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<th>Objectives</th>
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<td>1</td>
<td>Sets</td>
<td>Set builder notation</td>
<td>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</td>
<td>Set builder notation is a way of describing a set using an algebraic expression. Symbols used in set builder notation are: (&lt;) is less than (\geq) is greater than (\leq) is less than or equal to (\geq) is greater than or equal to (\in) is an element of (\notin) is not an element of (\cup) 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.</td>
<td>Reviewing natural numbers, whole numbers, integers, etc. and symbols use such as (&lt;) is less than (\geq) 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 (\subset) (contains) and (\supset) (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 = (2^n) where n is the number of elements in the given set.</td>
<td>Quiz Games Oral work Written assignment A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for Sec School in Guyana Bk 3</td>
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<tr>
<td>2</td>
<td>Intersection and Union of sets</td>
<td>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</td>
<td>The number line can be used to show the intersection and union of pairs of sets.</td>
<td>Drawing number lines and using dots to show the intersection and union of pairs of sets. Describing the union and intersection.</td>
<td>Quiz Oral and written assignment A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for...</td>
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<td>3</td>
<td>Describing the intersection and union of two sets using set-builder notation</td>
<td>Using the symbols $\cup$ and $\cap$ to make statements about sets.</td>
<td>Intersection of sets using set builder notation.</td>
<td>Project</td>
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<td>9)</td>
<td>Identifying elements in the intersection and union of:</td>
<td>Using the symbols $\cup$ and $\cap$ to make statements about sets.</td>
<td>Displaying examples to show the intersection and union of:</td>
<td>Quiz</td>
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<td>(a) two sets</td>
<td>Two sets</td>
<td>1. Two sets</td>
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<td>(b) three sets</td>
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<td>10) Shading the regions that represent intersection or union on a Venn diagram</td>
<td>Constructing and using Venn diagram to solve numerical problems.</td>
<td>3. Constructing and using Venn diagram to solve numerical problems.</td>
<td>Game</td>
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<td></td>
<td>11) Solving numerical problems arising from the intersection of not more than three sets</td>
<td>For any two sets A and B: $n(A \cup B) = n(A) + n(B) - n(A \cap B)$</td>
<td>Displaying examples to show the intersection and union of:</td>
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<td>12) Using Venn diagrams to represent propositions from which valid conclusions can be made</td>
<td>For any two sets A and B: $n(A \cup B) = n(A) + n(B) - n(A \cap B)$</td>
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<td>13) Using Venn diagrams to represent propositions from which valid conclusions can be made</td>
<td>For any two sets A and B: $n(A \cup B) = n(A) + n(B) - n(A \cap B)$</td>
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<td>Quiz</td>
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<th>Drawing and shading diagrams</th>
<th>Quiz</th>
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<td>Identifying regions on a Venn diagram for intersection of 3 sets</td>
<td>List elements of a set given set builder notation</td>
<td>Drawing and shading diagrams</td>
<td>Quiz</td>
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<td>Listing elements of a set given set builder notation</td>
<td>Solving problems involving the use of Venn diagrams for up to the intersection of three sets</td>
<td>Drawing and shading diagrams</td>
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<td>Solving problems involving the use of Venn diagrams for up to the intersection of three sets</td>
<td>Shading regions representing notation such as: $A \cup B \cup C$, etc. and vice-versa</td>
<td>Interpreting inequalities and listing elements</td>
<td>Written</td>
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<td>Shading regions representing notation such as: $A \cup B \cup C$, etc. and vice-versa</td>
<td>If ${x : -3 &lt; x &lt; 2, x \in Z}$ then $x = -2, -1, 0, 1$</td>
<td>Interpreting inequalities and listing elements</td>
<td>Exercise</td>
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<td>If ${x : -3 &lt; x &lt; 2, x \in Z}$ then $x = -2, -1, 0, 1$</td>
<td>Constructing/completing Venn diagrams from worded problems</td>
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<td>Multiplication of decimals</td>
<td>Division of decimals</td>
<td>Dividing decimals by decimals</td>
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<th>Approximation</th>
<th>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:</th>
<th>Discussing the importance of estimation in mathematics. Giving estimation of lengths and objects.</th>
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<td>4)</td>
<td>Approximating numbers by making use of decimal places and significant figures</td>
<td>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:</td>
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<td>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:</td>
<td>1. Decimal places</td>
<td>Discussing the importance of estimation in mathematics. Giving estimation of lengths and objects.</td>
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<td>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:</td>
<td>2. Significant figures</td>
<td>Discussing the importance of estimation in mathematics. Giving estimation of lengths and objects.</td>
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<td>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:</td>
<td>Squares of numbers</td>
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<td>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:</td>
<td>Square root of numbers</td>
<td>Discussing the importance of estimation in mathematics. Giving estimation of lengths and objects.</td>
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<td>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:</td>
<td>Using square root tables to find the square root of any number</td>
<td>Discussing the importance of estimation in mathematics. Giving estimation of lengths and objects.</td>
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| 7) | Calculating the squares of numbers without the use of tables or calculators | Squares of numbers | Approximating numbers to a given number of decimal places or significant figures. | Quiz | Mathematics for Sec School in Guyana Bk 3 |
|     | Calculating the squares of numbers without the use of tables or calculators | 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 | Mathematics for Sec School in Guyana Bk 3 |
| 8) | Using square root tables to find the square root of any number | Using square root tables to find the square root of any number | Calculating squares of numbers. Finding the squares from the table of squares. Finding the square root of numbers. | Quiz | Mathematics for Sec School in Guyana Bk 3 |
|     | Using square root tables to find the square root of any number | Using square root tables to find the square root of any number | Calculating squares of numbers. Finding the squares from the table of squares. Finding the square root of numbers. | Quiz | Mathematics for Sec School in Guyana Bk 3 |

