



MATHEMATICS CURRICULUM

SECONDARY LEVEL
(YEARS 1 - 5)

SCOPE

And

SEQUENCE

of

CONTENT

REVISED 2010

PREFACE

The start of the 2004 - 2005 school year marked the launch of a three-year Project aimed at improving the performance of students in the CSEC/CXC examination in Mathematics. The Project was totally funded by the NCB Foundation, part of the Bank's Jamaican Education Initiative.

The six participating schools were:

Gaynstead High School
Jamaica College
Meadowbrook High School
Mona High School
St. George's College and
St. Hugh's High School

Very early in the first year of the Project, the need for a document such as this was identified and a first version was prepared. It was used over the three-year period, and at the end, adjustments were made to accommodate the varied needs and practices across the Schools. [Revised Version, 2007]

Since that time, members of the Project Team have not only kept in touch with some of the Schools listed above, but have interacted with other schools and identified other needs. The revised version of the CXC syllabus which would be examined in 2010 coincided with the Team's decision to offer an up-dated resource for guiding the selection and sequencing of the *what* of the teaching-learning process over a critical five-year period..... the secondary stage of our education system.

ACKNOWLEDGEMENTS

Members of the Project Team hereby express our thanks to:

- members of the Board of the NCB Foundation for their sustained interest and words of encouragement as we faced the demands and challenges of the Project;
- members of the NCB staff who had direct responsibility for the management of the Project, and particularly to Mrs. Pamela Harrison, who gave invaluable support during the start-up period and to Mrs. Sheree Martin who followed in her footsteps;
- the Principals and staff of the mathematics departments in the original Project Schools and in others which sought our help, for their cooperation and tolerance and
- the students who received us so warmly and taught us so much.

It is our privilege to share this more recently revised version of the Scope and Sequence Chart. It is our hope that more schools will have an opportunity to use it, critique it, and eventually develop the art/skill of developing their own in response to their particular needs.

Radley D. Reid (Team Leader)

E.M. Terry Tomlinson

Lola McKinley

INTRODUCTION

The **Scope and Sequence of Content**, as the name suggests, describes not only the content to be taught/learned at each grade level, but more importantly, the developmental order or sequence in which elements of that content might best be introduced to facilitate their understanding and application.

Why a Scope and Sequence Chart at this time?

This is a response to two major needs that have been identified.

Firstly, although most practitioners follow available guidelines about the areas of focus at the particular grade level(s) for which they are responsible, these guidelines seldom indicate the flow from year to year that shows how a topic is introduced and developed over time. The advice offered, especially in the early years, to '*revise the work of the previous year*' often results in:

- unnecessary repetition of content at the same level of difficulty;
- gaps in knowledge and related concepts and skills;
- a cumulative lack of readiness for work in the succeeding year(s).

Secondly, and mostly as a result of the first observation, during the last two years of the five-year programme, there is an inexplicable choice of topics which varies across groups/classes at the same grade level, even in the same school. Often the pre-requisites for the introduction of some topics are not in place. Factor in the high incidence of teacher turn-over in some contexts and 'confusion' reigns.

This document, by its content and its format guides the way to addressing both these challenges.

The Content/Scope of Work

For the most part, institutions which offer a secondary level programme in Mathematics have as their goal the preparation of students for the CSEC/CXC examination. This Chart reflects the required content of the published syllabus for that examination. It takes note of the stated objectives, and provides intermediate steps that may be taken and/or sub-topics to be investigated en route to the achievement of those objectives.

The names of the strands remain essentially the same. There is one exception: for ease of 'handling' the topics; *Computation*, *Number Theory* and *Sets* all appear under the strand, *Number*.

The Format

The arrangement of the content in tabulated form provides easy access to a range of information at the proverbial glance. In each Strand there is a horizontal sequence that indicates development **across** grade levels. At the same time, the vertical columns identify the topics to be covered **at** each grade level.

The order in which the Strands appear is not of major significance. What is important is recognition of the 'seamlessness of Mathematics' and the need for good management of the delivery process to establish the relationships and linkages among concepts and skills within and across Strands.

Reference has already been made to a horizontal sequence. The table indicates the point of introduction of a topic, while arrows indicate the requirement for it to be maintained, reinforced and/or expanded at succeeding levels, year after year beyond that point.

Admittedly, there are possible alternatives to the vertical sequence in which the topics are presented.

In opting for an alternative to this proposed sequence, however, due care must be taken to ensure that topics within a Strand are introduced, not only because of their perceived level of difficulty, but because of their place in the hierarchy of concept development, skill development and the acquisition of knowledge that facilitate genuine understanding and logical reasoning.

Evaluation and Revision/Re-designing

The importance of on-going evaluation of the implemented programme based on this Chart cannot be over-emphasised. It is highly recommended that specific time be set aside for staff members to look back at what was intended (the stated objectives), what was accomplished and by whom (the outcomes) and the procedures which helped or hindered learning.

Do keep assessing and revising this document to the end that it will meet the particular needs of the students in your care. Remember, that population will change as new students join the school community with their own special needs. Remember, yours is the responsibility to detect strengths and weaknesses and to treat with them appropriately. If you can offer the best 'diet', to procure and sustain mathematical health, you'll have passed the test.

Consider this, then, what it must effectively be... *work in progress*.

A NOTE TO TEACHERS

It is generally agreed that determination of the **what** of the mathematics programme, important though it be, is but one element of the process that leads to its successful implementation. Key to effective implementation is effective management, and this, to a large extent depends upon **strategic planning**.

Spend quality time on planning.

What does such planning entail? What are the must *do's* at every grade level?

- Set goals / general objectives that reflect a response to your own reality. Where are your students now? Where do you want them to go? In what time?
- List and prioritise specific objectives... the targets or stepping stones towards the achievement of each goal./general objective.
It is strongly recommended that you familiarize yourself with the published CXC syllabus where the process is modelled over and over again [See pages 11 to 33]. Note that these are not achievable in a 2-year period. The imperative is that at every level, over the five years, these general objectives be used to inform the choice of specific objectives which are appropriate for that level. This document will be helpful at this stage.
- Select activities that will contribute to the attainment of the specific objectives. **Keep the students in mind... their learning styles, their interests and experiences, their varied abilities.** Ensure the development of a variety of cognitive abilities. Here again, the CXC syllabus provides guidance. Note the emphasis on the development of comprehension skills as well as on communication and problem-solving. [See especially: *Aims*, pages 1 - 2, *Profile Dimensions*, page 4, and the Glossary, pages 35 – 45]
Once students have mastered a skill or gained knowledge, provide opportunity for **meaningful practice , not meaningless, boring repetition, but practice that facilitates speedy recall of often-used facts and efficient application of concepts and skills.**
- **Evaluate! Evaluate! Evaluate!** At every stage get a measure of the results of all aspects of your plan. Be able to answer the question: '*How are we doing?*' before it is too late. There should be no surprises at the end of the planning cycle.

