 General Mathematics: Revision and Practice	Explain your answer. Similar figures that have the same size are congruent figures. What is the scale factor for two congruent figures? Explain.

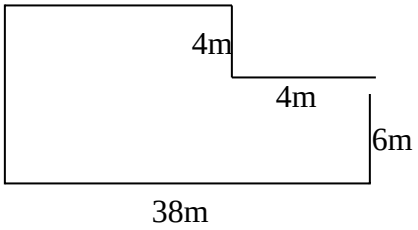
SCOPE OF WORK
GRADE 11
UNIT: MEASUREMENT

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
SIMILARITY AND CONGRUENCY *cont'd*		Two triangles will be congruent if: (i) Three sides of one triangle are equal to corresponding three sides of the other triangle. (S.S.S.) (ii) Two sides and the included angle of one triangle are equal to the corresponding two sides and included angle of the other triangle. (S.A.S.) (iii) Two angles and side of one triangle are equal to the corresponding two angles and side of the other triangle. (A.S.A.) (iv) Both triangles are right-angled, and the hypotenuse and a side of one triangle are equal to the hypotenuse and corresponding side of the other triangle. (R.H.S.)			

SCOPE OF WORK
GRADE 11
UNIT: MEASUREMENT

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
PERIMETER AND AREA	Use the formulae to calculate the area of triangles and parallelograms. Solve word problems involving area and perimeter of compound shapes	To calculate the area of a non-right triangle given the length of two sides and the included angle. A = ½ ab sin C  Area = ½ fg sin E 21.3 = ½ x 8 x 6 x sin E $\frac{21.3 \times 2}{8 \times 6}$ = sin E 0.888 = sin E (Remember that there two possible solutions.) Angle E = 62.6° or Angle E = (180° – 62.6°) = 117.4 ° Since the largest angle is required Angle E = 117.4 °	1. Find the area of Δ ABC.  2. The area of the triangle ABC is 58cm², AB = 15cm and BC = 9cm. Calculate: a) angle ABC b) AC 3. The sides of a triangle are 14cm, 18cm and 23cm. Calculate a) the largest angle of the triangle b) find the area of the triangle.	Mathematics: A Complete Course with CXC Questions Volume 1 Squared Papers STP Caribbean Mathematics Books 1 & 2 Complete Mathematics General Mathematics: Revision and Practice	Quizzes Worksheets Projects End of Unit Tests Past BGCSE Papers End of Term Examinations

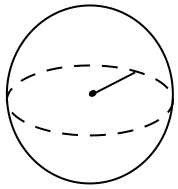
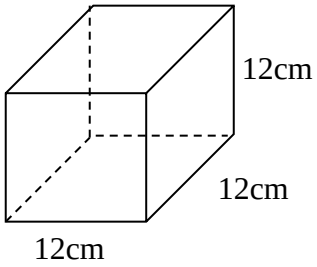
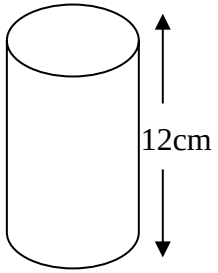
SCOPE OF WORK
GRADE 11
UNIT: MEASUREMENT

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
PERIMETER AND AREA *cont'd*			1. The diagram shows a plan of Philips' garden.  a) Calculate the perimeter of the garden. b) Find the area of the garden. Philip wishes to buy turf to cover the complete area of the garden. Turf is paid in units of $4m^2$. c) Workout how many units Philip needs to cover the whole garden. d) Turf cost \$10.90 per unit plus \$16.50 for delivery. Find the total cost of the turf plus delivery.		
SURFACE AREA	Solve word problems involving surface areas of cone, cube, cuboid and cylinder.	**Cone** Surface area = $\pi \times$ (radius of base)$^2 + \pi \times$ (radius of base) $\times$ height of cone **The Cylinder** - *CSA* = $2\pi rh$	1. A fruit crate is 35cm wide by 65cm long by 45cm deep. Find its surface area. 2. The paint in a tube will cover $24in^2$. How many tubes are needed to paint a cube 5in on each edge?		

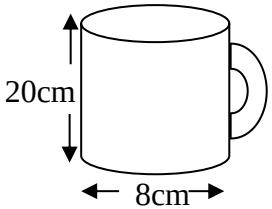
SCOPE OF WORK
GRADE 11
UNIT: MEASUREMENT

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
SURFACE AREA *cont'd*		$TSA = 2\pi rh + 2\pi r^2 = 2\pi r(h + r)$ **<u>The Cube</u>** - $TSA = 6l^3$ **<u>The Cuboid</u>** - $TSA = 2bh + 2lb + 2lh$	3. The height of a cylindrical water tank is 1.6m. The radius is 0.4m. Find the surface area. 4. How many square inches of metal are used to make a closed can 3½in wide and 5½in tall? 5. Mrs. Rolle plans to cover a rectangular box with wrapping paper. She will not cover the top face but will cover all other five faces. The box is 44cm long, 38cm wide and 35cm high. How many square centimeters of wrapping paper will she need to cover the box? 6. Find the surface area of a toy box that is in the shape of a cube. The edges of the toy box are 45 centimeters. 7. Mrs. Taylor is painting the walls of how bedroom. The room is 18 feet long, 12 feet wide and 8.5 feet high. How many square feet must she paint? Develop a collection of three-dimensional objects with drawings and pictures.	Mathematics: A Complete Course with CXC Questions Volume 1 Complete Mathematics New Comprehensive Mathematics for O' Levels Everyday Objects Geometry Solids Kits Extended Mathematics for IGCSE General Mathematics: Revision and Practice	Quizzes Worksheets Projects End of Unit Tests Past BGCSE Papers End of Term Examinations

SCOPE OF WORK
GRADE 11
UNIT: MEASUREMENT

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
VOLUME AND CAPACITY	Calculate the volume of spheres and prisms. Solve word problems involving volume of prisms.	 $V = 4/3\pi r^3$	1. Find the volume of a rectangular solid that is 15cm by 12cm by 14cm. 2. Find the volume of a cube with 7.8 centimeter edges. 3. The metal cube, each of whole side is 12cm long, is melted down and made into a cylinder 12cm high. What is the radius of this cylinder? 	http://nrich.maths.org/public/lE.g.php?code=150 http://www.bbc.co.uk/skillswise/factsheet/ma23capa-l1-f-capacity http://nzmaths.co.nz/volume-and-capacity-units-work General Mathematics: Revision and Practice Mathematics A Complete Course With CXC Questions Vol. 1 	Quizzes Worksheets Projects End of Unit Tests Past BGCSE Papers End of Term Examinations

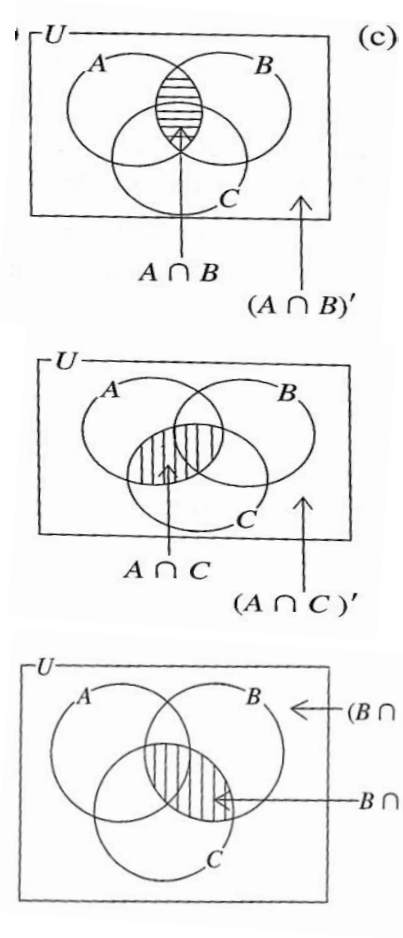
SCOPE OF WORK
GRADE 11
UNIT: MEASUREMENT

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
VOLUME AND CAPACITY *cont'd*			4. A hard plastic mug has the dimensions shown.  a). What is the greatest volume of coffee the mug can hold? b). If $900cm^3$ of coffee is in the mug, how high is it in the mug? 5. A tree trunk can be thought of as a circular prism (cylinder) with height of 1.8m. If the trunk has diameter of 50cm. What volume of wood is this in m^3? 6. Tom's garden has a circular pond which is surrounded by a ring shaped paved area. The pond is 34cm deep. The pond is filled with waters. a). Find the volume of water in the pond when full. b). Find the area of surrounding pavement of the pond.		

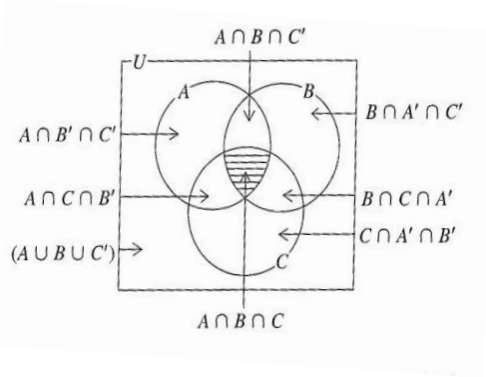
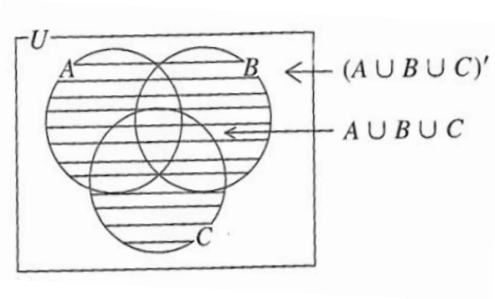
SCOPE OF WORK
GRADE 11
UNIT: MEASUREMENT

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
VOLUME AND CAPACITY *cont'd*			1. Find the volume of sphere with a a). Radius of 5cm b). Diameter of 8cm. 2. A solid metal sphere is recast into many smaller spheres. Calculate the number of the smaller spheres if the initial and final radii are as follows: a). Initial Radius: 10cm; Final Radius: 2cm b). Initial Radius: 7cm; Final Radius: ½cm c). Initial Radius: 1m; Final Radius: 1/3cm 3. Find the radius of a sphere of volume $90cm^3$. 4. A solid metal cube of side 6cm is recast into a solid sphere. Find the radius of the sphere?		

SCOPE OF WORK
GRADE: 11
UNIT: SETS

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
VENN DIAGRAMS	Describe regions on Venn diagrams using words and/or set symbols. Calculate the number of elements for three sets. Calculate the number of elements in a given regions using algebraic equation. Apply the Law of Syllogism and the Chain Rule. Describe regions on Venn diagrams using set notation. Draw suitable Venn diagrams to represent information given.	**Venn diagrams** are used to show relationships between sets. 	Draw a Venn Diagram with three overlapping sets. Carry out a survey of your classmates, finding out whether they like cola (C), lemonade (L), and flavoured milk drink (M). Write the initials of the person in the correct part of the diagram. You could do this out-of-doors- draw large sets in chalk. Each respondent then stands in the appropriate section.	http://www.math-aids.com/Venn_Diagram/ http://www.readwritethink.org/classroom-resources/student-interactives/venn-diagram-30973.html http://www.purplemath.com/modules/venndiag4.htm General Mathematics: Revision and Practice Mathematics A Complete Course With CXC Questions Vol. 1	Exercises to construct two-stage tree diagrams. Exercises to interpret tree diagrams.