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<td><strong>Place value</strong></td>
<td>The value of digits</td>
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<td>2. Stating the value of a digit in a number</td>
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<td><strong>Place value means that the position in a number has a different</strong></td>
<td><strong>Using tables to find the square root of numbers</strong></td>
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<td><strong>value associated with it.</strong></td>
<td><strong>Demonstrating the place value</strong></td>
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<td>of digits in numbers.</td>
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<td>Discussing the usefulness of the place value system.</td>
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<td>Investigating change in the position of digits using the place value chart.</td>
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<td>Finding the difference between the values of two digits in a number.</td>
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<td><strong>Addition and subtraction of numbers in base two, five and eight; and other bases using place value table and conversion method</strong></td>
<td><strong>Game</strong></td>
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<td><strong>7). Identifying and applying the commutative or associative or distributive law in performing the four basic operations</strong></td>
<td><strong>Calculating the area of polygons using appropriate formulas</strong></td>
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<td><strong>Multiplication in base two, five and eight; and other bases</strong></td>
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<td><strong>Creating the place value chart for base five and eight</strong></td>
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<td><strong>Multiplying in base five and eight</strong></td>
<td><strong>Calculating the area of circles using, A=πr²</strong></td>
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<td><strong>Calculating actual size using ratio or R.F.</strong></td>
<td><strong>Finding suitable R.F.</strong></td>
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<td><strong>5). Calculating the area of a triangle, square, rectangle, parallelogram and trapezium and their combinations</strong></td>
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<td><strong>Area of a circle, A=πr²</strong></td>
<td><strong>Surface area=total area of the faces.</strong></td>
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<td><strong>Finding suitable Representative Fractions.</strong></td>
<td><strong>Area of a trapezium</strong></td>
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<td><strong>1). Calculating the perimeter of a triangle, square, rectangle, parallelogram and trapezium and their combinations</strong></td>
<td><strong>= 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.</strong></td>
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<td><strong>2). Solving problems involving the calculation of the perimeter of polygons</strong></td>
<td><strong>Calculating the area of a trapezium using appropriate formulas</strong></td>
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<td><strong>3). Identifying the circumference of a circle</strong></td>
<td><strong>Calculating surface area of a prism</strong></td>
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<td><strong>4). Calculating and solving the circumference of a circle</strong></td>
<td><strong>Calculating the area of circles using, A=πr²</strong></td>
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<td><strong>Perimeter-total length around a plane shape. Circumference-the outside edge of a circle or the perimeter.</strong></td>
<td><strong>Finding suitable R.F.</strong></td>
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<td><strong>C=πd or c=2πr, where</strong></td>
<td><strong>Calculating actual size using ratio or R.F.</strong></td>
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<td><strong>π≈3.14 or ⊿ 7.</strong></td>
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<td><strong>Finding the classroom or playing field.</strong></td>
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<tr>
<td><strong>Area of a trapezium</strong></td>
<td><strong>Finding suitable Representative Fractions.</strong></td>
</tr>
<tr>
<td><strong>= 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.</strong></td>
<td><strong>Quiz</strong></td>
</tr>
<tr>
<td><strong>Measuring the classroom or play- field.</strong></td>
<td><strong>Oral and</strong></td>
</tr>
<tr>
<td><strong>Finding suitable Representative Fractions.</strong></td>
<td><strong>A Compl. Mths. Crse for Sec Schools Bk 2</strong></td>
</tr>
<tr>
<td><strong>Mathematics for Sec School in Guyana Bk 3</strong></td>
<td><strong>A Compl. Mths. Crse for Sec Schools Bk 2</strong></td>
</tr>
<tr>
<td><strong>A Compl. Mths. Crse for Sec Schools Bk 2</strong></td>
<td><strong>Mathematics for Sec School in Guyana Bk 3</strong></td>
</tr>
</tbody>
</table>
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 \( \pi \) times the radius square. 
\[ \text{Area} = \pi r^2 \]
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. = \( \frac{1500000}{1} = 1:500 \ 000 \)

