Ministry of Education
Secondary Sector
Mathematics
Grade 9
Christmas Term Schedule of Topics

Week	Topic	Sub-topics	Objectives	Content	Activities	Resources	Evaluation Strategies
1	Sets	Set builder notation Subsets	1). Using set-builder notation to describe a set whose elements are given 2). Identifying subsets of a given set 3). Using the symbols $\subset$ and $\supset$ to make statements about pairs of sets 4). Constructing subsets of a given set 5). Recognizing that the empty set and the set itself are subsets of every set	Set builder notation is a way of describing a set using an algebraic expression. Symbols used in set builder notation are: $<$ is less than $>$ is greater than $\leq$ is less than or equal to $\geq$ is greater than or equal to $\in$ is an element of : such that W Whole numbers Z Integers N Natural numbers Q Rational Numbers R Real numbers Subsets If all the elements of a set B can be found in a set A, then set B is a subset of A. There is a relationship between the number of elements in a set and the number of subsets that can be formed from that set. If a set contains "n" elements, then the number of subsets = 2^n, where n is the number of elements in the given set. The empty set is a subset of every set. All members of a set can be defined as a subset of the set under consideration.	Reviewing natural numbers, whole numbers ,integers etc. and symbols use such as $<$is less than $>$ is greater than $\leq$ is less than or equal to $\geq$ is greater than or equal to Using set –builder notation to describe set. Doing exercise on set builder notation. Using the symbols $\supset$ (contains) and $\subset$(subset) to make statements about pairs of sets Constructing subsets from given sets and then taking out all the elements Having students constructing as many subsets as possible from given sets. Finding the subsets of sets using the formula, no of ***subsets*** = $\mathbf{2^n}$ Where ***n*** is the number of elements in the given set.	Quiz Games Oral work Written assignment	A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for Sec School in Guyana Bk 3
2		Intersection and Union of sets	6). Using the number line to show the intersection and union of pairs of sets 7). Constructing and using Venn diagrams to show subsets, complements, intersection, and union of sets	The number line can be used to show the intersection and union of pairs of sets.	Drawing number lines and using dots to show the intersection and union of pairs of sets. Describing the union and	Quiz Oral and written assignment	A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for

			8). Describing the intersection and union of two sets using set-builder notation	Using the symbols ∪ and ∩to make statements about sets.	intersection of sets using set builder notation.	Project Game	Sec School in Guyana Bk 3
3			9). Identifying elements in the intersection and union of: (a) two sets (b) three sets 10). Shading the regions that represent intersection or union on a Venn diagram 11). Solving problems involving not more than three sets 12). Solving numerical problems arising from the intersection of not more than three sets 13). Using Venn diagrams to represent propositions from which valid conclusions can be made	For any two sets A and B: n(A∪B) = n(A) + n(B) - n(A∩B)	Displaying examples to show the intersection and union of 1. Two sets 2. Three sets Constructing and using Venn diagram to solve numerical problems.	Quiz Oral and written assignment Project Game	A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for Sec School in Guyana Bk 3
4		Venn Diagrams	14).Identifying regions on a Venn diagrams for intersection of 3 sets Listing elements of a set given set builder notation Solving problems involving the use of Venn diagrams for up to the intersection of three sets	Shading regions representing notation such as: $A \cup B \cup C'$,etc. and vice-versa If $\{x : -3 < x < 2, x \in Z\}$ then $x = -2,-1,0,1$ Constructing/completing Venn diagrams from worded problems	Drawing and shading diagrams Interpreting inequalities and listing elements	Quiz Written exercise	Mathematics a Complete Course with CXC Questions Vol. 1
5	Computa-tion	Basic Operations Multiplication and division of Decimals	1). Adding and subtracting decimals 2). Multiplying and dividing decimals by 10 and powers of 10 3). Multiplying and dividing a decimal by a decimal	Addition and subtraction of decimals Multiplication by 10 and powers of 10. Division by 10 and powers of 10. Multiplication of decimals Division of decimals	Adding and subtracting of decimals. Multiplying decimals by 10 and powers of 10 Dividing decimals by 10 and powers of 10. Multiplying decimals by decimals. Dividing decimals by decimals.	Quiz Oral and written assignment Project Game	A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for Sec School in Guyana Bk 3
6		Estimation Approximation Squares Square roots	4). Approximating numbers by making use of decimal places and significant figures 5). Calculating the squares of numbers without the use of tables or calculators 6). Using the table of squares to find the squares of large numbers 7). Calculating the square roots of numbers that are perfect square 8). Using square root tables to find the square root of any number	Estimation –this is a good guess at length, mass or some other items. It is usually made by reference to an amount of standard that is already known. Approximation means nearly exact. Two ways: 1. Decimal places 2. Significant figures Squares of numbers Square root of numbers	Discussing the importance of estimation in mathematics. Giving estimation of lengths and objects. Approximating numbers to a given number of decimal places or significant figures. Calculating squares of numbers. Finding the squares from the table of squares. Finding the square root of numbers.	Quiz Oral and written assignment Project Game	A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for Sec School in Guyana Bk 3