MANAGEMENT OF THE DELIVERY PROCESS

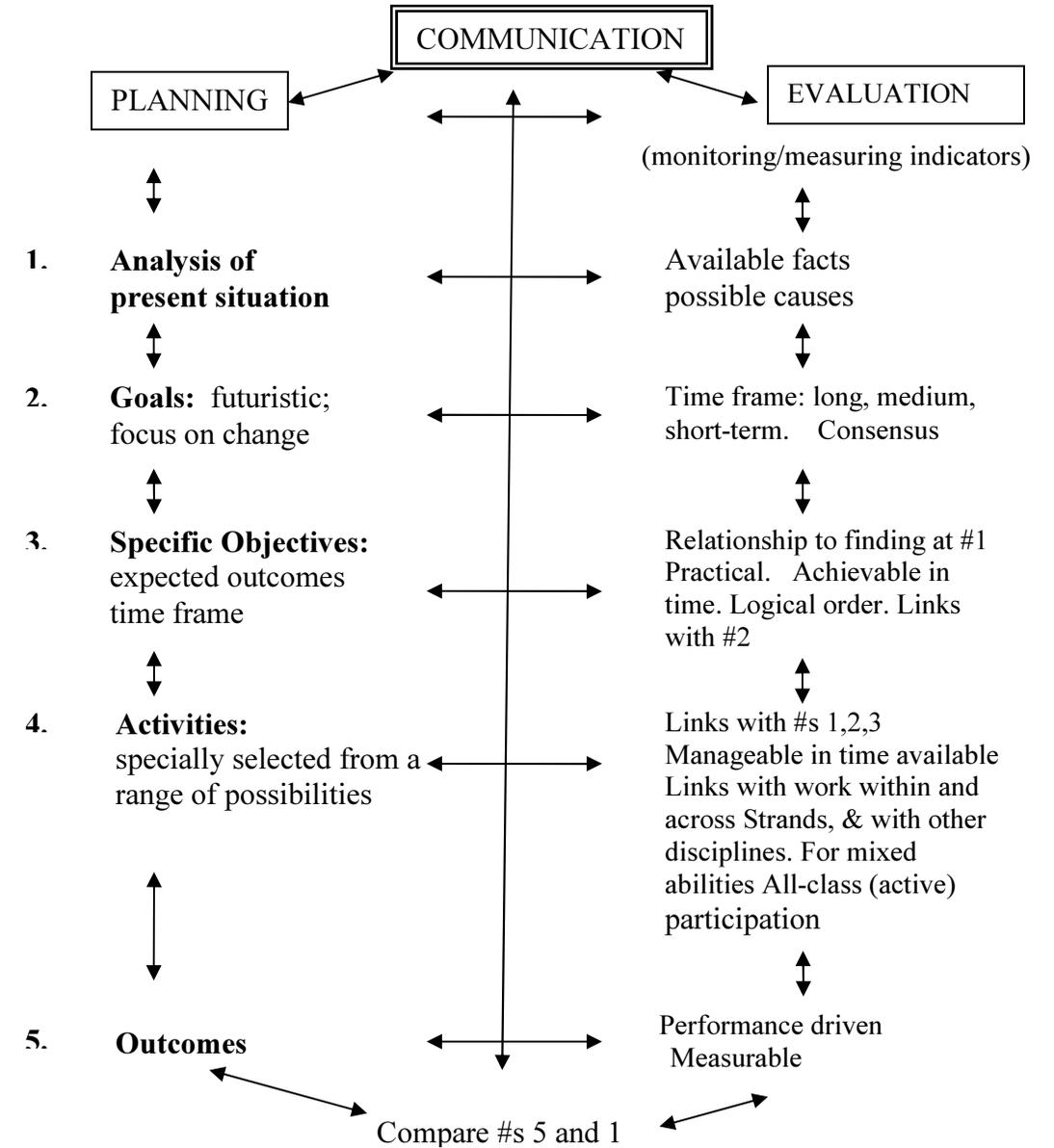


TABLE OF CONTENTS**(Scope and Sequence Chart)****STRANDS****A. NUMBER**

| | | |
|-----|---------------------------------|---|
| 1.0 | Number Symbols and Systems | 1 |
| 2.0 | Whole Numbers and Integers | 1 |
| 3.0 | Rational and Irrational Numbers | 5 |
| 4.0 | Sets | 9 |

B. MEASUREMENT

| | | |
|-----|-----------------------------|----|
| 1.0 | Introductory Concepts | 11 |
| 2.0 | Length | 12 |
| 3.0 | Perimeter and Circumference | 12 |
| 4.0 | Area | 13 |
| 5.0 | Volume, Capacity, Mass | 14 |
| 6.0 | Time | 15 |
| 7.0 | Temperature | 16 |

C. GEOMETRY and TRIGONOMETRY

| | | |
|-----|---|----|
| 1.0 | Shapes in the environment | 17 |
| 2.0 | Basic Geometric Concepts and Applications | 17 |
| 3.0 | Plane Figures/Shapes: Polygons | 19 |
| 4.0 | Plane Figures, Circles | 22 |
| 5.0 | Solids/3-D Figures | 24 |
| 6.0 | Movement/Transformation | 26 |
| 7.0 | Trigonometry | 31 |

D. ALGEBRA

| | | |
|-----|--|----|
| 1.0 | Symbolic Representation and Arithmetic-type Operations | 33 |
| 2.0 | Equations | 36 |
| 3.0 | Inequalities | 38 |

E. RELATIONS, FUNCTIONS & GRAPHS

| | | |
|-----|--------------------------------|----|
| 1.0 | Relations and Functions | 40 |
| 2.0 | Graphs of Linear Functions | 41 |
| 3.0 | Graphs of Non-linear Functions | 43 |
| 4.0 | Graphs of Inequalities | 44 |

F. STATISTICS and PROBABILITY

| | | |
|-----|---|----|
| 1.0 | Statistics...Introductory ideas | 45 |
| 2.0 | Data Collection, Organisation and Interpretation | 45 |
| 3.0 | Graphical Presentation and Interpretation of Data | 47 |
| 4.0 | Probability | 47 |

G. CONSUMER ARITHMETIC

| | | |
|-----|---|----|
| 1.0 | The Consumer: Spending for Goods and Services | 49 |
| 2.0 | The Consumer: Working and Earning | 51 |