SCOPE OF WORK
GRADE: 11
UNIT: SETS

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
VENN DIAGRAMS *cont'd*		 	Project : Carry out a survey of your classmates, finding out whether they like cola (C), lemonade (L), and flavoured milk drink (M). Draw a suitable Venn diagram to illustrate the information. Problem: A, B, and C are three sets, and $B \subset A$, $n(A) = 30, n(B) = 20, n(C) = 22, n(A \cup B \cup C) = 40$ and $n(A \cap B \cap C) = 6$. Construct a Venn diagram, and find $n(B \cap C)$.	Mathematics: A Complete Course with CXC Question Volume 2	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
GRADE: 11
UNIT: SETS

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
PROBLEM SOLVING	Calculate the number of elements for three sets Calculate the number of elements in a given regions using algebraic equations. Use Venn diagrams to solve word problems.	***Venn diagrams*** *are used to show relationships between sets.* $\boldsymbol{n(B)}$ *means* ***"number of elements in set B"*** *For three sets:* $\boldsymbol{n(A \cup B \cup C)} = \boldsymbol{n(A)} + \boldsymbol{n(B)} + \boldsymbol{n(C)} - \boldsymbol{n(A \cap C)} - \boldsymbol{n(B \cap C)} + \boldsymbol{n(A \cap B \cap C)}$ *and* $\boldsymbol{n(U)} = \boldsymbol{n(A \cup B \cup C)} + \boldsymbol{n(A \cup B \cup C)'}$	E.g. In a music class of 45 students, 28 students like Calypso, 16 students like Reggae, 28 students like Soca, 15 students like both Calypso and Soca, 9 like both Calypso and Reggae, and 10 students like both Soca and Reggae. Each student likes at least one of the three types of music. a) Draw a suitable Venn diagram to represent the information. b) Determine the value of $\boldsymbol{x}$. c) How many students likes : (i) Calypso only (ii) Reggae and Soca only ?	Mathematics: A Complete Course with CXC Question Volume 2 General Mathematics: Revision and Practice	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
GRADE: 11
UNIT: DATA MANAGEMENT

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
ORGANIZING AND ANALYZING DATA	Define and explain the terms: data, frequency tables, class, lower/ upper class limits, lower/upper class boundary, class interval, mid-point, class width. Calculate the measures of central tendency (mean, median, mode) and the range from a frequency distribution of ungrouped and grouped data.	The mean of a set of numbers is the sum of the numbers divided by the total count of numbers. An estimate of the mean of grouped data can be calculated by assuming that the average of each group is the halfway value for that group. The mode of a set of numbers is the number that occurs most often. If the numbers are grouped, the group with the highest frequency is called the modal grouped. The median of a list of n values is the $\frac{(n+1)}{2}$ value when the values are in order of size.	Heights of pupils in class. Weight of people in the class. Cost of journey to school this morning. Times of journeys to school (in minutes). Ages of students (in months).	STP Caribbean Mathematics Bk. 3 General Mathematics: Revision and Practice Mathematics A Complete Course With CXC Questions Vol. 2	Quiz Worksheets End of unit test Group projects Math Journals B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
GRADE: 11
UNIT: PROBABILITY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
PROBABILITY	Draw and interpret 2 stage probability tree diagrams. Apply the addition (sum) law to probability trees. Apply the product law to probability trees.	Two stage probability tree diagram involving a. 1st stage having no effect on the 2nd, e.g. 1st item taken out at random and replaced before 2nd item is chosen b. 1st stage having an effect on the 2nd e.g. 1st item taken out at random and NOT replaced before 2nd item is chosen. Different paths through a tree diagram represent mutually exclusive events for which the addition law for mutually exclusive events can be used. The possible outcome along each path of a tree diagram is found by multiplication of the probabilities along each path.	http://www.cimt.plymouth.ac.uk/projects/mepres/book8/y8s10os.pdf, sections 10.5 – 10.8	STP Caribbean Mathematics Book 2 New Comprehensive Mathematics for 'O' Level http://www.cimt.plymouth.ac.uk/projects/mepres/book8/y8s10os.pdf, sections 10.5 – 10.8 http://www.teachers.ash.org.au/mikemath/probcondtree/index.html General Mathematics: Revision and Practice	Exercises to construct two-stage tree diagrams. Exercises to interpret tree diagrams. Exercises to apply sum law to probability trees. Exercises to apply product law to probability trees.

GRADE 12

SCOPE OF WORK
GRADE: 12
UNIT: NUMBER & OPERATIONS

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
PERCENTAGES	Solve consumer math problems: compound interest; depreciation. Use calculators to check work.	**Compound Interest** is the overall interest earned on investment when the total interest earned in each period is added back to the original capital $\text{Amount} = \text{P}\left(1 + \frac{\text{R}}{100}\right)^{\text{n}}$, $\therefore \text{C. I.} = \text{Amount} - \text{Principal}$ Compound Interest can also be paid more than once per year – semiannually or quarterly $\text{Amount} = \text{P}\left(1 + \frac{\text{r}}{\text{n}}\right)^{\text{nt}}$ where ***n*** is the number of times per year that interest is paid, ***t*** is the number of years and ***r*** is the rate of interest as a percentage. **Depreciation** decreases the initial value of an asset each year by a given percentage. **Depreciation** is the opposite to compound interest; while compound interest increases the initial value each year by a given percentage, depreciation decreases the initial value each year by a given percentage. $\text{Amount} = \text{P}\left(1 - \frac{\text{R}}{100}\right)^{\text{n}}$, $\therefore \text{D} = \text{Principal} - \text{Amount}$	My savings account contains $1,000. Interest is 8% compounded annually. Calculate the amount that will be in my account after 8 years Calculate the compound interest on $5500 at the end of two years, when interest of 10% is added semi-annually	Mathematics: A Complete Course with CXC Questions Vol. 1 General Mathematics: Revision and Practice	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
GRADE: 12
UNIT: NUMBER & OPERATIONS

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
APPROXIMATION *cont'd*	Find lower and upper bounds of derived values given the degree of accuracy of their components.	When a number is rounded off, the **lower bound** is the smallest possible value that the number could have been, and the **upper bound** is the highest possible value that the number could have been.	A company stated that, to the nearest 100, it built 2600 homes. State: a) the greatest number of homes built; b) the least number of homes built. A rectangle has length 8.4cm and width 2.6cm to 1 decimal point. a) estimate the area to the nearest cm; b) Calculate: (i) the smallest possible area; (ii) the largest possible area.	Mathematics: A Complete Course with CXC Questions Vol. 1	Quizzes Questioning Techniques End of Unit Test Projects Math Journals Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
GRADE: 12
UNIT: ALGEBRA

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
ALGEBRAIC FRACTIONS	Reduce a given algebraic fraction to its lowest form. Solve quadratic equations containing algebraic fractions.	In some cases, factorization is necessary to simplify algebraic fractions. In order to multiply and divide algebraic fraction, it is necessary to: a) First, factorize the numerator or denominator, or both the numerator and denominator. b) Cancel the common factors. All quantities in a pair of brackets are regarded as a single term. Therefore, cancelling a term in the numerator with a term in the denominator is equivalent to dividing both the numerator and denominator by the same term. It is also very important to understand that we can cancel terms only if there is a product in the numerator and in the denominator. ***E.g. Simplify*** $\frac{x^2-8xy+16y^2}{3x^2-12xy}$ In order to add or subtract algebraic fractions, it is necessary to: a) First, factorize the denominators.	**Problem:** Write as a single fraction in simplest form. (i) $\frac{11x}{12} - \frac{3x}{4}$ ii) $\frac{2x-3}{4} - \frac{x-2}{3}$ (iii) $\frac{1}{x-2} + \frac{2}{x-3}$ (iv) $\frac{39x}{y^4} \div \frac{3}{xy}$ **Problem:** Factorize and simplify: $$\frac{3x - 6}{x^2 - 4x + 4}$$ **Problem:** Solve the equation: $$\frac{x-3}{2} = \frac{7}{x+2}$$	STP Caribbean Mathematics Book 3 Mathematics: A Complete Course with CXC Questions Vol. 2	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

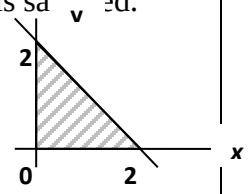
SCOPE OF WORK
GRADE: 12
UNIT: ALGEBRA

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
ALGEBRAIC FRACTIONS *cont'd*		b) Find the lowest common multiples of the denominators. c) Express the fractions as equivalent fractions over the common denominator, using brackets d) Add or subtract the like terms in the numerator as necessary. e) Factorize the numerator and denominator in order to reduce the fraction to lowest terms where possible. The L.C.M. of a set of algebraic terms is the smallest expression that is a multiple of each of the given terms. It is obtained by taking the highest power of each factor and multiplying them all together. ***E.g. Express as a single fraction in its lowest term:*** $\frac{3}{4x-1} + \frac{7}{16x^2-1}$			
EQUATIONS	Solve problems using simultaneous equations.	In solving a pair of simultaneous equations when one equation is a linear equation and the other equation is a non-linear equation or a quadratic type equation, make one of the unknown quantities of the linear equation the subject and use it to substitute into the non-linear equation or the quadratic-type equation.		Mathematics: A Complete Course with CXC Questions Vol. 1 & 2	Quizzes Questioning Techniques End of Unit Test

SCOPE OF WORK
GRADE: 12
UNIT: ALGEBRA

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
EQUATIONS *cont'd*	Form quadratic equations to solve given problems. Identify a pair of equations which have a) no solution b) an infinite number of solutions.	After the substitution, simplify. The end result is a quadratic equation. Then solve the quadratic equation to obtain the two possible values for the unknown quantity. After this, substitute the known values in the linear equation to obtain the two corresponding possible values for the other unknown quantity. E.g. Solve the pair of simultaneous equations: $\boldsymbol{x - y = 3}$ $\boldsymbol{xy = 28}$ ***The Quadratic Equation:*** $\boldsymbol{x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}}$ If there is a positive number inside the square root, there will be two real solutions; that is, two distinct $x - intercepts$. **E.g.** $\boldsymbol{x^2 - 2x - 3}$ If there is a zero in the square root, there will be one (repeated) real solution; that is, one (repeated) $x - intercepts$. **E.g.** $\boldsymbol{x^2 - 6x + 9}$ If there is a negative number in the square root, there will be two complex solutions; that is, no $x - intercepts$. **E.g.** $\boldsymbol{x^2 + 3x + 3}$	**Problem:** You are given the fraction $\frac{x}{y}$. When **3** is added to the denominator, the fraction becomes $\frac{1}{3}$. When **3** is subtracted from the denominator, the fraction becomes $\frac{1}{2}$. Solve for x and y.	General Mathematics: Revision and Practice STP Caribbean Mathematics Book 3	Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
GRADE: 12
UNIT: ALGEBRA

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
INEQUALITIES	Shading regions on a coordinate plane to define systems of linear inequalities. Deriving linear inequalities that define shaded regions on a coordinate plane.	***When two or more linear inequations are drawn simultaneously*** on graph, using the same scales and axes, then their common solution lies in the area where the region representing the inequations intersect (that is, overlap) at the same time. This area called the ***common region***, is usually in the shape of a polygon. ***E.g. Determine graphically the common region representing the inequations*** $\boldsymbol{y \geq x, y \leq 5}$ ***and*** $\boldsymbol{y \geq -3x + 5}$***. Hence state the vertices in the common region.***	**Problem:** Give the integer which satisfies the inequality $\boldsymbol{x + 1} < 19 < x + 3$ **Problem:** Graph and shade the solution set for $\boldsymbol{x > 0, y > x + 1,}$ and $\boldsymbol{y < 2 - x.}$ **Problem:** Give the system of inequalities for which the shaded region is sa ed. 	STP Caribbean Mathematics for CXC Book 4 Mathematics: A Complete Course with CXC Questions Vol. 1 General Mathematics: Revision and Practice	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam
RELATIONS AND FUNCTIONS	Find the inverse $f^{-1}(x)$ of a function $f(x)$. Find composite function $fg(x)$.	The notation $\boldsymbol{f^{-1}(x)}$ means ***'the inverse of the function of f'*** or ***'f inverse of x'***. Given the function $\boldsymbol{f: x \to ax + b}$ or $\boldsymbol{f(x) = ax + b}$ where $\boldsymbol{a}$ and $\boldsymbol{b}$ are constants and $\boldsymbol{x}$ is a variable, then the defining equation for $\boldsymbol{f(x)}$ is $\boldsymbol{y = ax + b.}$		STP Caribbean Mathematics for CXC Book 4 Mathematics: A Complete Course with CXC Questions Vol. 2	Quizzes Questioning Techniques End of Unit Test Projects