					Using tables to find the square root of numbers		
7	Number Theory	Place value The value of digits Number Bases	1). Stating the place value of a digit in a number 2). Stating the value of a digit in a number 3). Adding and subtracting numbers in base two, five, eight and other bases	Place value means that the position in a number has a different value associated with it. Addition and subtraction of numbers in base two, five and eight; and other bases using place value table and conversion method	Demonstrating the place value of digits in numbers. Discussing the usefulness of the place value system. Investigating change in the position of digits using the place value chart. Stating the value of digits in given numbers. Finding the difference between the values of two digits in a number. Creating the place value chart for base two, five and eight. Multiplying in base two, five and eight.	Quiz Oral and written assignment Project Game	A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for Sec School in Guyana Bk 3
8			5). Multiplying numbers in base five 6). Multiplying numbers in base eight 7). Identifying and applying the commutative or associative or distributive law in performing the four basic operations	Multiplication in base two, five and eight; and other bases	Creating the place value chart for base five and eight. Multiplying in base five and eight	Quiz Oral and written assignment Project Game	A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for Sec School in Guyana Bk 3
9	Measurement	Perimeter of Polygons Circumference of Circles	1). Calculating the perimeter of a triangle, square, rectangle, parallelogram and trapezium and their combinations 2). Solving problems involving the calculation of the perimeter of polygons 3). Identifying the circumference of a circle 4). Calculating and solving the circumference of a circle	Perimeter-total length around a plane shape. Circumference-the outside edge of a circle or the perimeter. $C=\pi d$ or $c=2\pi r$, where $\pi=3.14$ or $\frac{22}{7}$.	Calculating distances around shapes. Deriving formulas to find the perimeter of plane shapes. Using the derived formula to find the perimeter of shapes. Calculating the circumference of circles.	Quiz Oral and written assignment Project Game	A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for Sec School in Guyana Bk 3
10		Area of Circle Scale drawing	5). Calculatingthe area of a triangle, square, rectangle, parallelogram and trapezium and their combinations	Area : Rectangle. A=lb Parallelogram A,=bh Trapezium A,=1/2(a+b)h Surface area=total area of the faces. Area of a circle, $A=\pi r^2$ $R.F=\frac{sizeofdrawing}{sizeofobject}$ $R.F=\frac{1}{500000}$ =1:500000	Calculating the area of polygon using appropriate formulas Calculating surface area of a prism Calculating the area of circles using, $A=\pi r^2$ Finding suitable R.F. Calculating actual size using ratio or R.F.	Quiz Oral and written assignment Project Game	A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for Sec School in Guyana Bk 3
11				Area of a trapezium = 21(a + b) h, where a and b represent the lengths of the parallel sides and h the perpendicular height of the trapezium. The surface area of a prism = Total area of the faces.	Measuring the classroom or play- field. _ Finding suitable Representative Fractions.	Quiz Oral and	A Compl. Mths. Crse for Sec Schools Bk 2

			6). Calculating the surface area of a prism 7). Calculating area of a circle 8). Using scales to calculate actual area	The area of a circle in terms of its radius is π times the radius square. Area = πr^2 where r is the radius. Representative Fractions (RF) usually give the scale of large objects. A Representative Fraction =size of drawing size of object Both the numerator and denominator of the fraction must be in the same units, e.g. when 1 cm on the drawing represents 5 km on the object, then the size of drawing = 1 cm and the size of object = 5 km = 500 000 cm. R.F. = 1500000= 1:500 000	_ Calculating actual areas using the following guidelines: - Writing down the scale in the form of a ratio or Representative Fraction. - Checking that the numerator and denominator of the fraction are in the same units. - Squaring both parts of the ratio of a fraction	written assignment Game	Mathematics for Sec School in Guyana Bk 3
12			9). Solving simple problems involving time, distance and speed 10). Making suitable measurements on maps or scale drawing and using same to determine areas	Solving problems on time, distance and speed $Speed = \frac{dis\tan ce}{time}$ Units: km/h; m/s. Using scale drawing to determine areas	Creating worded problems and solving same Using maps or diagrams to solve problems	Quiz Oral and written assignment Game	A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for Sec School in Guyana Bk 3
13	Algebra 1	Indices	1). Applying the rules of indices to manipulate algebraic expressions with positive integral, negative integral and fractional indices	Rules • $x^a \times x^b = x^{a+b}$ • $x^a \times y^a = (xy)^a$ • $x^a \div x^b = x^{a-b}$	Applying the laws of indices to simplify algebraic expressions with positive integrals, negative integral and fractional indices.	Quiz Oral and written assignment Game	A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for Sec School in Guyana Bk 3
14			2). Differentiating between positive integral, negative integral and fractional integral 3) Work exercises by applying laws of indices	• $(x^a)^b = x^{ab}$ • $x^{-a} = \frac{1}{x^a}$	Applying the laws of indices to simplify algebraic expressions with positive integrals, negative integral and fractional indices.	Quiz Oral and written assignment Game	A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for Sec School in Guyana Bk 3
15			**REVIEW AND DO REMEDIAL WORK ON TOPICS/CONCEPTS BASED ON WEAKNESSES AND NEEDS OF STUDENTS**				