H. VECTORS and MATRICES

| | | |
|-----|----------|----|
| 1.0 | Vectors | 52 |
| 2.0 | Matrices | 53 |

SCOPE

And

SEQUENCE

Of

CONTENT

By

STRANDS

| MAIN TOPICS IN STRAND | DISTRIBUTION OF CONTENT ACROSS GRADE LEVELS | | | | |
|---|--|-----------------|-----------------|------------------|-----------------|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| A. 1.0 Numbers, Symbols, Number Systems (Historical Reflection & Review) | 1.1(a) Number: (i) idea, word, symbol; (ii) the many uses of numbers in everyday experiences..... counting, measuring, ordering, labelling.. | 1.1→(a) | 1.1→(a) | 1.1 →(a) | 1.1 →(a) |
| | (b) the evolution & use of many number systems with special reference to: (i) the Roman System and its symbols; (ii) the Tally System; (iii) the Hindu-Arabic System, a <i>Place-value</i> System, (PVS) and its symbols. | →(b) | →(b) | →(b) | →(b) |
| | (c)(i) special properties of the denary/base ten PVS (ii) types/classification of numbers in the Hindu-Arabic System & their inter-relationships | →(c) (i) , (ii) | →(c) (i) , (ii) | →(c) | →(c) |
| A. 2.0 Whole Numbers and Integers (Representation, Basic concepts and Operations) | 2.1(a) The Roman System: (i) use of the main symbols, I, V, X, L, C, D, M, for representing the counting numbers; (ii) the subtractive principle e.g. V for 5, IV for 4. | 2.1→(a) | 2.1→(a) | 2.1→(a) | 2.1→(a) |

| MAIN TOPICS IN STRAND | D I S T R I B U T I O N O F C O N T E N T A C R O S S G R A D E L E V E L S | | | | |
|--|--|---|---|------------------|------------------|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| A. 2.0 Whole Numbers and Integers (cont'd) | 2.1(b) use of Roman symbols in the environment: where they are usually seen; addition (A) & subtraction (S) operations as needed for investigations and problem-solving. | →(b) | →(b) | →(b) | →(b) |
| | 2.2 Using the base ten PVS for: (a) sequential counting, ordering and comparison of numbers, using the symbols, <, >, ≤, ≥ | 2.2→(a) | 2.2→(a) | 2.2→(a) | 2.2→(a) |
| | (b) the basic operations, A,S,M,D (i) singly; (ii) combined, noting the conventional order of operations; | →(b) application of the order of operations when (ii) numbers with indices/ exponents are included in the computation; | →(b) (i) – (iii) | →(b) (i) – (iii) | →(b) (i) – (iii) |
| | (c) application of the commutative, associative & distributive properties of numbers to aid efficient/ speedy ‘mental’ and written computation | →(c) | →(c) | →(c) | →(c) |
| | (d) giving approximate values: (i) to the nearest whole, 10, 100, 1000; | → (d) (i) & approximate values (ii) to 1 or 2 significant figures; | →(d) (i),(ii) & approximate values (iii) to 3 or more sig. figs; | →(d) (i) – (iii) | →(d) (i) – (iii) |
| | (e)(i) identification, completion and creation of number patterns and sequences | → (e)(ii) patterns & sequences observed & created in other mathematical strands [See D. 1.2 (a)] | →(e) (i) – (ii) | →(e) (i) – (ii) | →(e) (i) – (ii) |

| MAIN TOPICS IN STRAND | D I S T R I B U T I O N O F C O N T E N T A C R O S S G R A D E L E V E L S | | | | |
|---|--|--|---|---|--|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| A. 2.0 Whole Numbers and Integers (cont'd) | 2.2 (f) problem-solving involving (f ₁) (i) establishment and use of a basic 5-step plan ; | → (f ₁) (i) – (vii) plus (f ₂) problem-solving that uses additional strategies and skills including: | → (f ₁) & (f ₂) plus (f ₃) problem solving that uses a mix of strategies including: | → (f ₁) – (f ₃) plus (f ₄) problem-solving: | →(f ₁) – (f ₄) |
| | (ii) translation from words to numerals and use of symbols, =, ≠, >, <, ≥, ≤; | (i) identification of patterns; | (i) eliminating possibilities; | (f ₄) selecting the most appropriate problem-solving strategy / strategies in a given situation | |
| (iii) interpretation of information given by tables / charts, bar graphs; | (ii) classification of information, and making of organised lists; | (ii) identifying reasonable and/or unreasonable solutions; | | | |
| (iv) logical reasoning and choice of operation(s); | (iii) construction of tables/ charts, bar graphs, pie charts to represent information given in words &/or words and numbers; | (iii) working backward; | | | |
| (v) use of simple, clear statement(s) / reason(s) for choice at (iv) above; | (iv) making sketches, drawing diagrams, modelling. | (iv) checking for hidden assumptions; | | | |
| (vi) application of concepts and procedures, 2.2(a) – (e); | | (v) solving a simpler problem | | | |
| (vii) use of appropriate labels and/or units of measure | | | | | |
| (g) | (g) formal application of the <i>place-value</i> concept to numbers in base n where $n \leq 10$: | →(g) (i) - (iv) | →(g) (i) – (iv) | →(g) (i) – (iv) | →(g) (i) – (iv) |
| | (i) the value of a digit in a numeral in any base; | | | | |
| | (ii) conversion from base 10 to other bases and vice versa; | | | | |
| | (iii) the operations, A, S, M with numbers in bases besides 10; | | | | |
| | (iv) application of (i) – (iii) to non-metric systems of measurement e.g <i>time</i> | | | | |

| MAIN TOPICS IN STRAND | DISTRIBUTION OF CONTENT ACROSS GRADE LEVELS | | | | |
|--|--|---|---|--------------------|--------------------|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| A. 2.0 Whole Numbers and Integers (cont'd) | 2.3 (a) understanding and use of: (i) <i>even and odd, consecutive even and odd</i> numbers; (ii) <i>directed numbers/integers</i> : - representation on a number line - comparison & ordering - basic operations, (A, S, M, D) with integers | 2.3→(a) (i) – (ii) | 2.3→(a) (i) – (ii) | 2.3→(a) (i) – (ii) | 2.3→(a) (i) – (ii) |
| | (b) understanding and use of the concepts: (i) <i>factor, prime factor</i> ; (ii) <i>prime and composite numbers</i> ; (iii) <i>numbers as products of their factors</i> , e.g. $72 = 2 \times 2 \times 2 \times 3 \times 3$ (iv) <i>common factor, highest common factor (HCF)</i> ; (v) <i>multiple, common multiple, least common multiple (LCM)</i> ; problems involving the use of <i>HCF</i> and <i>LCM</i> | →(b) (i) – (v) | →(b) (i) – (v) | →(b) (i) – (v) | →(b) (i) – (v) |
| | (c) (i) numbers expressed as factors in index form e.g. $72 = 2^3 \times 3^2$ (ii) evaluation of numbers with positive indices and with the index, zero. | →(c) (i), (ii) and additionally: (iii) evaluation of numbers with integral indices; (iv) use of the index form to derive squares and square roots of numbers. | →(c) (i) – (iv) (v) numbers written as powers of 10 and in <i>standard form</i> ; (vi) evaluation of numbers with fractional indices; (vii) use of the index form to derive cubes and cube roots of numbers; | →(c) (i) – (vii) | →(c) (i) – (vii) |