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CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
RELATIONS AND FUNCTIONS *cont'd*		Interchanging x for y and y for x, we get, $x = ay + b$ So $ay = x - b$ $y = \frac{x-b}{a}$ This is the defining equation for $f^{-1}(x)$. Hence $f^{-1}: x \to \frac{x-b}{a}$ or $f^{-1}(x) = \frac{x-b}{a}$. If a function is a one-to-one mapping, then its inverse is a function. However, if the function is a many-to-one mapping, then its inverse is not a function. Given $f(x) = ax + b$ and $g(x) = cx + d$ where a, b, c and d are constants and x is the variable, then $fg(x) = a(cx + d) + b$. We obtained the composite function $fg(x)$ by substituting $g(x)$ for x in $f(x)$.	**Problem:** A value is placed in one of the functions below. Identify the function that has the given value. $f(x) = 3x - 4$, $g(x) = x^2$, $h(x) = x^2 - 5$, $k(x) = (x-1)^2$ 1. ____ $(7) = 36$ 2. ____ $(-1) = 1$ 3. ____ $(0) = -4$ 4. ____ $(-1) = 1$ 5. ____ $(0) = -4$ 6. ____ $(-1) = 1$ 7. ____ $(0) = -4$ 8. ____ $(5) = 16$ 9. ____ $(6) = 14$ 6. ____ $(2) = 4$ 7. ____ $(1) = -4$ 8. ____ $(6) = 36$ 9. ____ $(1) = -4$ 10. ____ $(6) = 36$ 11. ____ $(1) = -4$ 12. ____ $(6) = 36$ 13. ____ $(-5) =$ 36 14. __ $(2) +$ $\_(2) = 1$	General Mathematics: Revision and Practice	Math Journals

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CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
RELATIONS AND FUNCTIONS *cont'd*		Interchanging $\boldsymbol{x}$ for y and $\boldsymbol{y}$ for $\boldsymbol{x}$, we get, $\boldsymbol{x = ay + b}$ So $\boldsymbol{ay = x - b}$ $\boldsymbol{y = \frac{x - b}{a}}$ This is the defining equation for $\boldsymbol{f^{-1}(x)}$. Hence $\boldsymbol{f^{-1}: x \to \frac{x-b}{a}}$ or $\boldsymbol{f^{-1}(x) = \frac{x-b}{a}}$. If a function is a one-to-one mapping, then its inverse is a function. However, if the function is a many-to-one mapping, then its inverse is not a function. Given $\boldsymbol{f(x) = ax + b}$ and $\boldsymbol{g(x) = cx + d}$ where $\boldsymbol{a}$, $\boldsymbol{b}$, $\boldsymbol{c}$ and $\boldsymbol{d}$ are constants and $\boldsymbol{x}$ is the variable, then $\boldsymbol{fg(x) = a(cx + d) + b.}$ We obtained the composite function $\boldsymbol{fg(x)}$ by substituting $\boldsymbol{g(x)}$ for $\boldsymbol{x}$ in $\boldsymbol{f(x)}$.	10. $\_(-3) - \_(-3) = 12$ 11. $\_\_\_\_(4) = 8$ 12. $\_(-4) - \_(-4) = 41$ 13. $\_\_\_\_(-3) = -13$ 14. $\_\_(-6) - \_\_(-6) = 5$		B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

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CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
RELATIONS AND FUNCTIONS *cont'd*		Also, $\boldsymbol{gf(x)} = \boldsymbol{c(ax+b)+d}$. We obtained the composite function $\boldsymbol{gf(x)}$ by substituting $\boldsymbol{f(x)}$ for $\boldsymbol{x}$ in $\boldsymbol{g(x)}$. Therefore, it can be seen that $\boldsymbol{fg(x)} \neq \boldsymbol{gf(x)}$, that is, composite functions are non-commutative.	**Problem:** Find $f(x)$ and $g(x)$ so that $(f(g(x))$ and $(g(f(x))$ are correct. 1. $(f(g(x)) = (x+2)^2 (g(f(x)) = x^2 + 2$ 2. $(f(g(x)) = \sqrt{x} - 7 (g(f(x)) = \sqrt{x-7}$ 3. $(f(g(x)) = x - 7 (g(f(x)) = x - 7$ 4. $(f(g(x)) = x^2 - 2 (g(f(x)) = x^2 - 2x$ 5. $(f(g(x)) = x^2 - 2x + 1 (g(f(x)) = x^2 - 1$ 6. $(f(g(x)) = 2x - 1 (g(f(x)) = 2x - 2$		

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CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
PRACTICAL GRAPHS	Use and interpret speed-time graphs. Use and interpret a distance- time graph to find the speed of an object. Use a distance-time graph to estimate the average velocity between two times.	$\boldsymbol{Average\ Speed = \frac{total\ distance\ travelled}{total\ time\ taken}}$ $\boldsymbol{Average\ Acceleration = \frac{change\ in\ velocity}{time\ taken}}$ $\boldsymbol{Average\ Acceleration = \frac{v_2 - v_1}{t_2 - t_1}}$ The area under the velocity-time graph will give the distance travelled.	**Problem:** A train travels 100 km at a constant speed of $66\frac{2}{3}$ km/h, 75 km at a constant speed of $37\frac{1}{2}$ km/hand a further 25 km at a constant speed of $16\frac{2}{3}$ km/h. a) Draw a distance-time graph to represent the journey. b) Hence, determine the average speed for the entire journey.	STP Caribbean Mathematics Book 2 STP Caribbean Mathematics for CXC Book 4 Mathematics: A Complete Course with CXC Questions Vol. 2 General Mathematics: Revision and Practice	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam
GRAPHS OF FUNCTIONS	Find the roots of a quadratic equation from a graph. Interpret the gradient of a curve at a point on the curve.	The root of a given function is that value which when substituted into the equation in place of the variable will make the equation true. **The roots of a quadratic function** $\boldsymbol{f(x) = ax^2 + bx + c}$ **are the values of *x* when** $\boldsymbol{f(x) = y = 0}$.		STP Caribbean Mathematics Book 3 STP Caribbean Mathematics for CXC Book 4	Quizzes Questioning Techniques End of Unit Test Projects

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CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
GRAPHS OF FUNCTIONS *cont'd*		***E.g. a) Draw the graph of the quadratic function*** $f: x \rightarrow x^2 + 2x - 8$ ***for the domain*** $-5 \leq x \leq 3$. ***b) State the roots of the quadratic function f(x).*** **The gradient of a curve at a point is obtained by drawing a tangent to the curve at the point and finding its gradient.** The gradient of the tangent is equal to the gradient of the curve at the point. ***E.g., Draw the curve*** $y = f(x) = 3x^2$ ***for*** $-4 \leq x \leq 4$ ***and determine the gradient of the curve at the points where*** $x = -2$ ***and*** $x = 2$.	**Problem:** a) Using a graphical method, solve each of the following quadratic equations: *(i)* $2x^2 + 5x - 3 = 0$ *(ii)* $2x^2 + 5x - 3 = 4$ *(iii)* $2x^2 + 5x - 52 = 0$ Determine and state the roots of the quadratic equation $y = 2x^2 + 5x - 3$.	Mathematics: A Complete Course with CXC Questions Vol. 2 General Mathematics: Revision and Practice	Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam
VARIATION	Write a given statement in the form of an equation. Complete a table of values of variables for a given equation.	***Direct Variation*** If *y* is directly proportional to *x*, then we can write $y \propto x$. $y \propto x$ means "***y varies directly as x***". That is, when x increases, then y will also increase by a constant multiplier. And when x decreases, then y will also decrease by a constant multiplier.	**Problem:** y varies directly as x^2. $y = 36$ when $x = 3$. Find y when $x = 2$.	STP Caribbean Mathematics for CXC Book 4 Mathematics: A Complete Course with CXC Questions Vol. 1	Quizzes Questioning Techniques End of Unit Test Projects Math Journals

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GRADE: 12
UNIT: ALGEBRA

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
VARIATION ***cont'd***	Calculate the value of one variable, given its corresponding variable and the equation defining the relation. Identify and use direct and inverse variation.	***Inverse Variation*** If y is directly proportional to $\frac{1}{x}$, then we can write $y \propto \frac{1}{x}$. Therefore, y is inversely proportional to x. $y \propto \frac{1}{x}$ means "***y varies inversely as x***". That is, when x increases, then y will decrease and when x decreases, then y increase.			B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam
DIFFERENTIATION	Find the derivative of a function. (use of the rule $\frac{dy}{dx} = anx^{n-1}$ for $y = ax^n$) Calculate the maximum and minimum values of turning points. Calculate the gradient of a curve at a given point.	The derived function is the gradient of a curve at any given point. Thus if $y = x^n$, then it can be shown that the derived function is $\frac{dy}{dx} = nx^{n-1}$. The gradient of a curve is found by differentiation. It is given by it derived function. Thus if $y = x^n$ then it can be shown that the derived function is $\frac{dy}{dx} = nx^{n-1}$. This formula is true for all values of n including fractional and negative indices. The process of finding $\frac{dy}{dx}$ is called ***differentiation***.	**Problem:** Calculate the derivative of: a) $y = 3x^2 + 2x$ b) $y = (3x^2 - 1)(x - 3)$ c) $y = 9 - \frac{1}{x^2}$ **Problem:** Calculate the gradient of $y = x^2 + 3x$ at the point **(2, 10).**	A Complete O Level Mathematics Mathematics: A Complete Course with CXC Questions Vol. 2	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

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CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
DIFFERENTIATION	Find the coordinates of a point on a curve of given gradient. Derive the equation of a tangent to a point on a curve.	When a numerical constant is differentiated the result is zero. To differentiate an expression containing a sum of terms we differentiate each individual term separately. ***E.g. If*** $\boldsymbol{y = x^2 - 5x + 7}$ ***find the gradient of the curve at the points*** where $\boldsymbol{x = -3}$ and $\boldsymbol{x = 2}$. ***E.g. Find the coordinates of the points on the curve*** $\boldsymbol{y = x^3 - 2x^2 + 3x - 5}$ ***where its gradient is 2.***	**Problem:** Find the point on the graph $\boldsymbol{y = 3x - x^2}$ at which the gradient is **2.** **Problem:** Find the equation to the curve $\boldsymbol{y = x^2 - 2x - 3}$ at the point **(3, 0).** Find the point on the graph $\boldsymbol{y = 3x - x^2}$ at which the gradient is **2.** **Problem:** Find the equation to the curve $\boldsymbol{y = x^2 - 2x - 3}$ at the point **(3, 0).**		

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CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
DIFFERENTIATION *cont'd*		When a tangent is drawn at the turning points of a curve, the tangent is parallel to the $x - axis$ and hence at both points $\frac{dy}{dx} = 0$. This gives the turning points. To determine which of the values of ***x*** makes ***y*** a maximum and which makes ***y*** a minimum. Take a value of ***x*** just slightly less than the value of ***x*** at the turning point and substitute this value in the expression for $\frac{dy}{dx}$ to discover which turning point is a maximum and which is a minimum. If the number is positive, it is the maximum point. If the value obtained is negative, the value substituted is the minimum. Substitute the ***x*** values in ***f(x)*** to find ***y*** values. The equation of a line: $y = mx + c$. To find the equation of the tangent, substitute the values of the gradient (***m***) and the values of ***x*** and ***y*** from a given point into the equation on the line. Solve to find c.			