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2. The recommended texts: Mathematics for Secondary Schools in Guyana Book 3 and Mathematics for Secondary School Book 2 are not the only text you can use to give students practice exercises.
3. Use any Mathematics textbook that is available to you and the students.
4. Seek out the topics with the appropriate content for the students to gain practice.
5. If teachers feel that their students are competent in the objectives specified for the given week, then they can move on or give students additional work on the objectives to test their skills.

Ministry of Education
Secondary Sector
Mathematics
Grade9
Easter Term Schedule of Topics

Week	Topic	Sub-topic	Objectives	Content	Activities	Evaluation Strategies	Resources
1	Algebra 2	Factorisation	1). Factorizing expressions of the form: i) $2ab + b^2$ ii) $ax + bx + ay + by$ iii) $a^2 - b^2$	An expression representing the difference of two squares can be expressed as the product of two factors: e.g. $a^2 - b^2 = (a - b)(a + b)$ Use the distributive law to factorize; i). $2ab + b^2 = b(2a + b)$ ii). $ax + bx + ay + by$ $= x(a + b) + y(a + b)$ $= (a + b)(x + y)$	Illustrate with examples the difference of two squares. e. g. i). $36 - 9$ ii). $16a^4 - 25b^2$	Oral Written Worksheet	A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for Sec School in Guyana Bk 3
2		Factorisation	iv) $a^2+2ab+b^2$ v) $a\mathbf{x}^2 + b\mathbf{x} + c$, where a, b and c are integers. 2). Solving quadratic equations by factorization	Factorize as perfect squares Expressions of the form $a\mathbf{x}^2 + b\mathbf{x} + c$ are called quadratic expressions because the highest power of the unknown is 2. Examples of quadratic expressions are : $\mathbf{x}^2 + 5\mathbf{x} + 6$ $2\mathbf{x}^2 + 5\mathbf{x} + 2$ To factorise such expressions, we can re-write them as expressions of four terms. i). $\mathbf{x}^2 + 5\mathbf{x} + 6 = x^2 + 3x + 2x + 6$ $= x(x + 3) + 2(x + 3)$ $= (x + 3)(x + 2)$ ii). $2\mathbf{x}^2 + 5\mathbf{x} + 2 = 2x^2 + 4x + x + 2$ $= 2x(x + 2) + (x + 2)$ $= (x + 2)(2x + 1)$	Discuss the factorization of $2\mathbf{x}^2 + 5\mathbf{x} + 2$ along the following guidelines: ➢ Multiplying the coefficient of $\mathbf{x}^2$ by 2 i.e. $2 \times 2 = 4$ ➢ Write the factors of 4, i.e. 1 and 4 2 and 2 4 and 1 ➢ Sum the factors of 1 and 4 i.e. 5 ➢ Re-write $2\mathbf{x}^2 + 5\mathbf{x} + 2$ as $2\mathbf{x}^2 + \mathbf{x} + 4\mathbf{x} + 2$ $= \mathbf{x}(2\mathbf{x} + 1) + 2(2\mathbf{x} + 1)$ $= (2\mathbf{x} + 1)(\mathbf{x} + 2)$	Oral Written Worksheet	A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for Sec School in Guyana Bk 3
3		Changing the subject of the formula	3). Changing the subject of a formula and equations excluding those involving roots and powers	A formula is an equation that shows the relationship between two or more quantities, e.g. $v = u + at$ The subject of a formula is the variable that stands by itself in the formula. A formula can be rearranged so that any one of the variables can be the subject	Demonstrate with examples the changing of the subject of formulae with which students are familiar. E.g. Area = Length x Breadth or $A = LB$ $I = \frac{P \times R \times T}{100}$ $V = LBH$	Oral Written Worksheet	A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for Sec School in Guyana Bk 3

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<td>4</td>
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<td>Simultaneous Equations</td>
<td>3). Solve linear simultaneous equations by the methods of substitution and elimination