12)
9). Solving simple problems involving time, distance and speed

Solving problems on time, distance and speed
\[ \text{Speed} = \frac{\text{distance}}{\text{time}} \]
Units: km/h; m/s.

Using scale drawing to determine areas

Creating worded problems and solving same
Using maps or diagrams to solve problems

13)
Algebra 1
Indices
1). Applying the rules of indices to manipulate algebraic expressions with positive integral, negative integral and fractional indices

Rules
\[ x^a \cdot x^b = x^{a+b} \]
\[ x^a \cdot y^b = (xy)^a \]
\[ x^a \div x^b = x^{a-b} \]

Applying the laws of indices to simplify algebraic expressions with positive integrals, negative integral and fractional indices.

14)

2). Differentiating between positive integral, negative integral and fractional integral
3) Work exercises by applying laws of indices

\[ (x^n)^m = x^{nm} \]
\[ (\sqrt[n]{a})^m = a^{m/n} \]

Applying the laws of indices to simplify algebraic expressions with positive integrals, negative integral and fractional indices.

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<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Sub-topic</th>
<th>Objectives</th>
<th>Content</th>
<th>Activities</th>
<th>Evaluation Strategies</th>
<th>Resources</th>
</tr>
</thead>
</table>
| 1    | Algebra 2 | Factorisation | 1). Factorizing expressions of the form:  
   i) $2ab + b^2$  
   ii) $ax + bx + ay + by$  
   iii) $a - b^2$  
   An expression representing the difference of two squares can be expressed as the product of two factors: e.g. $a - b = (a - b)(a + b)$  
   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). $36 - 9$  
| 2    | Factorisation | iv) $a^2+2ab+b^2$  
   v) $ax + bx + c$, where $a$, $b$ and $c$ are integers.  
   2). Solving quadratic equations by factorization | Factorize as perfect squares  
   Expressions of the form $ax^2 + bx + c$ are called quadratic expressions because the highest power of the unknown is 2.  
   Examples of quadratic expressions are:  
   $x^2 + 5x + 6$  
   $2x^2 + 5x + 2$  
   To factorise such expressions, we can re-write them as expressions of four terms.  
   i). $x^2 + 5x + 6 = x^2 + 3x + 2x + 6 = x(x + 3) + 2(x + 3) = (x + 3)(x + 2)$  
   ii). $2x^2 + 5x + 2 = 2x^2 + 4x + x + 2 = 2x(x + 2) + (x + 2) = (x + 2)(2x + 1)$ | Discuss the factorization of $2x^2 + 5x + 2$ along the following guidelines:  
   - Multiplying the coefficient of $x$ by 2 i.e. $2 \times 2 = 4$  
   - Write the factors of 4, i.e. 1 and 4  
   - 2 and 2  
   - Sum the factors of 1 and 4 i.e. 5  
   - Re-write $2x^2 + 5x + 2$ as $2x^2 + x + 4x + 2 = x(2x + 1) + 2(2x + 1) = (2x + 1)(x + 2)$ | Written | Written | 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 | Oral | A Compl. Mths. Crse for Sec Schools Bk 2 |
Simultaneous Equations