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CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
MATRICES	Write a pair of simultaneous equations in matrix form. Solve a pair of simultaneous equations using matrices. Solve matrix equations of the form $A + X = B$, where A, X and B are matrices.	*Matrix E* = $\begin{pmatrix}3 & 4\\5 & 1\end{pmatrix}$ *is called a* ***square matrix*** because it consists of the same number of rows as columns. *Matrix F* = $\begin{pmatrix}0 & 0\\0 & 0\end{pmatrix}$ *is a* ***null matrix, or zero matrix***, because all the elements are zero. This is the identity matrix for addition of a *2* × *2* matrix. Given the non-singular *2* × *2 matrix* $A = \begin{pmatrix}a & b\\c & d\end{pmatrix}$ then, the inverse of the *matrix A,* $\boldsymbol{A^{-1}} = \begin{pmatrix}a & b\\c & d\end{pmatrix}^{-1}$ $= \frac{1}{/A/} \times \boldsymbol{A\ adjoint}$ $= \frac{1}{ad-bc}\begin{pmatrix}\boldsymbol{d} & \boldsymbol{-b}\\\boldsymbol{-c} & \boldsymbol{a}\end{pmatrix}$	**Problem:** $2\begin{pmatrix}3 & \boldsymbol{x}\\4 & 2\end{pmatrix} + \begin{pmatrix}-1 & 4\\2 & \boldsymbol{y}\end{pmatrix} = \begin{pmatrix}5 & 8\\10 & -1\end{pmatrix}$ Solve for $\boldsymbol{x}$ and $\boldsymbol{y}$. **Problem:** $\mathbf{A} = \begin{pmatrix}\mathbf{2} & \mathbf{1}\\\mathbf{2} & \mathbf{3}\end{pmatrix}$. Calculate: a) the determinant of A b) the inverse of A **Problem:** Solve using matrices: $\boldsymbol{2x + 3y = 4}$ $\boldsymbol{4x + 7y = 10}$	STP Caribbean Mathematics Book 3 Mathematics: A Complete Course with CXC Questions Vol. 2	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

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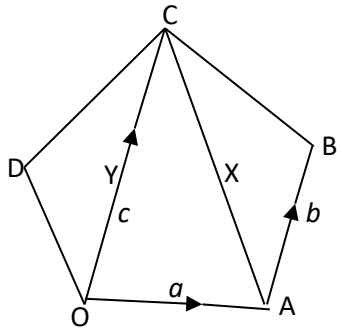
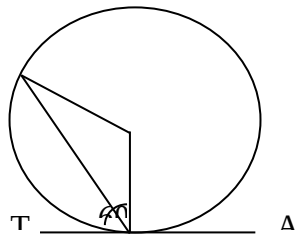
CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
VECTORS	Determine the geometrical properties of two-line segments Show that 3 points lie on a straight line Given that two-line segments are parallel, find the missing scalar value.		**Problem:** OABCD is a regular pentagon. $\overrightarrow{OA} = a$, $\overrightarrow{AB} = b$and $\overrightarrow{OC} = c$. The midpoints of AC and OC are X and Y respectively.  a) Write and simplify an expression in terms of *a*, *b*, and/or *c* for: (i) $\overrightarrow{AC}$ (ii) $\overrightarrow{BX}$ (iii) $\overrightarrow{XY}$ b) State the two geometrical properties of XY and OA.	STP Caribbean Mathematics Book 4 General Mathematics: Revision and Practice	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
GRADE 12
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
ANGLE PROPERTIES	Tangent to circles: - **a)** Determine that the angle between a tangent and the radius drawn to the point of contact is 90º b) Determine that from any point outside a circle just two tangents to the circle may be drawn and they are of equal lengths. c) Determine that the angle between a tangent and a chord through the point of contact is equal to the angle subtended by the chord in the alternate segment. d) Determine that the angle subtended at the centre by a chord in the alternate segment is twice the angle between a tangent and a chord.	The **radius** of a circle drawn to a point of contact of a **tangent** is perpendicular to the tangent. Two **tangents** to a circle from an **external point T** are equal in length. The **angle between a tangent to a circle and a chord** at the point of contact is equal to the angle in the **alternate segment** of the circle.	**ACTIVITY** **Materials:** compass, pencil, ruler, protractor. 1. Use a compass to draw three circles of different radii length. Label each centre O. 2. Mark any point T outside the first circle. 3. Draw a tangent TA, touching the circle at A. 4. Join OA and measure angle OAT. 5. Repeat steps 2 -4 with each of the other two circles. (Hint. Draw the tangent to each circle in a different position each time) 6. What do you find?  	Mathematics A Complete Course With CXC Questions Vol. 2 Heinemann Mathematics for CXC STP Caribbean Mathematics Book 3 Math in Action 4B General Mathematics: Revision and Practice	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
GRADE 12
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
THE CIRCLE	Calculate the length of an arc of a circle. Evaluate the area of a sector of a circle. Determine the area of a segment of a circle.	**Length of an Arc of a Circle** $$l = \frac{\theta}{360} 2\pi r$$ **Area of a Sector of a Circle** $$A = \frac{\theta}{360} \pi^2$$ **Area of a Segment of a Circle** The area of the **minor segment of the circle** bounded by the chord AB and the minor arc AB = the area of the minor sector AOB – the area of the triangle AOB. The area of the **major segment of the circle** bounded by the chord AB and the minor arc AB = the area of the circle – the area of the corresponding minor arc.	https://education.ti.com/en/us/activity/detail?id=FC36E463C76841BEAD63B7951694221F https://www.tes.com/teaching-resource/connect-4-activity-circles-area-perimeter-sector-area-and-arc-length-11067090 https://www.tes.com/teaching-resource/area-of-sector-and-arc-length-activity-6330814 **Exercise I** 1. A pendulum swings from A to B through an angle of 95°. The length of the string is 124cm. Determine the area of the minor sector defined by each swing from A to B. 2. A radius of a circle O is 15cm. Find the area of the major sector defined by a sector angle of 280°.	Mathematics A Complete Course With CXC Questions Vol. 2 http://www.regentsprep.org/regents/math/geometry/gp16/circlesectors.htm Oxford Study Mathematics Dictionary Excellent for All Aspects of Mathematics at the Secondary School Level Illustrated Math Dictionary – An Essential Student Resource General Mathematics: Revision and Practice	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

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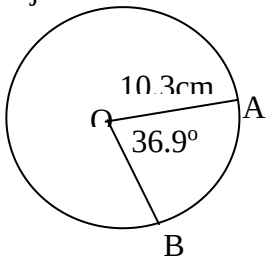
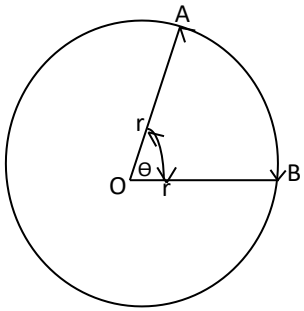
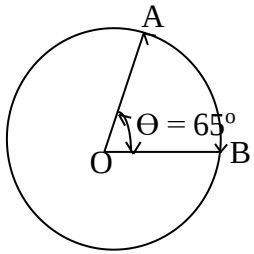
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
THE CIRCLE ***cont'd***		**Example 1** The diagram shows a circle of radius 10.3 cm with a sector angle of 36.9 degrees. Calculate the area of a) the minor sector b) the major sector.  **Solutions** a) A of minor sector, $A = \pi r^2 \frac{\theta}{360}$ = 3.142 x $(10.3cm)^2$ x $\frac{36.9}{360}$ = $34.1668cm^2$ = $34.2cm^2$ (1d.p.)	3. If an arc of 8cm long subtends arc angle of 65° at the centre, what is the radius of the circle. 4. Find the length of arc and area for each of the following sectors of a circle. a) radius 5cm; sector angle 55° b) radius 9cm; sector angle 90° c) radius 4in; sector angle 130°  		

SCOPE OF WORK
GRADE 12
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
THE CIRCLE *cont'd*		b) Major sector angle Θ° = 360° - 36.9° = 323.1° A major sector, $A = \pi r^2 \frac{\theta}{360}$ = 3.142 x (10.3cm)^2 x $\frac{323.1}{360}$ = 299.167965cm^2 = 299.2cm^2 (1d.p.) **Example 2**: Calculate the length of an arc of a circle of radius 3.5cm which subtends an angle of 65 degrees at the centre.  	**Exercise II** 1. Calculate the length of an arc of a circle of radius 3.8cm which subtends an angle of 50 degrees at the centre. 2. Estimate the length of an arc of a circle of radius 4.9cm which subtends an angle of 56 degrees at the centre. 3. A clock is reading 04:00h. The radius of the circle forming the face of the clock is 10cm. Calculate the length of the minor arc defined by the time. 4. A pendulum swings from X to Y through an angle of 77°. The length of the string is 168cm. Determine the length of the arc defined by each swing from X to Y. 5. The second hand of a clock of length 1.6cm moved through an angle of 3.75 radians. Estimate the length to the arc defined by that movement. 6. The length of an arc of radius 7.8cm is 12cm. Find the angle subtended by the arc at the centre of the circle.		Investigate the meaning of the numbers on a car or motorbike tyre as they relate to the size (diameter & thickness) of the tyre.

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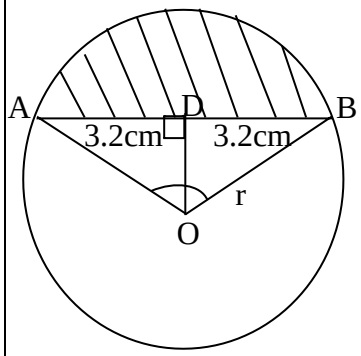
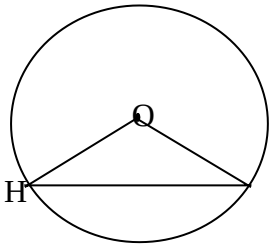
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
THE CIRCLE *cont'd*		**Example 3** A chord of length 6.4cm is 4.2cm away from the centre of a circle, centre O. Calculate the area of. a) The minor segment defined by the chord b) The major segment defined by the chord.  	**Exercise III** 1. A chord of length 7.8cm is 5.5cm away from the centre of a circle, centre O. Calculate the area of: a) the minor segment defined by the chord b) the major segment defined by the chord. 2. A chord of length 9.4cm is situated in a circle of radius 7.5cm. Evaluate the area of the minor segment the major segment. 3. In this question take Π = 3.14  The chord HK subtends angle HOK at 0, the centre of circle. Angle HOK = 125° and OH = 10cm. Calculate to 3 s.f. a) The area of circle b) The area of the minor sector OHK c) The area of triangle HOK d) The length of the minor arc HK.		

SCOPE OF WORK
GRADE 12
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
THE CIRCLE *cont'd*		**Solution:** Step 1 AB = 6.4cm, DB = 32cm Step 2 Calculate r using Pythagoras' theorem $r^2 = (4.2cm)^2 + (3.2cm)^2$ $r = \sqrt{(17.64 + 10.24)}cm$ $= \sqrt{27.88}$ = 5.3cm Step 3 Find angle BOD then multiply by 2 to find the sector angle. tan BOD = $\frac{BD}{OD} = \frac{3.2}{4.2} = 0.7619$ BOD = $\tan^{-1}$ 0.7619 = 37.3° Sector angle = 37.3° x 2 =74.6° **Step 4** Area of minor sector AOB (A_1) $A_1 = \frac{\theta}{360}\pi r^2$ $= \frac{74.6}{360} \times 3.142 \times (5.3cm)^2$ $= 18.3cm^2$ (1d.p.) A_2 = ½ bh = ½ x 6.4 x 4.2 = 13.4cm (1d.p.)			

SCOPE OF WORK
GRADE 12
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
THE CIRCLE *cont'd*		Step 5 Area of minor segment (A) A = (A_1) - (A_2) = (18.3 - 13.4) cm^2 = 4.9cm^2 b. Area of major segment = Area of circle – Area of minor segment Step 1 A of circle = πr^2 = 3.142 x 5.3 x 5.3cm^2 = 88.3cm^2 (1d.p.) Step 2 Area of major segment = (88.3 – 4.9) cm^2 = 83.4cm^2			
TRANSFORMATIONS	Identify, describe fully and perform the following transformations: **(i)** reflection about the lines 45° to the axes. **(ii)** rotation from any point.	Reflection in the line $\boldsymbol{y = x}$ $P(x, y) = P'(y, x)$ Reflection in the line $\boldsymbol{y = -x}$ $P(x, y) = P'(-y, -x)$ Rotation Enlargement, scale factor ***k***, centre (***x, y***) $P\begin{pmatrix}x\\y\end{pmatrix} \rightarrow P'\begin{pmatrix}kx\\ky\end{pmatrix}$	https://www.teacherspayteachers.com/Product/Entrapment-Transformation-Math-Games-256548 https://www.teacherspayteachers.com/Product/Entrapment-Transformation-Math-Games-256548	Mathematics A Complete Course With CXC Questions Vol. 2 STP Caribbean Mathematics Book 4	Quizzes Questioning Techniques End of Unit Test Projects B.G.C.S.E. Worksheets