4)Solve word problems using pairs of linear simultaneous equations</td>
<td>Method of solving simultaneous equations:
➢ Substitution
➢ Elimination
Solving worded problems involving simultaneous equations</td>
<td>Solving pairs of simultaneous equations by the method of elimination and substitution.
Checking solutions and comparing methods</td>
<td>Quiz
Oral and written assignment
Game</td>
<td>A Compl. Mths. Crse for Sec Schools Bk 2
Mathematics for Sec School in Guyana Bk 3</td>
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<td>5</td>
<td>Relations & Functions</td>
<td>Relations and Functions

Linear Functions</td>
<td>1). Identifying a function

2). Identifying linear functions

3). Differentiating between linear relations and linear functions

4). Interpreting functional notation

5). Using functional notation to find solutions to problems</td>
<td>When a relation is a function, as:
➢ an arrow diagram, one and only one arrow leaves each member of the domain.
➢ a set of ordered pairs, no two ordered pairs have the same first element, e.g. (2, 4), (4, 1), (7, 1)
➢ a graph, if vertical lines pass through only one point.
Functions whose points lie on the same straight line are called linear functions.
Linear relations and linear functions in the form of:
_ sets of ordered pairs
_ points plotted
_ graphs
Symbols can be used to describe a function, e.g.
f: x → 3x + 2 means that f is a function such that x is mapped onto 3x + 2.
The function f: x → 3x + 2
can be expressed as f(x) = 3x + 2
or y = 3x + 2
The use of functional notation to find solutions to problems, e.g. using
f: x → 3x +2 to find the element in the range for 3 in the domain.
f(x) = 3x + 2, then
f(3) = 3(3) + 2 = 11
The range for 3 under f(x) is 11.
This can be written as an ordered pair, e.g. (3, 11)
The set of ordered pairs: {(0, 2), (1, 5), (2, 8), (3, 11)} that expresses the function

f: x → 3x + 2 can be written in the form of a table, e.g.
<table><tr><td>x</td><td>0</td><td>1</td><td>2</td><td>3</td></tr><tr><td>3x</td><td>0</td><td>3</td><td>6</td><td>9</td></tr><tr><td>3x + 2</td><td>2</td><td>5</td><td>8</td><td>11</td></tr><tr><td>f(x)</td><td>2</td><td>5</td><td>8</td><td>11</td></tr></table></td>
<td>Observe and discuss the various forms of representing functions.
Identify similarities or common features of functions.
Apply the vertical line test.

Demonstrate and discuss on linear functions.
Draw graphs of sets of ordered pairs and identify those that are linear functions.

Represent a relation using the notation:
x → 3x +2:

Deduce the fact that the symbol f can be used to represent functions. E.g. we can have
f(x) → 3x + 2 or
f: x → 3x + 2 or when expressed as an equation y = 3x + 2
Write the elements in the range of functions given the domain and vice versa.

Complete a table and use functional notation to state the rule that was applied.</td>
<td>Oral

Written

Worksheet</td>
<td>A Compl. Mths. Crse for Sec Schools Bk 2

Mathematics for Sec School in Guyana Bk 3</td>
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<td>6</td>
<td></td>
<td>Graph of Linear Equation Gradient of linear graphs</td>
<td>6). Constructing the graph of a linear function</td>
<td>A function such as y = 3x + 2 is called a linear equation.
When plotted on a graph all points on the line will satisfy the equation y = 3x + 2. The co-ordinates of any point will satisfy the rule y = 3x + 2.
The function y = 4 is a linear function in which all the points</td>
<td>Show students that a convenient way to find ordered pairs is to solve the given equation for ‘y’ before making replacements for x, e.g.</td>
<td>Oral