3. Solve linear simultaneous equations by the methods of substitution and elimination
4) Solve word problems using pairs of linear simultaneous equations

Method of solving simultaneous equations:
- Substitution
- Elimination

Solving worded problems involving simultaneous equations

Solving pairs of simultaneous equations by the method of elimination and substitution.
Checking solutions and comparing methods

Quiz
Oral and written assignment
Game
A Compl. Mths. Crse for Sec Schools Bk 2
Mathematics for Sec School in Guyana Bk 3

Relations & Functions

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

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.
\( f: x \rightarrow 3x + 2 \) means that \( f \) is a function such that \( x \) is mapped onto \( 3x + 2 \).

The function \( f: x \rightarrow 3x + 2 \)
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
\( f: x \rightarrow 3x + 2 \) 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

\( f: x \rightarrow 3x + 2 \) can be written in the form of a table, e.g.

<table>
<thead>
<tr>
<th>( x )</th>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
</tr>
</thead>
<tbody>
<tr>
<td>3x + 2</td>
<td>2</td>
<td>5</td>
<td>8</td>
<td>11</td>
</tr>
</tbody>
</table>

Graph of Linear Equation Gradient of linear graphs

6. Constructing the graph of a linear function

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

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.
7). Calculating the gradient of a straight line

The gradient or slope of a straight line is the change in the vertical distance ÷ the change in the horizontal distance.

If \( P(x_1, y_1) \) and \( Q(x_2, y_2) \) 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.

8). Writing the equation of a straight line in the form \( y = mx + c \)

\( y = mx + c \) 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 \( y = 2x + 3 \), the gradient is 2 and the line \( y = 2x + 3 \) cuts the y-axis at the point \((0, 3)\).

9). Solving linear simultaneous equations graphically

The solution to a pair of linear simultaneous equations lies at the point of intersection of the lines that represent the equations.

Draw graphs of linear inequalities.

The solution set to a linear inequality in two variables is represented by an 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.

Describe the translation of line

Sec School in Guyana Bk 3
### 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.

### Consumer Arithmetic

| Discount Sales and Income Tax | 1). Calculating discount, sales tax, profit or loss when they are given as a percentage |
| Cost price and Selling price | 2). Calculating marked price when loss or discount is given |
| Hire purchase | 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 newspapers 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.
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| 11 | Mortgages | 5). Calculate mortgages, deposits on mortgages, total mortgage repayments | Mortgages 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. |
| 11 | Simple Interest | 6). Calculate the interest and monthly installments on mortgages | |
| 11 | Compound Interest | 7). Use Simple Interest formula to calculate principal, time and rate |
| 11 | Depreciation | 8). Calculate Compound Interest |
| 11 | | 9). Calculate Depreciation on an item |
| | | 10). Collect information from a bank on mortgages |
| | | 11). Calculate mortgages, deposits on mortgages, total mortgage repayments, interest on mortgages, monthly payments on mortgages |
| | | 12). Discuss the term compound interest. Discuss the formula: $A = P(1 + \frac{r}{100})^n$ Calculate compound interest using the compound interest formula. |
| | | 13). 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. |