SCOPE OF WORK
GRADE 12
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
TRANSFORMATIONS ***cont'd***	**(iii)** enlargement from any point, including fractional and negative scale factors.			General Mathematics: Revision and Practice	End of Term Exam
PYTHAGORAS' THEOREM AND TRIGONOMETRY	Use quadratic expressions to solve problems involving Pythagoras' Theorem. Identify the graphs of trigonometric functions. Calculate the value of trigonometric ratios for θ such that $0^o \leq \theta \leq 360^o$ Identify and use the sine and cosine rules. Interpret and use sine and cosine rules to solve problems.	**Cosine Rule** $\boldsymbol{a^2 = b^2 + c^2 - 2bc\,cosA}$ The cosine rule can be applied when given: (i) The length of two sides and the included angle of a triangle to find a third side. (ii) The lengths of the three sides of a triangle in order to find an angle.	http://stufiles.sanjac.edu/placement_testing_review/math/solving_quadratic_equations/Solving_Quadratic_Equations3.html http://www.mathplanet.com/education/algebra-1/radical-expressions/the-pythagorean-theorem	Mathematics A Complete Course With CXC Questions Vol. 2 Heinemann Mathematics for CXC	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
GRADE 12
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
PYTHAGORAS THEOREM AND TRIGONOMETRY *cont'd*	Solve trigonometrically, problems in three dimensions including angle between a line and a plane.	**Sine Rule** $\frac{a}{Sin\ A} = \frac{b}{Sin\ B} = \frac{c}{Sin\ C}$ The sine rule can be applied when given: (i) Two angles and the length of one side of a triangle in order to find another angle. (ii) The lengths of two sides of a triangle and an angle not formed by the two given sides in order to find another side. **Area of triangle:** $A = \frac{1}{2}ab\ sin\ C$ **Area of triangle:** $A = \frac{1}{2}ab\ sin\ C$		STP Caribbean Mathematics Books 3 & 4 General Mathematics: Revision and Practice	

SCOPE OF WORK
GRADE 12
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
SIMILARITY AND CONGRUENCY	Extend the properties of similar figures to find the area and volume of similar shapes/objects. State for two similar figures/objects the ratio of their lengths, areas and volumes.	When two triangles are similar: $\frac{\textbf{The area of } \Delta XYZ}{\textbf{The area of } \Delta ABC} =$ $\frac{YZ^2}{BC^2} = \frac{XZ^2}{AC^2} = \frac{XY^2}{AB^2} = \frac{ZQ^2}{CP^2}$ $\frac{\textbf{The volume of } \Delta XYZ}{\textbf{The volume of } \Delta ABC} =$ $\frac{YZ^3}{BC^3} = \frac{XZ^3}{AC^3} = \frac{XY^3}{AB^3} = \frac{ZQ^3}{CP^3}$	**ACTIVITY** **(**Developmental) **Materials:** graph paper Celluloid Creatures Studios has asked you to investigate the cost of buying and fencing different sized lots. Lot space costs \$100 per square foot. Fencing costs\$12 per foot. 1. Let one grid square represent 10ft by 10ft. Sketch a 50ft × 200ft lot. Find the lot space cost, the fencing cost, and the total cost of the lot. 2. Sketch a 100ft × 200ft and a 100ft × 400ft foot lot. For each, find the lot space cost, the fencing cost and the total cost.	Middle School Math Course 2	**ASSESMENT ACTIVITY** Critical Thinking 1. On a movie set, a 2-meter-tall Godzilla casts a shadow whose area is 3m². If the real Godzilla is 50m tall, what is the area of his shadow?

SCOPE OF WORK
GRADE 12
UNIT: GEOMETRY, SPATIAL SENSE & TRIGONOMETRY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
SIMILARITY AND CONGRUENCY *cont'd*			3. Compare the lot space, fencing and total cost of the three lots. What do you notice? Which of the larger lots would you say is "twice as big" as the original? What geometric measurement is associated with the fencing of the lot? What measurement is associated with the size of the lot?		2. You find that it takes 0.16 gallons of paint to paint a rectangular wall whose length is 6ft and whose height is 8ft. How much paint will be needed to paint a wall whose length is 12ft and whose height is 16ft? Explain how you found your answer.

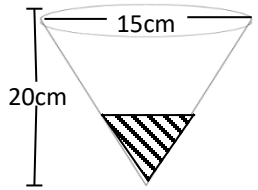
SCOPE OF WORK
GRADE 12
UNIT: MEASUREMENT

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
SURFACE AREA	Calculate the surface area of spheres, pyramids and cones.	*A **sphere** is a solid consisting of an infinite set of points which are all equidistant from a fixed point called the centre.* *Surface Area of a Sphere,* *C.S.A.* $= 4\pi r^2$ *Surface Area of a Sphere, C.S.A.* $= 4\pi r^2$ *Surface Area of Square Pyramids* $4\left(\frac{1}{2}bh\right) + b^2$	1. Use the formula to find the surface area of the square pyramids with these dimensions. a). Base 8in, Slant height 7in, Surface Area _____ b). Base 12cm, Slant height 9cm, Surface Area _____ c). Base 15cm, Slant height 13mm, Surface Area _____ 2. The formula for the surface area of a sphere is $4\pi r^2$. Find the surface area of a sphere with radius of 6cm. 3. A closed cylinder has radius of 3.5cm and height 5.8cm. Find a. the area of its curved surface b. the total surface area. 4. Which has the greatest surface area a cone of radius 4.5cm and slant height 10cm or a sphere of radius 4.5cm? What is the difference between the areas? 5. Find the total surface area of a hemisphere of radius 14cm. (22/7 may be used for π)	http://www.mathguide.com/lessons/SurfaceArea.html Questioning Techniques http://www.onlinemathlearning.com/surface-area-formula.html End of Unit Test General Mathematics: Revision and Practice Projects Mathematics: A Complete Course with CXC Questions Vol. 1 Math Journals B.J.C. Worksheets	

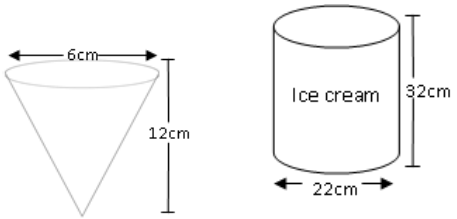
SCOPE OF WORK
GRADE 12
UNIT: MEASUREMENT

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
VOLUME AND CAPACITY	Solve word problems on volume and capacity. Calculate the volume of pyramids and cones. Determine whether a formula gives a length, an area or a volume.	***The Square-based Pyramid*** – $V = \frac{1}{3}l^2h$ ***The Rectangular-Based Pyramid*** – $V = \frac{1}{3}lbh$ ***The Cone*** – $V = \frac{1}{3}\pi r^2 h$	**Exercise I** 1) A car gas tank is 0.8m long 30cm wide and 20cm deep. How many liters of gas can it hold? 2) A circular metal sheet is 50cm in diameter and 2mm thick is melted down and recast into a cylindrical bar 6cm in diameter. How long is the bar? 3) A cylindrical tin full of engine oil has a diameter of 12cm and a height of 15cm. The oil is poured into a rectangular tin 16cm long and 13cm wide calculate the depth of the oil in the tin. 4) A cylindrical shoe polish tin is 12cm in diameter and 3.6cm deep. a) Calculate the capacity if the tin in cm^3 b) When full, the tin contains 310g of polish calculate the density of the polish in g/cm^3 correct to 2d.p. 5) Find the capacity in liters of a bucket 25cm in diameter at the top and 18cm in diameter at the bottom and 22cm deep.	https://www.tes.com/teaching-resource/volume-and-surface-area-prisms-pyramids-cones-and-spheres-11251871 General Mathematics: Revision and Practice STP Caribbean Mathematics Book 4 Mathematics: A Complete Course with CXC Questions Vol. 1	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

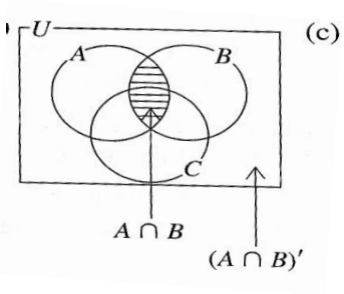
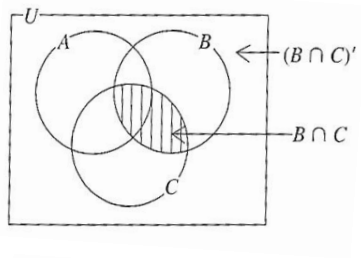
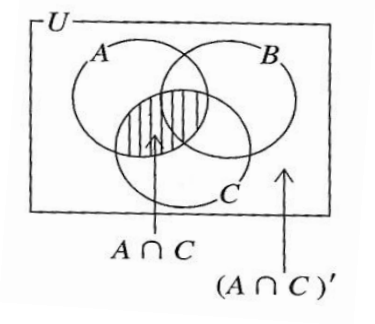
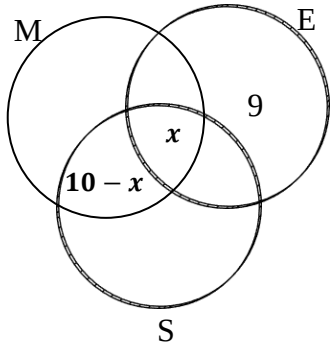
SCOPE OF WORK
GRADE 12
UNIT: MEASUREMENT

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
VOLUME AND CAPACITY ***cont'd***			**Exercise II** 1. A pyramid 9cm length stands on a rectangular base 8cm by 5cm. Calculate the volume of the pyramids. 2. Calculate the volume and curved surface area of a cone 14cm in base diameter and 28cm high. 3. A right pyramid on a base 12m square is 16m high. a) Find the volume of the pyramid b) If the top 8m of the pyramid are removed, calculate the volume of the remaining frustum. 4. The cone in the diagram is exactly half full of water by volume. Calculate the depth of water in the cone.  5. Lengths are denoted by a, b, and h, (i) Which formulas represent areas? a) $\pi (a + b)$ b) $\pi h (a + b)^2$ c) $\pi r^2 h$ d) $\pi (a + b) h$ e) $\pi (a + b) h^2$		

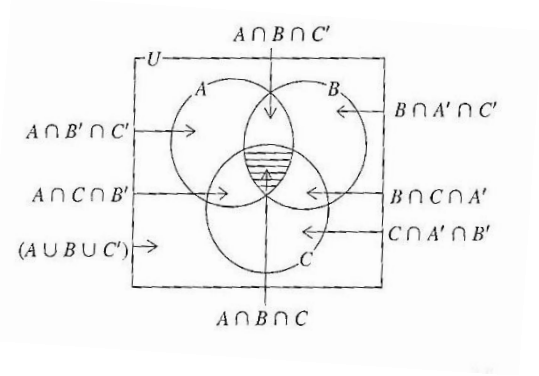
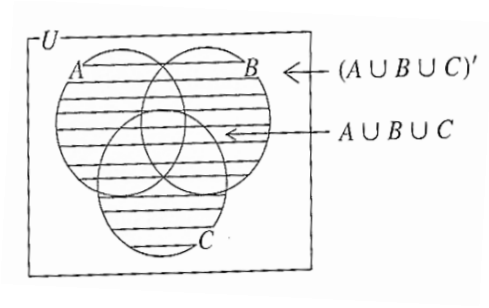
SCOPE OF WORK
GRADE 12
UNIT: MEASUREMENT

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
VOLUME AND CAPACITY *cont'd*			(ii) Which of the following formulas could represent a volume? Give a reason for your answer. a) πabh b) $\pi (a + b) h$ c) $\pi h^2 (a + b)$ d) $\pi h^2 (a + b)^2$ 6. A biscuit cone completely filled with ice cream is 12 cm deep and has a base of diameter 6cm. Ice cream is also mounted on top of the cone in the shape of a hemisphere that fits the base of the cone.  a) Calculate the volume of ice cream required to make one ice cream cone. b) How many ice cream cones can be made from a cylindrical container of ice cream of height 32 cm and diameter 22cm if it three quarters full? c) Calculate the volume of ice cream required to make one ice cream. d) How many ice creams can be made and 32cm high, which is three quarters full of ice cream?		

SCOPE OF WORK
GRADE: 12
UNIT: SETS

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
PROBLEM SOLVING	Describe regions on Venn diagrams using set notation. Calculate the number of elements for three sets. Calculate the number of elements in a given region using algebraic equation.	**Venn diagrams** are used to show relationships between sets.   	E.g. In a survey, 50 Evening Institute students were asked which of the offered classes of English (E), Mathematics (M) and Science (S) they took. The Venn diagram shows that x took all three subjects, 9 took English only, $10 - x$ took Mathematics and Science only. In addition, 11 took Mathematics only and 7 took English and Science. The number who took Mathematics and English only is one more than those who took all three subjects. The number who took Science only is three times as many who took all three subjects. 	Mathematics: A Complete Course with CXC Questions Vol. 2	Quizzes Questioning Techniques End of Unit Test Projects Math Journals B.J.C. Worksheets B.G.C.S.E. Worksheets End of Term Exam

SCOPE OF WORK
GRADE: 12
UNIT: SETS

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
PROBLEM SOLVING *cont'd*		  For three sets: $n(A \cup B \cup C)$ $= n(A) + n(B) + n(C) - n(A \cap C)$ $- n(B \cap C) + n(A \cap B \cap C)$ and $n(U) = n(A \cup B \cup C) + n(A \cup B \cup C)'$	a) Copy and complete the Venn diagram. b) Form an equation in terms of ***x***, and solve it to find the number of students who took all three subjects.		