Written

Worksheet</td>
<td>A Compl. Mths. Crse for Sec Schools Bk 2

Mathematics for</td>
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			7). Calculating the gradient of a straight line	along the line have the y-coordinate equal to 4. The equation of the line is y = 4. When plotting the graph of a linear function, at least three ordered pairs should satisfy the rule of the function. The gradient or slope of a straight line is the change in the vertical distance ÷ the change in the horizontal distance. If P($\mathbf{x}_1$, y_1) and Q($\mathbf{x}_2$, y_2) are two points on a line, then the gradient of the line is: $\frac{y_2 - y_1}{x_2 - x_1}$ When the gradient of a line is positive, the line rises from left to right. When the gradient of a line is negative, the line descends from left to right. The gradient of a horizontal line is zero.	$3\mathbf{x} + 2y = 6$ $y = \frac{6 - 3x}{2}$ Let students examine the graph of this equation. Plotting the points of linear functions and join same Determine the gradient of straight lines that pass through pairs of points. Investigate the slope in relation to the size of the gradient. Discuss the direction of a line when the gradient is positive, negative or zero. Determine the value of an unknown co-ordinate when two points and the gradient are given		Sec School in Guyana Bk 3
7		Equation of Linear graphs Use of Graphs to solve linear simultaneous equations	8). Writing the equation of a straight line in the form y = mx + c 9). Solving linear simultaneous equations graphically	y = mx + c is an equation of a straight line that cuts the y-axis at the point (0, c) and **m** is the gradient of the line. E.g. in the equation y = 2**x** + 3, the gradient is 2 and the line y = 2**x** + 3 cuts the y axis at the point (0, 3) Use of graphs to solve pairs of linear simultaneous equations. The solution to a pair of linear simultaneous equations lies at the point of intersection of the lines that represent the equations.	Construct a table of values for equations of straight lines in the form y = m**x** + c. Determine from graphs the **x**-intercept, y-intercept and gradient of straight lines. State the gradient and y-intercept for given equations of straight lines. Write equations of straight lines given, the gradient and y-intercepts. Writing the equations of lines that pass through pairs of points. Construct tables of values for given linear equations. Checking ordered pairs. Plotting points and joining them. Extending the lines until they intersect. Writing the co- ordinates of the point of intersection.	Oral Written Worksheet	A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for Sec School in Guyana Bk 3
8		Graphs of Linear Inequalities	10). Drawing graphs of linear inequalities	Graphs of linear inequalities. The solution set to a linear inequality in two variables is represented by a infinite set of points. The solution set cannot be listed, hence the need for shading	Draw graphs of linear inequalities. Shade the regions that represent the solutions.	Oral Written Worksheet	A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for Sec School in Guyana Bk 3
9	Geometry 1	Translation	1). Describing and carrying out a translation	A translation is a movement, sometimes called a glide of an	Describe the translation of line	Oral	A Compl. Mths.

		Reflection	2). Describing and carrying out reflections in the **x** and y-axes 3). Carrying out reflections in the co-ordinate plane about any axis	object from one point to another, e.g. the sliding of a book across a table. When an object under goes a translation its shape and size remains unchanged. The co-ordinates of a point are normally written in row form, e.g. (**x**, y). A translation vector is written in column form, e.g. $\begin{pmatrix} x \\ y \end{pmatrix}$ where **x** is the horizontal displacement and y is the vertical displacement. When a reflection is carried out: ➢ the object and its image are at equal distances from the mirror line or line of reflection. ➢ the line joining the object and its image is perpendicular to the mirror line. ➢ Points on the mirror line remain unchanged. ➢ The object and its image are on opposite sides of the mirror line. Reflection of points in the **x**-axis, e.g. (**x**, y) $\rightarrow$ (**x**, -y) Reflection of points in the y -axis, e.g. (**x**, y) $\rightarrow$ (-**x**, y) Reflection of points in any axis. Successive reflections in two parallel mirror lines are equivalent to a translation.	segments in terms of distance moved in the **x**-direction and distance moved in the y-direction. Write the co-ordinates of the point (**x**, y) after a given translation Fold a piece of paper along a mirror line and by pricking with a pin, form any shape on the folded paper. Open the paper, join the points and look at the shapes, students discuss their observations Reflect given points on a co-ordinate plane in the **x**-axis and write down the co-ordinates of the images. Reflect given points on a co-ordinate plane in the y-axis and write down the co-ordinates of the images. Plot given points on a co-ordinate plane, join the points and find the images of these shapes after reflection in an axis other than the **x** or y axis, e.g. the lines: ➢ y = **x** ➢ y = -**x** ➢ any line parallel to the **x** or y-axis.	Written Worksheet	Crse for Sec Schools Bk 2 Mathematics for Sec School in Guyana Bk 3
10	Consumer Arithmetic	Discount Sales and Income Tax Cost price and Selling price Hire purchase	1). Calculating discount, sales tax, profit or loss when they are given as a percentage 2). Calculating marked price when loss or discount is given 3). Solving problems involving payments by installments as in the case of Hire purchase, mortgages, etc in simple cases 4). Solving problems involving invoices and shopping bills	Hire purchase involves a loan with interest repayments. In a hire purchase arrangement the customer pays more than the cash price for the article. Calculations: ➢ deposits ➢ instalments ➢ interest rates	A visit to stores that offer the hire purchase plan or have students use the advertisement from news papers relating to hire purchase offers to calculate: ➢ interest as a percentage of cost price. ➢ total amount paid, i.e. deposit plus instalments. ➢ interest paid i. e. subtracting cash price from total amount paid. ➢ the interest rate:	Oral Written Worksheet	A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for Sec School in Guyana Bk 3