| MAIN TOPICS IN STRAND | DISTRIBUTION OF CONTENT ACROSS GRADE LEVELS | | | | |
|--|--|--|---|----------------------|----------------------|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| A. 3.0 Rational and Irrational Numbers | 3.1 (a) the concept: common fraction , and working with common fractions: (i) formation and use of equivalent fractions; (ii) comparison and ordering of fractions; (iii) operations (A.S, M, D) with common fractions and mixed numbers, actual & estimated results; (iv) expression of one quantity as a fraction of another; (v) computation of the required fraction of a given number or quantity; (vi) computation of the whole or the total when given the value of a fraction of it; | 3.1→(a) (i) – (vi) and (vii) simplifying fractions of the form, $(5\frac{1}{4} - 2\frac{2}{3}) \div 2\frac{1}{2}$ and/or, $6\frac{1}{2} - 3\frac{1}{5} \div 1\frac{1}{3}$ [See A. 2.2(b) (ii)] | 3.1→(a) (i) – (vii) and (viii) simplification of fractions of the form, $\frac{1\frac{2}{3} \times 7}{3\frac{1}{2}}$ $\frac{3\frac{7}{8} - 1\frac{5}{6}}{2\frac{3}{4} - 1\frac{2}{3}}$ | 3.1→(a) (i) – (viii) | 3.1→(a) (i) – (viii) |
| | (b) solution of ‘word’ problems involving the use of common fractions and/or mixed numbers. | →(b) | →(b) | →(b) | →(b) |
| | (c) | 3.1 (c) extension of the use of common fractions to represent ratios : (i) a ratio : the concept; (ii) symbolic representation of a ratio: a to b or $a : b$, or a/b | →(c)(i)-(vii) and other uses of ratio: (viii) ratios comparing three or more numbers or quantities; (ix) division of a total into three or more unequal parts; | →(c) (i) - (xi) | →(c) (i) – (xi) |

| MAIN TOPICS IN STRAND | D I S T R I B U T I O N O F C O N T E N T A C R O S S G R A D E L E V E L S | | | | |
|---|--|--|---|--------------------|--------------------|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| A. 3.0 Rational and Irrational Numbers {cont'd} | 3.2 (a) <i>a percent</i> , the concept, symbol and use: (i) forming and comparing percentages; (ii) computation of a percentage of a number or quantity; (iii) expressing one number as a percentage of another; (iv) computation of the total when given a percentage of that total | 3.2(a)→ (i) – (iv) Extending the concept: (v) <i>percent</i> : a ratio that compares a number to 100; expression of a ratio as a percent | 3.2(a)→ (i) – (v) | 3.2(a) → (i) – (v) | 3.2(a) → (i) – (v) |
| | 3.3(a) <i>the decimal fraction</i> : concept, notation and use: (i) relation between location and value of a digit in a number in the base ten <i>PVS</i> ; special attention to digits which value 10^{th} , 100^{th} , or 1000^{th} of a unit; (ii) reading, writing, comparing and ordering of numbers which are in decimal form; (iii) the basic operations (A, S, M, D) with decimal fractions & mixed numbers including decimal currency | 3.3(a) → (i) – (iii) | 3.3(a) → (i) – (iii) and (iv) writing decimal fractions and mixed numbers in <i>standard form</i> i.e. using scientific notation; (v) the basic operations with numbers that are written in standard form | 3.3(a) → (i) – (v) | 3.3(a) → (i) – (v) |
| | (b) representing approx. values of decimal fractions and mixed numbers by: | →(b) representing approx. values of decimal fractions and mixed numbers by: | →(b) giving approximate values of decimal fractions and mixed numbers correct to: | →(b) | →(b) |

| MAIN TOPICS IN STRAND | DISTRIBUTION OF CONTENT ACROSS GRADE LEVELS | | | | |
|---|--|---|---|----------------------------------|--------------------------------|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| A. 3.0 Rational and Irrational Numbers {cont'd} | 3.3 (b) (cont'd) (i) rounding to the nearest whole number; (ii) correcting to one or two places of decimals (c) ----- | 3.3(b) → (i) - (ii) plus (iii) correcting to 3 decimal places; (iv) correcting to 1, 2 or 3 significant figs. (c) identification of decimal fractions with a pattern of repeating digits | 3.3(b) → (i) – (iv) →(c) | 3.3 (b)→ (i) – (iv) → (c) | 3.3(b)→(i) – (iv) →(c) |
| | 3.4(a) relationships among the rational numbers at 3.1 – 3.3: conversion from (i) common fractions to percents and vice versa; (ii) common fractions to decimal fractions and vice versa with or without the help of a calculator; (iii) decimal fractions to percents and vice versa; (iv) selection of the most appropriate type of rational number to be used in a given situation (b) ----- | 3.4(a) (i) – (iv) and (v) ready recall of some frequently-used equivalents such as: $0.25 = 25\% = 1/4$ $33\frac{1}{3}\% = 1/3 \approx 0.33$ $3/4 = 0.75 = 75\%$ →(b) use of <i>proportion</i> to make comparisons and do conversions listed at 3.4(a) | 3.4(a) → (i) – (v) →(b) | 3.4(a) → (i) – (v) →(b) | 3.4(a)→ (i) – (v) → (b) |
| | 3.5 | 3.5(a)(i) <i>an irrational number</i> : concept and examples; (ii) introduction of π ; use of the more commonly used approximate values for π | 3.5(a) → (i) – (ii) plus (iii) operations with other irrational numbers; (results given in surd form when appropriate) | 3.5(a)→ (i) – (iii) | 3.5(a) → (i) – (iii) |