SCOPE OF WORK
GRADE: 12
UNIT: DATA MANAGEMENT

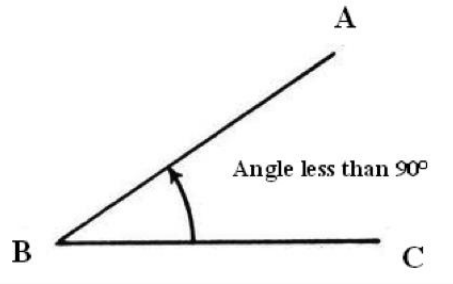
CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
ORGANIZING AND ANALYZING DATA	Construct and use cumulative frequency tables and diagrams. Identify modal class for grouped data. Calculate/ estimate the mean of grouped/ continuous data. Calculate the interquartile range. Estimate median, upper/lower quartiles as well as interquartile range from cumulative frequency diagrams. Estimate percentiles (multiples of 10, the 25^{th} and 75^{th}) from cumulative frequency diagrams.	The mean of a set of numbers is the sum of the numbers divided by the number of numbers. An estimate of the mean of grouped data can be calculated by assuming that the average of each group is the halfway value for that group. The mode of a set of numbers is the number that occurs most often. If the numbers are grouped, the group with the highest frequency is called the modal grouped. The median of a list of n values is the $\frac{(n+1)}{2}$ value when the values are in order of size.	Heights of pupils in class. Weight of people in the class. Cost of journey to school this morning. Times of journeys to school (in minutes). Ages of students (in months)	STP Caribbean Mathematics Book 3 Mathematics: A Complete Course with CXC Questions Vol. 2	Quiz Worksheets End of unit test Group projects

SCOPE OF WORK
GRADE: 12
UNIT: PROBABILITY

CONCEPTS/ TOPICS	OBJECTIVES	CONTENTS	ACTIVITIES	RESOURCES	ASSESSMENTS
PROBABILITY	Determine mutually exclusive events. Determine dependent events. Determine independent events. Calculate conditional probability	Mutually exclusive events cannot occur at the same time. E.g. tossing a coin once, this can result in either head or tail, but not both. Dependent events are events where the outcome of one event affects the outcome of another. E.g., if you draw two colored balls from a bag and the first ball is not replaced before you draw the second ball then the outcome of the second draw will be affected by the outcome of the first draw. Independent events are two events, A and B, where the fact that A occurs does not affect the probability of B occurring. E.g. choosing a marble from a jar **AND** landing on heads after tossing a coin. Conditional probability is the probability that an event will occur, given that one or more other events have occurred.	http://www.mathgoodies.com/lessons/vol6/dependent_events.html http://www.onlinemathlearning.com/dependent-probability.html http://www.mathgoodies.com/lessons/vol6/independent_events.html http://www.regentsprep.org/Regents/math/ALGEBRA/APR3/Tconditional.htm	http://www.intmath.com/counting-probability/9-mutually-exclusive-events.php http://www.onlinemathlearning.com/mutually-exclusive-probability.html http://www.onlinemathlearning.com/dependent-probability.html http://www.mathgoodies.com/lessons/vol6/conditional.html http://mathworld.wolfram.com/ConditionalProbability.html http://people.richland.edu/james/lecture/m170/ch05-cnd.html http://mathworld.wolfram.com/ConditionalProbability.html Mathematics A Complete Course With CXC Questions Vol. 2	Exercises to identify problems involving mutually exclusive events. Exercises to identify problems involving dependent events. Exercises to identify problems involving independent events. Exercises to calculate conditional probability.

GLOSSARY

Acute Angle: An angle whose measure is greater than 0° and less than 90°.



Acute Triangle: A triangle in which all three angles are acute.

Adjacent Angles: Two angles with the same vertex and a common side.

Adjacent Vertices: Two vertices joined by a side of a polygon.

Adjacent Sides: Two sides of a polygon that intersect at a vertex of the polygon.

Algebraic Expression: A mathematical phrase that is a meaningful collection of constants, variables and operation symbols.

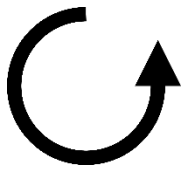
Angle: Two rays that intersect at their endpoints.

Arc: A section of a curve.

Arc of a Circle: A section of the circumference.

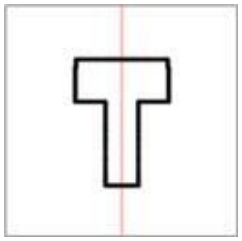
Area: A two-dimensional region or its measure in square units. The area of a plane figure is the amount of space enclosed by its boundaries.

Anticlockwise: A circular movement opposite to the direction of the movement of the hands of a clock.

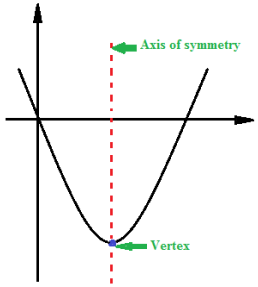


Arithmetic Expression: A meaningful collection of constants and operation symbols.

Axis of Symmetry: 1. A line that divides a shape in half and acts as a mirror line so that each half is a reflection of the other.



2. The vertical line $x = -\frac{b}{2a}$ for the parabola $y = ax^2 + bx + c$. The vertical line $x = h$ for the parabola $y = a(x-h)^2 + k$.



Base (Algebra): In the expression x^n, x is called the base.

Base (Geometry): Any side of a polygon may be called the base if given the perpendicular height with respect to that side.

Base-Ten Place Value: The value of each place or position in a numeral is a power of 10.

Binomial: An algebraic expression that is the sum or difference of two terms. A polynomial with two terms.

Boundary: A line or border that indicates the limit or extent of a region or plane figure.

Boundary Values: The limiting values that indicate the maximum and minimum values of a quantity.

Cardinal Number: 1. A whole number used to answer the question 'how many?'.
2. The cardinal number of a set indicates the number of elements in the set.

Cartesian Plane: Named after French mathematician Rene Descartes who formalized its use in mathematics.
See **Rectangular Coordinate Plane.**

Cartesian Coordinates: See **Coordinates**.

Central Angle: An angle with its vertex at the centre of a circle.

Chord: A line segment that joins two points on a circle.

Circle: A set of points at a fixed distance from a fixed point called the centre. The fixed distance is called the radius of the circle.

Circumference: 1. The set of points in a circle.
2. The perimeter of a circle.
3. The boundary line of a circular region.

Coefficient: In a term involving the product of a constant and a variable, the constant is the numerical coefficient of the variable and is frequently referred to simply as the coefficient. The numerical coefficient indicates how many times the variable appears as a term in a sum. For example: In the term $3x$, the coefficient is 3 so the variable x appears in a sum three times. $3x = x + x + x$ (Three like terms).

Common Denominator: A number that is a multiple of all the denominators of the fractions in a problem.

Common Factor: A factor that appears in two or more numbers or terms.

Common Fraction: A number in the form $\frac{a}{b}$, where a and b are integers, and $b \neq 0$. The quotient when an integer is divided by a non-zero integer.

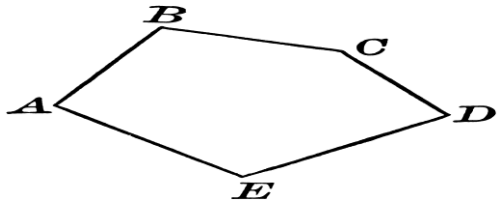
Composite Number: A natural number that has more than two factors.

Compound Interest: Interest calculated on previous interest which was added to the principal.

Congruent: Exactly the same. Identical in regard to size and shape.

Constant: A number or symbol that represents a fixed or specified value. Usually a real number or a symbol like a, b, or c, from the beginning of the English alphabet.

Convex Polygon: A closed plane figure formed by three or more line segments that intersect only at their end points and form interior angles that are less than 180 degrees.



Coordinate: A number assigned to a point on the real number line which indicates its position or location with respect to the origin.

Coordinates: The ordered pair (x, y), assigned to each point in the rectangular coordinate plane, indicating its position in relation to the origin.

Counterclockwise: See **Anticlockwise**.

Counting numbers: The counting numbers are the numbers in the following infinite sequence: $1, 2, 3, 4, 5, 6, 7, \ldots$. We can also write this infinite sequence as $^{+}1, ^{+}2, ^{+}3, ^{+}4, ^{+}5, ^{+}6, ^{+}7, \ldots$. These numbers are also called the positive integers or natural numbers.

Cross Section: A shape or surface exposed by cutting through a solid object.

Cube (Algebra): The third power of a number. The result of using a base in a product three times. $x^3 = x \cdot x \cdot x$. (Three like factors)

Cube (Geometry): A regular solid with six square faces. A square prism.

Cube Root: For real numbers x and y, y is the cube root of x, ($y = \sqrt[3]{x}$), if x is the cube of y, ($x = y^3$).

Customary Units: Units of measurement such as inches, ounces, and gallons that are used for measuring length, weight, and capacity, based on the Imperial (English) system of measurement.

Curve: A continuous set of points that do not form a straight line. A smoothly-flowing path traced out by a moving point.

Data Set: A collection of numerical information.

Decagon: A polygon with ten sides and ten angles.

Decimal Fraction: A common fraction with a denominator that is a power of ten. If a decimal fraction is between zero and one, its numerator is written as the digits at the right of the decimal point when it is written as a decimal number.

Decimal Number (A Decimal): A base-ten number. A decimal point separates the whole and fractional parts of the number. A whole number can be written without a decimal point or with zero(s) after the decimal point.

Decimal Places: The places at the right of the decimal point in a decimal number. The number of digits at the right of the decimal point indicates the number of decimal places in the number. The decimal places are ordered from the decimal point.

Decimal Point: The dot used to separate the whole number and fraction parts of a decimal number. The decimal point is placed in the base line and is read as 'and' or 'point'. For example, 3.25 is read as 'three and twenty-five hundredths' or as '3 point two five'.

Decimal Place Value: See **Base-Ten Place Value.**

Degree (Algebra): The degree of a term is the exponent on the variable or the sum of the exponents on the variables. The degree of a polynomial is the highest degree of its terms. The degree of a constant polynomial is zero.

Degree (Geometry): A unit of measurement for angles that is $\frac{1}{360}th$ of a revolution. $1^\circ = \frac{1}{360}th$ of a revolution and 1 revolution $= 360^\circ$.

Denominator: The bottom number in a common fraction. It indicates the number of equal parts the whole is divided into.

Dependent Variable: The variable in a function representing the elements of the range; the output values.

Diagonal: A line segment joining two non-adjacent vertices of a polygon. A diagonal joins vertices that are not already joined by a side.

Diameter: A chord that passes through the centre of a circle. The longest chord of a circle. The length of the line segment that divides the circle in half.

Difference: The result of subtracting one number from another.

Dilation: A transformation that changes the size but not the shape of the original object.

Dimension: 1. A measurable attribute such as length, area, and volume.
2. The distance between two points. A measurement of length in one direction. Examples: width, height and depth.

Disjoint Sets: Two sets with no common elements so their intersection is the empty set.

Distance: The length of the straight line segment joining two points.

Direct Variation: For real variables x and y, y varies directly as x if $y = kx$ or $\frac{y}{x} = k$ for a nonzero constant k.
k is called the constant of proportionality.

Divisor: 1. A number that divides another number exactly.
2. A factor of a number.
3. The number doing the dividing. Written after the division sign, outside the division bracket, or in the denominator.

Dodecagon: A polygon with twelve sides and twelve angles.

Domain: The set of all the values of the independent variable (the input values) of a relation or function.

Edge: The line segment joining two vertices of a three-dimensional solid. The intersection of two faces of a solid.

Elements: Members of a set.

Enlargement: A dilation that produces an image that is larger than the original object when the scale factor is greater than 1. When the scale factor is between 0 and 1, the image is smaller than the original object

Equation: A mathematical sentence using the equal sign to state that two quantities or expressions have the same value.

Equilateral: All sides are equal.

Equivalent Equations: Two equations are equivalent if they have the same solution or solution set.