					$R = \frac{100\ I}{PxT}$ where R is the interest rate, I the interest, P the principal and T the time.		
11		Mortgages Simple Interest Compound Interest Depreciation	5). Calculate mortgages, deposits on mortgages, total mortgage repayments 6). Calculate the interest and monthly installments on mortgages 7). Use Simple Interest formula to calculate principal, time and rate 8). Calculate Compound Interest 9). Calculate Depreciation on an item	Mortgage is a claim on property as security for a loan from a bank or person with provision that the money is repaid within an agreed time. Calculation of mortgages, deposits on mortgages; total mortgage repayments; interest and monthly payments In compound interest, the interest for one year is added to the principal for that year, the total (principal + interest) becomes the principal for the next year. The interest changes each year, as the yearly interest is added. This method pays a higher amount than simple interest. When calculating compound interest over a number of years, it is useful to use the compound interest formula: $A = P(1+\frac{r}{100})^n$ where A represents the amount, P the principal, r the rate percent and n the number of years. Depreciation is the reduction in the value of assets. Appreciation is the increase in the value of assets.	Collect information from a bank on mortgages Calculate mortgages, deposits on mortgages, total mortgage repayments. Calculate interest on mortgages, monthly payments on mortgages Discuss the term compound interest. Discuss the formula: $A = P(1+\frac{r}{100})^n$ Calculate compound interest using the compound interest formula Depreciation after first year = \$100 Value of calculator at the beginning of the second year = \$2000 - \$100 = \$1900 Use given percentages to calculate the depreciation of an article over a number of years. Calculate the appreciation or the increase in the value of an item over a number of years.	Oral Written Worksheet	A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for Sec School in Guyana Bk 3
12			**EASTER TERM EXAMINATIONS**				
13			**EASTER TERM EXAMINATIONS AND REMEDIAL WORK ON WEAK AREAS IDENTIFIED FROM MATHEMATICS EXAMINATION**				

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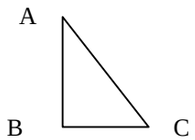
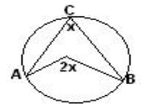
Ministry of Education
Secondary Sector
Mathematics
Grade9
August Term Schedule of Topics

Week	Topic	Sub-topic	Objectives	Content	Activities	Evaluation Strategies	Resources
1	Geometry 2	Pythagoras Theorem	1). Using Pythagoras' theorem to solve simple problems	Pythagoras Theorem states that in any right-angled triangle the square on the hypotenuse is equal to the sum of the squares on the other two sides.  In the right-angled triangle above, $AC^2 = AB^2 + BC^2$ $AC = \sqrt{AB^2 + BC^2}$ Pythagorean triples satisfy Pythagoras Theorem. Examples are: {3, 4, 5} {5, 12, 13} {8, 15, 17} Application of Pythagoras theorem.	Have students draw on graph paper a right-angled triangle whose sides are 3 cm, 4 cm and 5 cm. Have students draw a square on each side of the triangle and find their areas. Discuss findings and have students formulate a rule from the findings. Investigate other Pythagorean triples as a Project. Calculate the length of the unknown sides of given right-angled triangles.	Oral Written Worksheet	A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for Sec School in Guyana Bk 3
		Similar triangles	2). Recognizing the properties of: i) congruent triangles ii) the concept of similarity 3). Using the properties of congruent triangles to solve geometric problems 4). Using the concept of similarity to solve geometric problems	Triangles and other shapes are similar if: ➢ their corresponding angles are equal. ➢ their corresponding sides are in the same ratio. The symbol for similarity is **~**.	Display examples of similar triangles and shapes. Have students measure the sides and angles of cardboard shapes that are similar and verify the properties for similar shapes, e.g. triangles ABC and XYZ, $\frac{AB}{XY} = \frac{AC}{XZ} = \frac{BC}{YZ}$ $\hat{A} = \hat{X}$ $\hat{B} = \hat{Y}$ $\hat{C} = \hat{Z}$		
2		Angles in a circle	5). Using the properties of cyclic quadrilaterals in the solution of geometric problems	Sector: the part of the circle bounded by two radii and an arc. Segment: the part of the circle bounded by a chord and an arc. The size of the angle, which an arc of a circle subtends at the centre, is twice the angle, which the arc subtends at any point on the remaining part of the circumference	Locate a sector of a circle on a circular geoboard. Locate a segment of a circle on a circular geoboard	Oral Written Worksheet	A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for