| MAIN TOPICS IN STRAND | DISTRIBUTION OF CONTENT ACROSS GRADE LEVELS | | | | |
|-----------------------|--|---|---|---|--|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| A. 4.0 Sets | <p>4.1(a) The concept, <i>Set</i>; and special language relating to sets:</p> <ul style="list-style-type: none"> (i) an element or a member of a set; (ii) belonging/not belonging to a set or being a subset of a given set; (iii) the cardinal number of a set, taking note of repeated elements; (iv) the empty or null set; (v) finite and infinite sets; (vi) describing a set by listing its members or by using its defining property. <p>(b) Use of special symbols :</p> <ul style="list-style-type: none"> (i) curly brackets/braces to enclose members of a set; (ii) a capital letter to name a set; (iii) \in, \notin to show membership/non-membership in a set ; \subset, $\not\subset$ to show belonging / not-belonging to a given set or being /not being a subset of a given set; (iv) $n(A)$ to denote the number of elements in a set and of $\{ \}$ or \emptyset to represent the empty or null set; (v) dots to indicate that some members of a set have been left out. | <p>4.1(a)→(i) – (vi) plus additional concepts and related set language:</p> <ul style="list-style-type: none"> (vii) the universal set; (viii) the complement of a set; (ix) equal and equivalent sets; <p>(b) → (i) – (v) and</p> <ul style="list-style-type: none"> (vi) use of special symbols to indicate the Universal set and the complement of a set; (vii) calculation of the number of subsets in a given set | <p>4.1(a) → (i) – (ix)</p> <p>→ (b) (i) – (vii)</p> | <p>4.1(a) (i) – (ix)</p> <p>→ (b) (i) – (vii)</p> | <p>4.1 (a) (i) – (ix)</p> <p>→ (b) (i) – (vii)</p> |

| MAIN TOPICS IN STRAND | DISTRIBUTION OF CONTENT ACROSS GRADE LEVELS | | | | |
|--|--|--|--|---------------------|-------------------|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| A. 4.0 Sets (cont'd) | 4.1(c) Use of special symbols / set notation to show the relationship between two sets: (i) intersection of 2 sets; (ii) union of 2 sets; (iii) disjoint sets | → (c) (i) – (iii) | → (c) (i) – (iii) | → (c) (i) – (iii) | → (c) (i) – (iii) |
| | (d) Use of sets and their relationships in problem-solving situations [Deliberate linkage between <i>Sets</i> and various types of groupings across Strands] | → (d) using the result, $A \cup B = n(A) + n(B) - n(A \cap B)$ to solve simple numerical problems | → (d) | → (d) | → (d) |
| 4.2 (a) The Venn diagram : a graphical way of representing a single set and/or the relationship between two sets. (i) use of loop or other enclosed plane shape, instead of curly brackets and symbols, to show different types of sets and their relationships (ii) interpretation of information given by Venn diagrams which show one or two sets. (iii) the use of Venn diagrams to solve problems | 4.2 →(a) (i) – (iii) and (iv) the construction and interpretation of Venn diagrams which show the universal set (a rectangular shape) and its subsets (usually loops) (v) interpretation of diagrams as at (iv) to identify a set and its complement | 4.2 →(a)(i) –(v) and (vi) the solution of problems in which one or more of the element(s) in a given relationship must be found | 4.2→(a) (i) – (vi) and (vii) the construction and interpretation of Venn diagrams with three sets and/or subsets | 4.2 (a) (i) – (vii) | |

B. MEASUREMENT

| MAIN TOPICS IN STRAND | D I S T R I B U T I O N O F C O N T E N T A C R O S S G R A D E L E V E L S | | | | |
|---|--|---|---|--|--|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| B. 1.0 Introductory Concepts | 1.1 (a) the S.I.(metric) system of units for measuring <i>length, area, mass, volume, capacity</i> and the link to: (i) the base 10 place-value system for reading and recording decimal numbers; (ii) the use of prefixes to indicate the relative sizes of measures. (b) expression of one unit of measurement in terms of a larger or smaller unit; (c) appropriate choice and use of measuring instrument and unit of measure for best results | 1.1→(a)(i) – (ii) →(b) →(c) | 1.1→(a) (i) – (ii) →(b) →(c) | 1.1→(a) (i) – (ii) →(b) →(c) | 1.1→(a) →(b) →(c) |
| B. 2.0 Length (Linear or one-dimensional measure) | 2.1(a)(i)The basic unit of length, <i>m</i> , and its relation to commonly used smaller & larger units (mm, cm, km); conversion from one unit to another; (ii) choice of appropriate unit for the reqd. measure of length, height and distance (actual or estimated); (b)(i)basic operations, A,S,M,D with linear measures; [See A. 3.3 (a)(iii)] | 2.1→(a)(i) – (ii) →(b) (i) | 2.1→(a)(i) - (ii) →(b)(i) and (ii) increase and/or decrease in length by a (given) scale factor | 2.1→(a) (i) – (ii) →(b)(i) – (ii) and (iii) conversion of lengths from maps &/or scale drawings to actual distances & vice versa | 2.1→(a) (i) – (ii) →(b) (i) – (iii) |

B. MEASUREMENT

| MAIN TOPICS IN STRAND | DISTRIBUTION OF CONTENT ACROSS GRADE LEVELS | | | | |
|--|--|--|---|--|---|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| B. 2.0 (cont'd) | 2.1 (c) approximate measures: (i) to the nearest whole; (ii) to 1 or 2 decimal places [See A. 3.3 (b) (i), (ii)] (d) problem-solving requiring the application of (a) – (c) [practical & written work] | →(c) approximate measures (iii) to 3 decimal places (iv) to 1, 2 or 3 sig. figs [See A. 3.3 (b) (iii), (iv)] →(d) | →(c) (i) – (iv) →(d) | →(c) (i) – (iv) →(d) | →(c) (i) – (iv) →(d) |
| B. 3.0 Perimeter and Circumference (distance around the outside of a shape/region) | 3.1(a) Perimeter of plane shapes (regular or irregular) bounded by straight lines whose lengths are given: (i) triangles (ii) quadrilaterals identified ‘at sight’: the square and the rectangle. (b)(i) approximation of values as listed at B.2.1(c)(i), (ii) (c) solution of problems involving (a) , (b) | 3.1→(a)(i) – (ii) plus measurement around plane shapes with curved lines: (ii) circumference of circle; (iv) length of a $\frac{1}{2}$ or $\frac{1}{4}$ of the whole circum ^{ence} . (v) perimeter of composite shapes bounded by a combination of straight line(s) and semi-circular arcs or arcs of $\frac{1}{4}$ circles →(b) (i) and (ii) approximations as listed at B. 2.1(c)(iii),(iv) →(c) | 3.1→(a) (i) – (v) plus (vi) perimeter of a sector of a circle. →(b) (i) , (ii) →(c) | 3.1→(a) (i) – (vi) and (vii) perimeter of a segment of a circle. →(b) (i), (ii) →(c) | 3.1→(a) (i) – (vii) →(b) (i), (ii) →(c) |