<p>| 12 | | EASTER TERM EXAMINATIONS |
| 13 | | EASTER TERM EXAMINATIONS AND REMEDIAL WORK ON WEAK AREAS IDENTIFIED FROM MATHEMATICS EXAMINATION |</p>
<table>
<thead>
<tr>
<th>Week</th>
<th>Topic</th>
<th>Sub-topic</th>
<th>Objectives                                                                licht</th>
<th>Content</th>
<th>Activities</th>
<th>Evaluation Strategies</th>
<th>Resources</th>
</tr>
</thead>
</table>
| 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.  
A
B
C
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.  
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 \( \sim \).  
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.  
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.  
\[ \frac{AB}{XY} = \frac{AC}{XZ} = \frac{BC}{YZ} \]  
\[ \hat{A} = \hat{X} \]  
\[ \hat{B} = \hat{Y} \]  
\[ \hat{C} = \hat{Z} \]  
Locate a sector of a circle on a circular geoboard.  
Locate a segment of a circle on a circular geoboard.  
Oral  
Written  
Worksheet                                                                 |
| 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 | 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 | 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.  
\[ \frac{AB}{XY} = \frac{AC}{XZ} = \frac{BC}{YZ} \]  
\[ \hat{A} = \hat{X} \]  
\[ \hat{B} = \hat{Y} \]  
\[ \hat{C} = \hat{Z} \]  
Locate a sector of a circle on a circular geoboard.  
Locate a segment of a circle on a circular geoboard.  
Oral  
Written  
Worksheet                                                                 |
<table>
<thead>
<tr>
<th>3</th>
<th>Tangent properties of a circle</th>
<th>6). Using the relationship between the tangent of a circle and the related angles in the solution of geometric problems</th>
<th>The angle in a semi circle is a right angle. Angles in the same segment of a circle are equal.</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Draw the diagram below:</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Use a protractor to measure the size of angle $2\alpha$ and angle $\alpha$, compare answers and draw conclusions.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>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.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>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</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Oral Written Worksheet</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>A Compl. Mths. Crse for Sec Schools Bk 2 Mathematics for Sec School in Guyana Bk 3</td>
</tr>
</tbody>
</table>
| 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,  
\( \sin \theta = \frac{\text{side opposite}}{\text{hypotenuse}} \)  
In any right-angled triangle the sine of an angle = \( \frac{\text{side opposite}}{\text{hypotenuse}} \)  
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 \( \frac{\text{side opposite}}{\text{hypotenuse}} \)  
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.  
Crs 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,  
\( \cos \theta = \frac{\text{side adjacent}}{\text{hypotenuse}} \)  
In any right-angled triangle the cosine of an angle = \( \frac{\text{side adjacent}}{\text{hypotenuse}} \)  
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 \( \frac{\text{side adjacent}}{\text{hypotenuse}} \)  
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.  
Crs 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,  
\( \tan \theta = \frac{\text{side opposite}}{\text{side adjacent}} \)  
In any right-angled triangle the tangent of an angle = \( \frac{\text{side opposite}}{\text{side adjacent}} \)  
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 \( \frac{\text{side opposite}}{\text{side adjacent}} \)  
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.  
Crs 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 | \( f \) | \( f \times x \) | Have students set out given data in a regular pattern, e.g. 1, 2, 3, 4 …  
Have students check the number of \( f \times x \) | Oral  
Written  
Worksheet | A Compl. Mths.  
Crs for Sec Schools Bk 2  
Mathematics for Sec School in Guyana Bk 3 |
In the table above, \( x \) represents the scores, \( f \) the frequency and \( \sum \) the sum.

\[
\text{Mean } = \frac{\sum fx}{\sum f} = \frac{25}{11} = 2.27
\]

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.

<table>
<thead>
<tr>
<th>( x )</th>
<th>Tally</th>
<th>( f )</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 – 9</td>
<td>1111</td>
<td>4</td>
</tr>
<tr>
<td>10 – 19</td>
<td>111</td>
<td>3</td>
</tr>
<tr>
<td>20 – 29</td>
<td>1111</td>
<td>8</td>
</tr>
</tbody>
</table>

Discrete data refer to definite known values that can be identified, e.g. 0, 7, 15 or shoe sizes: 4, 6, 8, 10, 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.

Recognize that 9.5 is the lower boundary for the class interval 10 to 19.

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.

Recognize that 19.5 is the lower boundary for the class interval 10 - 19.

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.
### 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.

### 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

\[
\frac{2 + 4 + 6 + 8 + 10}{5} = \frac{30}{5} = 6
\]

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

\[
\frac{6 + 8}{2} = 7
\]

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 classmates and determine the median age. Students can then discuss/compare the mean age with the median age.
- Discussion on the advantages and disadvantages of using the mean, median, and mode.

#### 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.
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.