				The angle in a semi circle is a right angle. Angles in the same segment of a circle are equal.	Draw the diagram below:  Use a protractor to measure the size of angle 2**x**and angle **x**, compare answers and draw conclusions. Construct a triangle in a semi-circle using the diameter as the base. Measure the angle in the semicircle with a protractor and compare results. Draw angles in the same segment of a circle. Measure the angles with a protractor and compare results.		Sec School in Guyana Bk 3
3		Tangent properties of a circle	6). Using the relationship between the tangent of a circle and the related angles in the solution of geometric problems	A tangent is a line that touches the circumference of a circle at one point only. The point is called the point of **contact** or **point of tangency.** The tangent is always perpendicular to the radius of the circle. Tangent properties: ➢ If two circles touch internally or externally, then the line that passes through their centres also passes through the point of tangency. ➢ A tangent to a circle is perpendicular to the radius drawn through the point of tangency. If two tangents are drawn from a point outside the circle, then the: ➢ tangents are equal. ➢ tangents make equal angles with the chord joining the points of tangency. ➢ a line passing through the centre of a circle and the external point bisects the angle between the tangents. ➢ The angle between a tangent to a circle and a chord drawn from the point of tangency is equal to one-half the angle at the centre of the circle subtended by the chord.	Demonstrate how to draw tangents to a circle. Draw tangents to circles. Demonstration and discussion involving the tangent properties of a circle. Use diagrams during demonstration	Oral Written Worksheet	A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for Sec School in Guyana Bk 3

4	Introduction to Trigonometry	Sine ratio	1). Determining the sine of acute angles in a right-angled triangle 2). Using the sine ratios in the solution of right-angled triangle	In the right-angled triangle above, Sin θ = side opposite / hypotenuse In any right-angled triangle the sine of an angle = side opposite / hypotenuse Tables of natural sines Calculation of unknown sides and angles of right-angled triangles.	Present students with right angled-triangles in various positions and have them recognise that the sine of any one of the acute angles is side opposite / hypotenuse Given an angle have students use tables of natural sines to find its value. Given the value of the sine, have students use tables of natural sines to find the size of the angle	Oral Written Worksheet	A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for Sec School in Guyana Bk 3
5		Cosine ratio	3). Determining the cosine of acute angles in a right-angled triangle. 4).Using the cosine ratio in the solution of right-angled triangle	In the right-angled triangle above, cos θ = side adjacent / hypotenuse In any right-angled triangle the cosine of an angle = side adjacent / hypotenuse Tables of natural cosine Calculation of unknown sides and angles of right-angled triangles	Present students with right-angled triangles in various positions and have them recognise that the cosine of any one of the acute angles is side adjacent / hypotenuse Given an angle use tables of natural cosines to find its value. Given the value of the cosine use tables of natural cosines to find the size of the angle.	Oral Written Worksheet	A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for Sec School in Guyana Bk 3
6		Tangent ratio	5). Determining the tangent of acute angles in a right-angled triangle. 6).Using the tangent ratio in the solution of right-angled triangle	In the right-angled triangle above, tan θ = side opposite / side adjacent In any right-angled triangle the tangent of an angle = side opposite / side adjacent Tables of natural tangents Calculation of unknown sides and angles of right-angled triangles.	Present students with right angled-triangles in various positions and have them recognise that the tangent of any one of the acute angles is side opposite / side adjacent Given an angle have students use tables of natural tangents to find its value. Given the value of the tangent, have students use tables of natural tangents to find the size of the angle.	Oral Written Worksheet	A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for Sec School in Guyana Bk 3
7	Statistics	Frequency Polygon	1).Construct a frequency table for a given set of data	A **Frequency Table** lists classes or categories of values along with frequencies of the number of values that falls within each class. It is a way of summarising a large amount of data. E.g. *x* | Tally | f | f x *x*	Have students set out given data in a regular pattern, e.g. 1, 2, 3, 4 … Have students check the number of	Oral Written Worksheet	A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for Sec School in

				1 | 111 | 3 | 3 2 | 11 | 2 | 4 3 | ~~1111~~ 1 | 6 | 18 $\sum$ | | 11 | 25 In the table above, **x** represents the scores, f the frequency and $\sum$ the sum. Mean = $\sum \frac{fx}{x} = \frac{25}{11} = 2.27$	times each item occurs. Have students construct a frequency table to show the data Have students calculate **f** x ***x***for each data entry and then find the total. Have students divide the total by the number of data entries or frequencies to find the mean		Guyana Bk 3
8		Class intervals	2). Determining the class interval for a given set of data.	Frequency Table: In the table below, the class intervals are: 0 – 9, 10 – 19, 20 – 29. *x* | *Tally* | *f* 0 – 9 | 11 | 2 10 – 19 | 111 | 3 20 - 29 | ~~1111~~ 111 | 8 Discrete data refer to definite known values that can be identified, e.g. 0, 7, 15 or shoe sizes: 4, 6, 8, $10\frac{1}{2}$ etc. Discrete data takes exact values, e.g. the number of trials necessary in order to pass a driving test. These can only take discrete values such as 1, 2, 3, etc. Continuous data refers to data that have no exact values. These values usually arise from situations that involve measuring, e.g. the masses of four men: 74.2 kg, 67.4 kg, 57.7 kg, 70.4 kg. These can take values along a continuum. In discrete data the lower class boundary of a class interval is the lowest value that an item in the class interval can have, e.g. in the class interval 10 -19, the lower value is 9.5. The upper boundary of a class interval is the highest value that an item in a class interval can have, e.g. in the class interval 10 – 19, the upper boundary is 19.5. In continuous data the upper boundary of one class is the lower boundary of the next higher class. In the class interval 10 – 19, the lower limit is 10 and the upper limit is 19. Class size or width is the numerical difference between the upper class boundary and the lower class boundary, e.g. 19.5 – 9.5 = 10	Inserting dotted lines to join the mid-point on the top of each rectangle. Construct frequency polygons using scores as data. Show an empty interval at the end of each distribution and draw the polygon down to the mid-point of each empty interval. Data collection, e.g. the scores of 40 students on a test. Discuss a suitable size for class intervals. Arrange data into class intervals. Present the different types of data and differentiate between the discrete and continuous data. Calculate the number half way between 9 and 10. This is 9.5 Recognize that 9.5 is the lower boundary for the class interval 10 - 19. Recognize that 19.5 is the upper boundary for the class interval 10 to 19.	Oral Written Worksheet	A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for Sec School in Guyana Bk 3