B. MEASUREMENT

| MAIN TOPICS IN STRAND | DISTRIBUTION OF CONTENT ACROSS GRADE LEVELS | | | | |
|--|---|--|--|--|---|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| <p>B. 4.0 Area (Space covered by a shape or region)</p> | <p>4.1(a) Area of region covered by: (i) some plane shapes.... the <i>rectangle, square & triangle</i>, where lengths of sides are given or can be deduced; (ii) composite shapes: any combination of shapes named at (a) (i);</p> <p>(b)(i) use of appropriate square units</p> <p>(c)</p> <p>(d) problem-solving involving area concepts and procedures already introduced.</p> | <p>4.1→(a) (i), (ii) plus area of region covered by: (iii) the <i>parallelogram, rhombus, trapezium</i>; (iv) a circle, semi-circle and quadrant given the radius or diameter; (v) composite shapes: 3 or 4-sided polygon or part of polygon plus circle or part circle</p> <p>→(b) (i) and (ii) conversion from one sq. unit to another;</p> <p>(c)</p> <p>→(d)</p> | <p>4.1→(a) (i) – (v) plus area of region covered by (vi) a <i>kite-shaped quad.</i>; (vii) the sector of a circle;</p> <p>→ (b)(i), (ii) and (iii) use of Pythagoras’ theorem to give the relationship between the areas of the squares on the sides of a right - angled Δ. (iv) use of (b)(iii) to find the length of a missing side in a right-angled triangle. [See C.3.4(a)(iv)]</p> <p>(c) -----</p> <p>→ (d)</p> | <p>4.1→(a) (i) - (vii) plus (viii) area of a segment of a circle</p> <p>→(b) (i) – (iv) and (v) conversion of areas shown on maps and/or scale drawings to actual areas and vice versa (vi) use of maps and scale drawings to determine distances and areas</p> <p>→ (c) total surface area of solids: (i) cubes, cuboids, prisms & cylinders;</p> <p>→(d)</p> | <p>4.1→(a) (i) – (viii)</p> <p>→(b) (i) – (vi)</p> <p>→(c) (i) and (ii) total surface area of cones & spheres</p> <p>→(d)</p> |

B. MEASUREMENT

| MAIN TOPICS IN STRAND | D I S T R I B U T I O N O F C O N T E N T A C R O S S G R A D E L E V E L S | | | | |
|---|---|----------------|---|---|--------------------------------|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| B. 5.0 Volume, Capacity & Mass | 5.1 | 5.1 | 5.1(a) concept of <i>volume</i> : (i) the commonly - used unit of measure (cubic cm/ cm ³) and its relation to other cubic units; (ii) calculation of volume of cubes, cuboids, cylinders, prisms; | 5.1→ (a) (i) , (ii) and (iii) calculation of volume of pyramids, cones, spheres | 5.1→(a) (i) – (iii) |
| | 5.2 | 5.2 | 5.2(a) concept of <i>capacity</i> : (i) the basic unit of capacity (litre) and the relationship between measures of volume and of capacity; (ii) calculation of the capacity of figures named at 5.1(ii) | 5.2→ (a)(i), (ii) and (iii) calculation of the capacity of figures named at 5.1 (a)(iii) | 5.2→ (a) (i) - (iii) |
| | 5.3 | 5.3 | 5.3(a) concept of <i>mass</i> : (i) the basic unit of mass (gram) and the relationship between measures of volume and of mass; (ii) calculation of the mass of figures named at 5.1 (ii); (b) solution of problems involving measurements of volume, capacity and mass of the solid figures already introduced | 5.3→(a)(i) , (ii) and (iii) calculation of the mass of solids named at 5.1(a) (iii) →(b) | 5.3→(a)(i) – (iii) →(b) |
| | 5.4(a) estimation of the margin of error for a given measurement | 5.4 → (a) | 5.4→(a) | 5.4→(a) | 5.4→(a) |

B. MEASUREMENT

| MAIN TOPICS IN STRAND | D I S T R I B U T I O N O F C O N T E N T A C R O S S G R A D E L E V E L S | | | | |
|-----------------------|--|---|---|--|--|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| B. 6.0 Time | <p>6.1 (a) basic unit (hour) and the relation to (i) parts of the hour; (ii) other measures of time: day, week, month, year, leap year, decade, century (iii) use of <i>B.C.</i> and <i>A.D.</i></p> <p>(b)(i) representation of time: - on the 12-hour clock - on the 24-hour clock - in digital form (ii) conversion from one type of representation to another; (iii) use of <i>a.m.</i> and <i>p.m.</i></p> <p>(c)(i) estimation of and formal operations (A, S, M, D) with units of time; special attention to calculation of <i>time elapsed</i></p> <p>(d) problem-solving involving the passing and use of time whether the information is given verbally, in writing, or on tables or charts</p> | <p>6.1→(a) (i) – (iii)</p> <p>→(b)(i) – (iii)</p> <p>→(c)(i) plus (ii) concept of <i>speed</i>: - estimation and /or calculation of speed and average speed</p> <p>→(d)</p> | <p>6.1→(a) (i) – (iii)</p> <p>→(b) (i) – (iii)</p> <p>→(c)(i) - (iii) plus (iv) further relationships among <i>distance, time, speed</i>; (v) concept of <i>acceleration</i>.</p> <p>→(d)</p> | <p>6.1→(a) (i) – (iii)</p> <p>→(b) (i) – (iii)</p> <p>→(c) (i) – (v)</p> <p>→(d)</p> | <p>6.1→(a) (i) – (iii)</p> <p>→(b) (i) – (iii)</p> <p>→(c) (i) – (v)</p> <p>→(d)</p> |

B. MEASUREMENT

| MAIN TOPICS IN STRAND | D I S T R I B U T I O N O F C O N T E N T A C R O S S G R A D E L E V E L S | | | | |
|-------------------------------|---|----------------|----------------|------------------|-----------------|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| B. 7.0 Temperature | 7.1(a) Use of the Celsius scale : - notation for a unit of measure (°C); - use of the thermometer; - temperatures at freezing and boiling points; | 7.1 →(a) | 7.1 →(a) | 7.1 →(a) | 7.1 →(a) |
| | (b) relative heat and cold; - temperatures below zero; - comparison of temperatures; - other operations with measures of temperature [See A. 2.3 (a) (ii)] | →(b) | →(b) | →(b) | →(b) |
| | (c) problem-solving involving (a) , (b). | →(c) | →(c) | →(c) | →(c) |