Equivalent Inequalities: Two inequalities are equivalent if they have the same solution set.

Equivalent Expression: Expressions that have the same numerical value for given values of the variables.

Evaluate: To find the numerical value of an expression.

Even Number: A number that is divisible by 2. A multiple of 2.

Exponent: In the expression x^n, n called the exponent. If n is a natural number, then x^n denotes the nth power of x, or x to the nth power, and n indicates how many times the base appears as a factor in a product.

Exponential Notation: A notation that expresses a number in terms of a base and an exponent.

Extraneous Solutions: Apparent solutions which do not satisfy the given equation; usually introduced by raising to a power or multiplying by the variable in obtaining the solution.

Face: A flat side of a three-dimensional shape.

Factor: A part of a product.

1. For integers a, b and c, a and b are factors of c if $c = ab$.
2. Similarly for functions, $f(x)$ and $g(x)$ are factors of $h(x)$ if $h(x) = f(x) \cdot g(x)$.
3. **To Factor** means to express as a product.

Factorise (or Factorize): To write a number or an expression as a product.

Formula: An equation showing the relationship between two or more quantities represented by variables.

Formulae or Formulas: Plural form of **Formula**

Fraction: A part of a whole.

Function: A function is a rule which assigns to each member of the domain (the set of inputs), one member of the range (the set of outputs).

Function Notation: $f(x)$, read "f of *x*", used to indicate the value of the function when the input is *x*. $f(x)$ represents the image of *x*.

Gradient of a Line: A measure of the direction and steepness of a line. See **Slope of a Line**.

Graph of a Function: The pictorial representation of a function by plotting all of its input-output pairs on a coordinate system.

Greatest Common Factor (GCF): The largest number that belongs to each set of factors that divide each of the given numbers.

Height: The perpendicular line segment from a vertex to the opposite side selected as the base. Also used to refer to the length of that line segment.

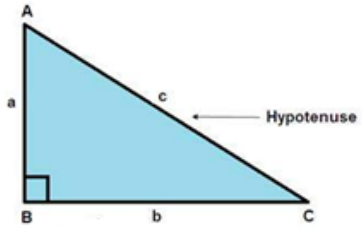
Heptagon: A polygon with seven sides and seven angles.

Hexagon: A polygon with six sides and six angles.

Highest Common Factor (H.C.F.): The largest number (or the expression) that is a factor of two or more numbers (or expressions).

Horizontal Axis: The number line that goes left and right on a graph. The *x*-axis on the rectangular coordinate plane.

Hypotenuse: The side opposite the right angle in a right triangle. The longest side in a right triangle.



Improper Fraction: A common fraction that is greater than or equal to 1. The numerator is greater than or equal to the denominator.

Image: 1. The output (range element) when a relation or a function is applied to an input (domain element).
2. The result of applying a transformation to an object.

Independent Variable: The variable in a function representing the elements of the domain (the input values).

Index: Indicates how many times a number is used in a product. An exponent or power.

Index Form: See **Exponential Form**

Indices: Plural form of index.

Inequality: A statement that two expressions represent different values. A statement involving an inequality symbol.

Inequality Symbols: $<$ (is less than), $>$ (is greater than), $\leq$ (is less than or equal to), $\geq$ (is greater than or equal to)

Inequation: See **Inequality**

Strict (Strong) Inequalities: Statements such as "x is less than y", ($x < y$), and "x is greater than y", ($x > y$).

Non-strict (Weak) Inequalities: Statements such as "x is less than or equal to y", ($x \leq y$), and "x is greater than or equal to y", ($x \geq y$).

General inequality: The statement "x is not equal to y", ($x \neq y$).

Imperial System: The English system of measuring length, weight, and capacity using such units as feet, pounds, and gallons.

Input Values: All the values that a relation or a function rule is applied to. The values of the domain.

Integer: A whole number or the negative of a whole number.

Integers: The collection of whole numbers and their negatives. The set negative integers, zero, and the positive integers: $\ldots {}^{-}5, {}^{-}4, {}^{-}3, {}^{-}2, {}^{-}1, 0, {}^{+}1, {}^{+}2, {}^{+}3, {}^{+}4, {}^{+}5, \ldots$.

Interest: Amount charged for borrowing money or amount earned from investing money. A percentage of the original principal.

Interest Rate: The amount of interest charged (or paid) on an annual basis. Expressed as a percent.

Intersecting Lines: Lines with exactly one common point.

Intersection of Sets: A set whose elements are all the elements that the given sets have in common.

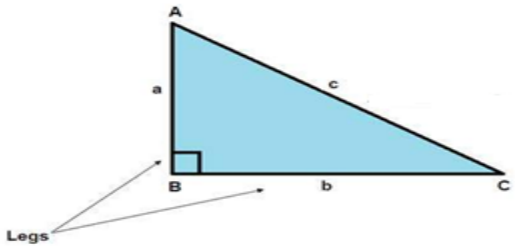
Inverse Variation: For real variables x and y, y varies inversely as x if $y = \frac{k}{x}$ or $xy = k$, where k is a non-zero constant.

Irrational Number: A number that cannot be expressed as a common fraction. A decimal number that neither repeats nor terminates.

Isosceles: Two equal sides.

Least Common Multiple: See **Lowest Common Multiple**

Legs: 1. The two equal sides of an isosceles triangle.
2. The two sides of a right triangle that form the right angle.



Length: 1. The extent of a line segment.
2. The greatest of the linear dimensions of a plane shape or the base of a space figure.

Less Than, Greater Than: The statement that "the number *a* is less than the number *b"*, written $a < b$, means that there is a positive number *x* such that $b = a + x$. The number *x* must be $b - a$. If *a* is less than *b*, then *b* is greater than *a*, written $a > b$.

Like Terms: Algebraic terms that contain the same variables and for each variable the power is the same.

Line: A continuous set of points extending in two opposite directions. A never-ending straight path.

Line of Symmetry: See **Axis of Symmetry**.

Line Segment: Two points on a line and all the points between them.

Linear Dimensions: The measurements of line segments of a plane shape or space figure. Examples: length, width, and height.

Common Denominator (LCD): The LCM of all the denominators of the fractions in a problem.

Lowest Common Multiple (LCM): The smallest number (or expression) that is a multiple of two or more numbers (or expressions).

Major Arc: Section of the circumference determined by a central angle that is greater than 180°.

Metric System: The decimal system that uses the metre, gramme, and litre as the basic units for measuring length, weight, and capacity.

Minor Arc: Section of the circumference determined by a central angle that is less than 180°.

Mixed Number: A number that is a combination of a whole number and a fraction.

Monomial: An algebraic expression that is a single term. A polynomial with only one term.

Multiple: An integer or polynomial is said to be a multiple of any of its factors. A multiple of an integer is the result of multiplying the integer by a whole number.

Multiplicative Identity: For every number n, $n \cdot 1 = n$ and 1 is called the identity element for multiplication.

Multiplicative Inverse: The number $\frac{1}{x}$ is called the multiplicative inverse or reciprocal of x, where $x \neq 0$, because $x \cdot \frac{1}{x} = 1$.

Natural Number: A number used 'naturally' when counting.

Natural Numbers: The numbers that are 'naturally' used when we are counting. See **Counting Numbers**.

Negative Exponent: 1. If x is non-zero, then $x^{-n} = \frac{1}{x^n}$, which is the multiplicative inverse or reciprocal of x^n.

2. $\left(\frac{a}{b}\right)^{-n} = \left(\frac{b}{a}\right)^{n}$

Negative 1 Exponent: If x is non-zero, then $x^{-1} = \frac{1}{x}$, which is the multiplicative inverse or reciprocal of x.

Non-negative Numbers: Numbers greater than or equal to zero.

Numerator: The top number in a common fraction. It indicates how many of the equal parts of the whole are being considered.

Numerical Coefficient: See **Coefficient**.

Obtuse Angle: An angle whose measure is greater than 90° and less than 180°.

Obtuse Triangle: A triangle that has an obtuse angle.

Ordered pair: A pair of numbers that represent the coordinates of a point in the rectangular coordinate plane with the first number measured along the horizontal scale and the second along the vertical scale.

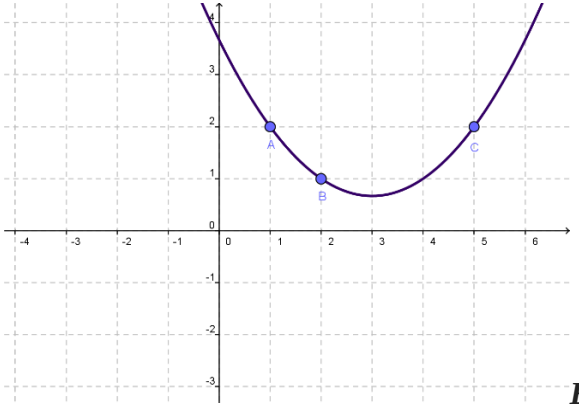
Ordinal Number: A number indicating the position of an object or event in a sequence or series, such as first, second, third, or fourth.

One-Dimensional (1D): One measurable attribute. Length can only be measured in one direction. A line segment is one dimensional because its length is its only measurable attribute.

Origin: 1. The reference point on the real number line. The point with coordinate 0 on the real number line.
2. The reference point on the rectangular coordinate plane. The point with coordinates (0, 0) on the rectangular coordinate plane.

Output Values: All the results obtained by applying a relation or a function rule to a set of input values. The values of the range.

Parabola: The shape of the graph of a quadratic function.



Example of a parabola

Parallel Lines: Two lines in a plane that never intersect.

Parallelogram: A quadrilateral with both pairs opposite sides that are parallel.

Parent function: The simplest example of a family of functions.

Percent: 1. Per 100 or Out of 100.
2. A fraction with a denominator of 100.

Percentage: 1. A portion of a quantity.
2. The result of multiplying a number by a percent.

Perfect Cube: The cube of an integer: An integer n that can be written in the form $n = k^3$, where k is an integer.

Perfect Square: The square of an integer: An integer n that can be written in the form $n = k^2$, where k is an integer.

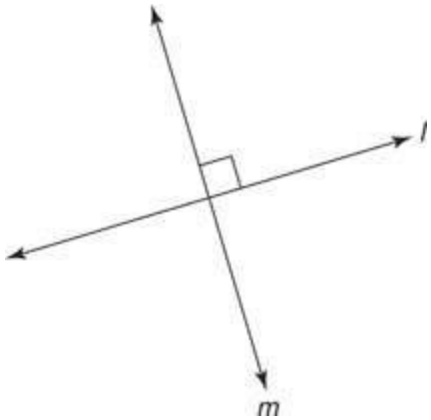
Perfect Square Trinomial: An expression of the form $a^2 \pm 2ab + b^2$ that be written in the form $(a \pm b)^2$.

Perimeter: 1. The boundary of a region or plane figure.
2. The total distance around the boundary of a region or plane figure.

Perpendicular: Form right angles.

Perpendicular Distance: The shortest distance from a point to a line. The length of the perpendicular line segment from a point to a line.

Perpendicular Lines: Lines are perpendicular if they intersect to form a right angle.



Perpendicular Line Segments: Line segments are perpendicular if the lines containing the segments are perpendicular.

Pi (π): The symbol used to represent the ratio of the circumference to the diameter of a circle. $\pi \approx 3.142$ or $\pi \approx \frac{22}{7}$.

Plane: 1. A continuous two-dimensional set of points.
2. A smooth flat surface.

Plane Shape: A closed two-dimensional figure. A figure that lies entirely in a plane.

Point-slope form: A form of the equation of a line written as $y - y_1 = m(x - x_1)$, where m is the slope and (x_1, y_1) is a point on the line.

Polygon: A simple closed plane figure formed by three or more line segments.

Polynomial: A polynomial is a term or an algebraic expression obtained by adding or subtracting two or more terms. Each term of a polynomial has the form ax^n where a is a real number and n is a whole number.

Positive Integer: A whole number greater than zero. A counting or natural number.

Positive Number: A number greater than zero.

Power: 1. An exponent or index.
2. The result of raising a number to an exponent.

Prime Number: A natural number with exactly two factors.

Prism: A solid figure with a uniform cross section. A space figure that has two congruent opposite faces.

Proper Fraction: A common fraction that is between zero and 1. The numerator is less than the denominator.

Proportion: An equation that states that two ratios are equal.