		Histogram	3). Drawing and using histograms and frequency polygons	A histogram is used to display data contained in a frequency distribution. It consists of continuously joined vertical rectangles. The width of the rectangles represents the class size and the height of the rectangles represents the class frequency. When the class sizes are the same, the width of the rectangles is equal but the heights are different. The areas contained by the rectangles are proportional to the frequencies of the classes they represent. A frequency polygon is formed by plotting the mid-points of the top horizontal lines of each rectangle on a histogram and then joining the points.	Calculate class size by finding the numerical difference between boundaries Display a few histograms and have students discuss them, e.g. there is no space between the rectangles. Construct histograms. Identify the mid-point on the top of each bar in a histogram. Insert dotted lines to join the mid-point on the top of each rectangle. Construct frequency polygons using scores as data. Show an empty interval at the end of each distribution and draw the polygon down to the mid-point of each empty interval.		
9		4. Mean 5. Median 6. Mode	4). Determining mean, median and mode for a set of data	The mean is found by adding the values of all data entries and dividing this sum by the total number of data entries. E.g. the mean of 2, 4, 6, 8, 10 is $\frac{2+4+6+8+10}{5} = \frac{30}{5} = 6$ When the number of entries is odd the median is the middle value, e.g. the median of 12, 13, 14, 15, 16 is 14. When the number of entries is even, the median is obtained by finding the mean of the two middle values, e.g. the median of 2, 4, 6, 8, 10, 12 is $\frac{6+8}{2} = 7$ The median of a given set of data cannot be specified if the data is not measured numerically. Mode is an average. It is the value that occurs with the greatest frequency, e.g. in the set of values: 3, 4, 6, 4, 9, 4, 6, 3, 2, the mode is 4. When the values are all different, e.g. 10, 11, 12, 13, 14, there is no mode. When the values are the same, e.g. 1, 1, 1 or 9, 9, 9, 9, there is no mode. When there are two or more values as modes, the data is said to be bi-modal, e.g.	Discussion: Citing situations in which the mean is used, e.g. cricket. Small group activities: ➢ _ Have students calculate the mean of given numbers. ➢ _ Have students calculate the mean age of group members. ➢ Have students collect data and calculate the mean odd number of students and have them identify the one that is in the middle. ➢ Have students record the ages of their class-mates and determine the median age. Students can then discuss/compare the mean age with the median age. ➢ Discussion on the advantages and	Oral Written Worksheet	A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for Sec School in Guyana Bk 3

				2, 2, 4, 5, 5, 6, 7, 8, 8...The values 2, 5 and 8 are modes	disadvantages of the median. Use bar charts to identify the mode. Discuss the advantages/ disadvantages and usefulness of the mode. Construct frequency tables and find the mode.		
10		**ANNUAL EXAMINATIONS**					
11		**ANNUAL EXAMINATIONS AND REMEDIAL WORK ON WEAK AREAS IDENTIFIED FROM MATHEMATICS EXAMINATION**					

Note for all Teachers:

1. Use this termly schedule of topics, together with the Ministry of Education's Curriculum Guides.
2. The recommended texts: Mathematics for Secondary Schools in Guyana Book 3 and Mathematics for Secondary School Book 2 are not the only text you can use to give students practice exercises.
3. Use any Mathematics textbook that is available to you and the students.
4. Seek out the topics with the appropriate content for the students to gain practice.
5. If teachers feel that their students are competent in the objectives specified for the given week, then they can move on or give students additional work on the objectives to test their skills.