C. GEOMETRY AND TRIGONOMETRY

| MAIN TOPICS IN STRAND | DISTRIBUTION OF CONTENT ACROSS GRADE LEVELS | | | | |
|---|---|----------------|----------------|-----------------|-----------------|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/FORM 4 | GRADE 11/FORM 5 |
| C. 1.0 Shapes in the Environment | <p>1.1(a) Examination of our environment (the space in which we live), and the many objects around us:</p> <ul style="list-style-type: none"> (i) their shapes and relative sizes; similarities and differences; normal/regular usage; (ii) familiar names given to objects / three-dimensional shapes and solids that are most often seen and / or used; (iii) informal methods of measuring their length, width, height, volume, mass, capacity; <p>(b) selection of flat surfaces for closer examination/study.</p> | 1.1(a) | 1.1(a) | 1.1(a) | 1.1(a) |
| C. 2.0 Basic Geometric Concepts & Applications | <p>2.1(a) Plane/2-dimensional shapes in the immediate environment or elsewhere:</p> <ul style="list-style-type: none"> (i) observed common properties; special names vis-à-vis number and type of sides; instant recognition of triangles, rectangles, squares, circles; representative drawings on plain paper (ruler for lines, compasses for circles) | 2.1(a) | 2.1 (a) | 2.1(a) | 2.1 (a) |

C. GEOMETRY AND TRIGONOMETRY

| MAIN TOPICS IN STRAND | DISTRIBUTION OF CONTENT ACROSS GRADE LEVELS | | | | |
|---|---|-------------------|-------------------|-------------------|-------------------|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/FORM 4 | GRADE 11/FORM 5 |
| C. 2.0 Basic Geometric Concepts & Applications (cont'd) | 2.1(b) use of geometric terms and symbols to describe and represent observations: (i) - <i>plane / flat surface</i> ; - <i>edges / sides / straight lines; polygons</i> ; - <i>vertex</i> : 2 edges/lines meet: (a <i>point</i> , +) - amount of turning from one edge/side/line to the other at that point: (an <i>angle</i> , \angle). (ii) graphic representation of elements at (i): - point - line & line segment - line segments in different directions (vertical, horizontal, slanting or oblique) - letter names for points and line segments. | 2.1(b) (i) – (ii) |
| | (c)(i) measurement of a given line segment; drawing a line segment of a specified length; (ii) giving approximate / estimated measures to the nearest mm. [See B.1.1,2.1] | → (c) (i), (ii) | →(c) (i) – (ii) | →(c) (i) – (ii) | →(c) (i) – (ii) |
| | (d)(i) two line segments (<i>rays</i>) meeting at a point to form an angle : | →(d) (i), (ii) | →(d) (i), (ii) | →(d) (i), (ii) | →(d) (i) , (ii) |

| MAIN TOPICS IN STRAND | DISTRIBUTION OF CONTENT ACROSS GRADE LEVELS | | | | |
|---|---|--|---|--------------------|--------------------|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/FORM 4 | GRADE 11/FORM 5 |
| C. 3.0 Plane Figures / Shapes : Polygons | 2.1(d) - use of protractor to find (cont'd) size of a given angle and for drawing an angle of x° where $0 < x \leq 180$; (ii) classification of angles by size: <i>right, straight, acute, obtuse</i> | | | | |
| | 3.1 (a) The Triangle: a polygon enclosed by 3 <i>edges/sides /straight lines:</i> (i) use of letter names for the sides of the triangle and use of the symbol, Δ ; (ii) classification of triangles by comparing the lengths of the sides: <i>equilateral, isosceles, scalene:</i> the special properties of each; (iii) use of ruler & compasses to construct a triangle when given the lengths of its sides. (SSS) [See 4.1(a) (i) – (iii)] (b)(i) types of triangles by the sizes of their angles: <i>right-angled acute-angled, obtuse-angled,</i> (ii) measurement of the sizes of the angles in a given triangle; | 3.1(a)(i) – (iii) and The Quadrilateral: study of 4-sided polygons: (iv) use of letter names for vertices and sides of any quadrilateral; (v) classification of quads. by the relationship between the sides, angles and diagonals of each type of quadrilateral <i>parallelogram, rectangle, square, rhombus, trapezium, kite;</i> common and distinctive properties of these quadrilaterals | 3.1(a)(i) – (v) plus Other Polygons enclosed by n sides, where $4 < n \leq 10$; (vi) the special name of each as the value of n changes; (vii) concave and convex polygons; regular and irregular n-sided polygons; the relationship between sides and angles in each case. | 3.1(a) (i) – (vii) | 3.1(a) (i) – (vii) |
| | (b)(i) types of triangles by the sizes of their angles: <i>right-angled acute-angled, obtuse-angled,</i> (ii) measurement of the sizes of the angles in a given triangle; | →(b) (i) – (iii) and (iv) finding the sum of the angles of any quad.; (v) using available info. to calculate the size of one or more unknown angle(s) | →(b) (i) – (v) plus (vi) finding - the sum of the angles in an n-sided polygon; - the size of one angle of a regular polygon when given the number of sides | →(b) (i) – (vi) | →(b) (i) – (vi) |

| MAIN TOPICS IN STRAND | D I S T R I B U T I O N O F C O N T E N T A C R O S S G R A D E L E V E L S | | | | | |
|--|---|--|--|---|-----------------|--|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/FORM 4 | GRADE 11/FORM 5 | |
| C. 3.0 Plane Figures / Shapes : Polygons (cont'd) | 3.1(b) (iii) finding : (cont'd) - the sum of the measures of the 3 angles in any Δ ; - the size of one angle of any equilateral Δ ; - for any Δ , the relationship between any two sides and the angles opposite to them. - the relationship between an exterior angle and the interior opposite angles. | | | - the size of unknown angle(s) of irregular polygons given info., directly or indirectly, about other angles; - the number of sides of a regular n -sided polygon when given information about its angles. - the exterior angles of an n -sided polygon, $5 \leq n \leq 10$ | | |
| | 3.1(c)(i) more constructions: use of ruler and protractor to construct a triangle when given information about its sides and its angles: SAS, AAS, RHS; (ii) use of information about the sides and/or angles of a triangle to calculate the size of each 'missing' or unknown angle. | → (c)(i), (ii) and (iii) use of ruler and protractor to construct quadrilaterals of the types listed at 3.1(a)(v) above. | → (c) (i) – (iii) plus (iv) use of appropriate instruments to construct polygons of n sides. | →(c) (i) – (iv) | →(c) (i) – (iv) | |
| | 3.2(a) Other relationships between lines and identification of the resulting angles: (i) two or more lines meeting at a point \leftrightarrow angles with a common arm or adjacent angles; special adjacent angles: | → (a) ((i) – (v) | → (a) (i) – (v) | → (a) (i) – (v) | → (a) (i) – (v) | |