Quadrant: 1. A quarter of a circle. The region bounded by two perpendicular radii and an arc that is one quarter of the circumference.
2. A quarter of the coordinate plane. See **Rectangular Coordinate Plane**

Quadratic Equation: An equation with a second degree term as its term with the highest degree.

Quadratic Expression: A polynomial containing a second degree term as its term with the highest degree.

Quadratic Function: A function of the form $f(x) = ax^2 + bx + c$, where $a \neq 0$.

Radical: 1. An expression containing a radical sign.
2. An indicated root of a number denoted by $\sqrt[n]{x}$, the nth root of x.
3. The index n is omitted when $n = 2$ and we write $\sqrt{x}$ to denote the square root of x.

Radical Equation: An equation in which the variable appears in the radicand.

Radical Function: A function that is the *n*th root of a variable expression.

Radicand: The number or expression that appears under the radical sign; the number or expression whose root is to be found.

Radii: Plural of radius

Radius: 1. A line segment from the centre to the circumference of a circle.
2. The distance from the centre to the circumference of a circle.

Range: 1. The set of all the values of the dependent variable (the output values) of a relation or a function.
2. The difference between the largest and smallest values in a data set.

Rate: A ratio comparing two quantities with different units of measure. See **Unit Rate**.

Rational Equation: An equation involving one or more rational expressions.

Rational Expression: An expression in the form $\frac{p(x)}{q(x)}$, where $p(x)$ and $q(x)$ are polynomials, the degree of $q(x)$ is at least 1, and $p(x) \neq 0$.

Rational Number: A number that can be written as a common fraction $\frac{a}{b}$, where a and b are integers, and $b \neq 0$.

Ray: A part of a line that starts at a point and extends in one direction.

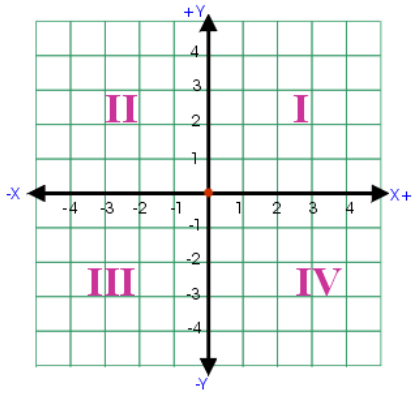
Real Number: A number that 'exists' as a point on the real number line.

Real Number Line: The set of all points that correspond to real numbers. Every real number is the coordinate of a point on the real number line and indicates the position of the point in relation to the origin.

Reciprocal: See **Multiplicative Inverse**

Rectangle: A parallelogram with four right angles.

Rectangular Coordinate Plane: A plane that consists of a horizontal number line and a vertical number line that intersect at right angles at their origins. The number lines, called axes, divide the plane into four quadrants. The quadrants are numbered I, II, III, and IV beginning in the upper right quadrant and moving counterclockwise.



Reduction: A dilation that produces an image that is smaller than the original object. An enlargement with a scale factor that is between 0 than 1.

Reflection: A transformation that flips an object across a line creating a mirror image.

Reflex Angle: An angle whose measure is greater than 180° and less than 360°.

Regular Polygon: A polygon with all sides and all angles equal.

Regular Solid: A solid with faces that are regular polygons and the same number of faces meet at each corner.

Relation: A rule connecting the elements of two sets called the domain and the range.

Revolution: A complete turn. An angle measuring 360°.

Rhombus: A parallelogram with congruent sides.

Right Angle: One quarter of a revolution. An angle measuring 90°.

Right Triangle: A triangle that has a right angle.

Roots of a Quadratic Equation: 1. The solutions of $ax^2 + bx + c = 0$.
2. The zeros of the quadratic function $f(x) = ax^2 + bx + c$.
3. The x-intercepts of the graph of $y = ax^2 + bx + c$.

Rotation: A transformation that turns an object clockwise or anticlockwise about a fixed point called the centre of rotation.

Scale Factor of a Drawing: The ratio of a length on a scale drawing to the corresponding length of the actual object.

Scale Factor of an Enlargement: The number used to multiply the side-lengths of the original object to find the side-lengths of the image.

Scalene Triangle: A triangle with no congruent sides.

Scientific Notation: Numbers written in the form $a \times 10^n$, where $1 \le a < 10$ and n is an integer.

Sequence: An ordered list of numbers or objects.

Set: A collection of objects called elements or members.

Set-Builder Notation: A symbolic description of a set. "A is the set of all *x* such that *x* is an element of the set of natural numbers and *x* is greater than 2 but less than 11." is written in set-builder notation as $A = \{x : x \text{ is a natural number, } 2 < x < 11\}$.

Set Notation: The collection of symbols used to represent sets, their relationships, and operations.

Simplify: To write in the simplest form.

Simplifying: 1. Combining the like terms of an algebraic expression by carrying out the indicated additions or subtractions.
2. Eliminating common factors between the numerator and denominator of a common fraction or rational expression.

Simple Interest: Interest calculated a single time on a principal invested or borrowed. Computed using the formula $I = Prt$.

Slope of a Line: If (x_1, y_1) and (x_2, y_2) are two points on a line, then the slope of the line is the ratio $m = \frac{\text{rise}}{\text{run}} = \frac{y_2 - y_1}{x_2 - x_1}$, provided $x_2 \neq x_1$.

Slope-intercept form: $y = mx + b$ is the slope-intercept form of the equation of a line, where *m* is the slope and *b* is the *y*-intercept of the line.

Solution of an Equation: A solution of an equation with variable *x* is a number that, when substituted for *x*, makes the equation a true statement. If the equation has more than one solution, then the collection of solutions is called the solution set.

Solution of an Inequality: The set of values that may be substituted for the variable in an inequality to obtain a true statement.

Solution of a System of Linear Equations: An ordered pair that satisfies each of the equations. See **System of Linear Equations**.

Solve: Determine the solution.

Solid Figure: A three-dimensional object. A figure that does not lie entirely in a plane.

Space: 1. The continuous set of all the points that exist in our three-dimensional environment.
2. A three-dimensional set of points.
3. The region within the boundaries of a plane shape.
4. The interior of a hollow three-dimensional object.

Space Figure: A three-dimensional object. A figure that does not lie entirely in a plane.

Square: A rectangle with congruent sides. A rhombus with congruent angles.

Square Root: For non-negative x and y, y is the square root of x if $y^2 = x$. For a real number x, $\sqrt{x^2} = |x|$ because the square root symbol denotes the non-negative root.

Square Root Function: A function that is the square root of a variable expression. See **Radical Function**.

Standard Form: See **Scientific Notation**.

Standard Form of a Linear Equation: $Ax + By = C$ where A and B are not both equal to 0.

Standard Form of a Quadratic Equation: $ax^2 + bx + c = 0$, where $a > 0$ and $a, b,$ and c are integers with H.C.F. equal to 1.

Straight Angle: Half of a revolution. An angle measuring 180°.

Straight Line Segment: The shortest path between two points in a plane.

Subset: Set B is a subset of set A if every element of set B is also an element of set A.

Surface: The outer boundary or layer of an object. It is a two-dimensional set of points that can be flat or curved.

Surface Area: The total area of the outer boundary or layer of an object.

System of Linear Equations: Two equations that both impose conditions on the variables. An ordered pair is a solution of the system if and only if it is a solution of each of the given equations.

Systems of equations may be classified as follows:

1. A system with one or more solutions is called Consistent.
2. A system with no solution is called Inconsistent.
3. A Consistent system with exactly one solution is called Independent.
4. A Consistent system with more than one solution is called Dependent.

System of inequalities in two variables: Two inequalities that both impose conditions on the variables. If the inequalities form an ”and” statement the solution is all ordered pairs that satisfy both inequalities. If the inequalities form an ”or” statement the solution is any ordered pair that satisfies either inequality.

Term of a Sequence: An element of a sequence.

Term (Algebra): A constant, a variable, or a product of constants and variables.

Terms (Algebra): The parts of an algebraic expression that are separated by addition or subtraction signs.

Three-Dimensional (3D): Three measurable attributes. Length can be measured in three perpendicular directions. A space figure is three dimensional since we can measure its linear dimensions (length, width, and height/depth), surface area, and volume.

Transformation: An operation that changes the position, size, or shape of an object. The four main transformations are reflection, translation, rotation, and dilation.

Translation: A transformation that moves a figure along a line in a plane but does not alter its size or shape. Also called a slide.

Transpose: 1. Move terms from one side of an equation to another by adding or subtracting on both sides.
2. The transpose of a matrix is obtained by interchanging its rows and columns.

Transposition: Changing the subject of a formula.

Trapezium or Trapezoid: A quadrilateral with exactly one pair of opposite sides that are parallel.

Triangle: A polygon with three sides and three angles.

Trinomial: An algebraic expression that is the sum or difference of three terms. A polynomial with three terms.

Two-Dimensional (2D): Two measurable attributes. Length can be measured in two perpendicular directions. A plane shape is two-dimensional since we can measure its linear dimensions (length and width) and its area.

Unit Rate: A ratio of two unlike quantities that has a denominator of 1 unit.

Unknown: A letter or symbol representing a value that is not known or given. See **Variable**.

Variable: A letter or symbol that represents an unspecified value or an unknown quantity. Usually a symbol like *x, y,* or *z,* from the end of the English alphabet.

Vertex: A point.
1. The common endpoint of two rays forming an angle.
2. The intersection of two sides of a plane figure.
3. The intersection of three or more edges or faces of a space figure. A corner of a space figure.
4. The highest or lowest point of a parabola.

Vertex form of a Parabola: A quadratic function written as $f(x) = a(x-h) + bx + c$ is in vertex form. The vertex is (h,k).

Vertical Axis: The number line that goes up and down on a graph. The y-axis on the rectangular coordinate plane.

Volume: The amount of space that a three-dimensional figure occupies or contains.

Whole Number: A number that indicates the number of whole objects. The coordinate of the origin or a point that is a whole number of units from the origin.

Whole Numbers: The whole numbers are the numbers in the following never-ending sequence: 0, 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, . . .

***X*-axis:** The horizontal axis of a rectangular coordinate plane.

***X*-coordinate:** The first number in an ordered pair indicating the horizontal distance of a point from the origin in the coordinate plane.

***X*-intercept(s):** The *x* coordinate(s) of the point(s) of intersection of a graph and the x-axis.

***Y*-axis:** The vertical axis of a rectangular coordinate plane.

***Y*-coordinate:** The second number in an ordered pair indicating the vertical distance of a point from the origin in the coordinate plane.

***Y*-intercept:** The point of intersection of a graph with the y-axis.

Zero-Dimensional (0D): No measurable extent or attribute. A point is zero dimensional because it only specifies a location.

Zero power: For any nonzero number x, $x^0 = 1$.

Zeros of a Quadratic Function: See **Roots of a Quadratic Equat**ion.

Technology Integration

4 C's of Learning and Innovation Skills

- Critical Thinking & Problem Solving
- Creativity
- Collaboration
- Communication

Students should be able to:

- Demonstrate knowledge
- Apply knowledge to real life situations
- Express themselves using math language and vocabulary
- Contribute to the global knowledge bank

STUDENT ACTIVITIES	TOOLS
VOCABULARY SLIDE SHOW Create a math vocabulary slideshow using PowerPoint. Convert the PPT to a video and upload the video to a video streaming service.	MS PowerPoint Video Streaming Service (YouTube, Vimeo, etc.)
HOW TO VIDEOS Create instructional/ how to videos (similar to Khan Academy) to demonstrate how to complete a mathematical function/process. Extension – Have students choose a particular audience (age group, gender, etc.) to tailor the instruction.	Video Camera PowerPoint Video Editing Software Video Streaming Service (YouTube, Vimeo, etc.)
APPLICATION PROBLEMS Create a book of application problems. Students submit a unique word problem to be included in the book. Each problem must be accompanied by the worked-out solution. Students should also justify why their question should be included in the book.	MS Word or MS Publisher
DIGITAL FLASH CARDS Create digital flash cards to support mental math concepts.	MS PowerPoint
PIN THAT STRATEGY Curate a collection of strategies to best teach and learn math concepts. Publish the collection using Pinterest.	Pinterest Account
PROBLEM VIDEOS Turn word problems into video problems. Create a short video clip demonstrating a real-life problem related to the concept.	PowerPoint Video Editing Software Video Streaming Service (YouTube, Vimeo, etc.)

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