C. GEOMETRY AND TRIGONOMETRY

| MAIN TOPICS IN STRAND | DISTRIBUTION OF CONTENT ACROSS GRADE LEVELS | | | | |
|--|--|--|---|------------------|------------------|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/FORM 4 | GRADE 11/FORM 5 |
| C. 3.0 Plane Figures / Shapes : Polygons (cont'd) | 3.2(a) <i>complementary, adjacent (cont'd) angles on a straight line, supplementary, many adj. angles at the same point;</i> (ii) use of protractor to measure a <i>reflex</i> angle; (iii) 2 intersecting lines and the relationship between <i>vertically opposite angles</i> ; (iv) other angles associated with the intersection of a line with two other lines: <i>alternate, corresponding, co-interior</i> or <i>allied</i> ; special relationships if the two lines are parallel; (v) problems requiring the use of (i) – (iv). (b) further work with lines and angles: use of ruler and compasses only to (i) draw an angle of 60°; (ii) bisect and copy an angle; (iii) draw angles of 30°, 90°, 45° (iv) bisect a line /construct its perpendicular bisector (v) construct parallel lines | → (b) (i) – (v) and (vi) use of ruler and compasses only to draw an angle of 120°; (vii) construction of the perpendicular to a given line at a point in the line and /or from a point outside the line. | →(b) (i) – (vii) | →(b) (i) – (vii) | →(b) (i) – (vii) |
| | 3.3(a) More constructions: (i) use of ruler and compasses only to construct triangles in which any given interior angle is of size 60°, 30°, 45° or 90°. | 3.3 → (a) (i) and (ii) use of ruler & compasses only to construct quads. of the types listed at 3.1(a)(v) above | →(a)(i) - (ii) plus (iii) construction of regular or irregular polygons of n sides ($n > 4$) | →(a)(i) - (iii) | →(a)(i) - (iii) |

| MAIN TOPICS IN STRAND | DISTRIBUTION OF CONTENT ACROSS GRADE LEVELS | | | | |
|--|---|--|---|--|--|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/FORM 4 | GRADE 11/FORM 5 |
| C. 3.0 Plane Figures / Shapes : Polygons (cont'd) | 3.4(a) Other measurements: (i) calculating the perimeter of a triangle when given the lengths of the sides ; (ii) calculating the area of a square , rectangle, triangle (b) Other concepts: (i) congruent triangles: to identify and name by matching or observing mix of sides and angles | 3.4→(a)(i) , (ii) plus: (iii) calculating the perimeter and area of other quads.: parallelogram, rhombus, trapezium, kite → (b) (i) plus (ii) similar figures; (iii) lines of symmetry | 3.4→(a)(i) – (iii) plus (iv) using Pythagoras’ theorem [See B. 4.1(b) (iii) – (iv)] → (b) (i) – (iii) | →(a)(i) – (iv) → (b) (i) – (iii) | →(a)(i) – (iv) → (b) (i) – (iii) |
| | C. 4.0 Plane Figures: Circles | 4.1(a) The circle , a plane figure / shape enclosed by a curved line: (i) identification and names of parts of a the circle: <i>centre, radius, diameter, chord, circumference, arc, chord</i> & relationships among them; (ii) use of compasses to draw a circle of a given radius & intersecting circles of the same or different radii (iii) marking on a given circle, and naming the parts listed at (i) (b) | 4.1(a)(i) – (iii) plus (iv) identification and names of parts of the circle... <i>sector, segment</i> and the relationships to other parts (b) measurement of: (i) the circumference and area of a circle, semi-circle, and quadrant given the radius or diameter of the circle. | 4.1(a) (i) – (iv) plus (v) the identification and naming of tangents; the relationship between a tangent and a radius at the point of contact →(b) (i) | 4.1 (a)(i) - (v) plus (vi) extension of work with tangents: construction of a tangent to a circle at a given point on the circle → (b) (i) |

| MAIN TOPICS IN STRAND | D I S T R I B U T I O N O F C O N T E N T A C R O S S G R A D E L E V E L S | | | | |
|--|---|--|--|---|---|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/FORM 4 | GRADE 11/FORM 5 |
| C. 4.0 Plane Figures: Circles (cont'd) | 4.1(c) | 4.1(c) the sector of a circle : (i) sum of the angles at the centre of a circle; (ii) size of angle of sector; (iii) relationship between size of sector angle and length of arc which subtends the angle; (iv) relationship between size of sector angle and - area of sector; - perimeter of sector | 4.1(c) (i) – (v) plus (vi) extension of work with sectors: - concepts: <i>angle subtended by an arc at the centre of a circle; angle(s) in the alternate segment;</i> drawing & measuring such angles; (vii) working with the segment of a circle :: its perimeter and area → (d) (i) – (ii) | 4.1 (c) (i) – (vii) → (d) (i) – (ii) | 4.1 (c) (i) – (vii) →(d) (i) – (ii) |
| | (d)(i) application of knowledge & skills gained at C. (4.1) (a) to other topics and Strands | (d)(ii) solving problems using properties of circles introduced at (a) – (c) | | | |
| | 4.2 | 4.2 | 4.2 Circle Theorems (a) The angle which an arc of a circle subtends at the centre of a circle is twice that which it subtends at any point on the remaining part of the circumference (b) The angle in a semicircle is a right angle. (c) Angles in the same segment of a circle and subtended by the same arc are equal. (d) Problem solving using (a) - (c) | 4.2 (a) –(d) plus (e) The opposite angles of a cyclic quadrilateral are supplementary. (f) The exterior angle of a cyclic quad. is equal to the interior opposite angle (g) The line joining the centre of a circle to the midpoint of a chord is perpendicular to the chord. (h) Problem solving using (e) – (g) | 4.2 (a) – (h) plus review of & more work with tangents: (i) A tangent to a circle is perpendicular to the radius of that circle at the point of contact. (j) The lengths of two tangents from an external point to the points of contact on the circle are equal. |

C. GEOMETRY AND TRIGONOMETRY

| MAIN TOPICS IN STRAND | DISTRIBUTION OF CONTENT ACROSS GRADE LEVELS | | | | |
|--|---|----------------|--|---|---|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/FORM 4 | GRADE 11/FORM 5 |
| C.5.0 Solids / Three-Dimensional Figures | 4.2 (cont'd) | | | | 4.2 (k) The angle between a tangent to a circle & a chord through the point of contact is equal to the angle in the alternate segment. (l) Problem-solving and constructions using using (i) - (k) |
| | 5.1 | 5.1 | 5.1(a) Further examination of 3-D figures in the environment: (i) identification & description of <i>faces, edges, vertices, base, height/length/width, cross-section;</i> (ii) properties of <i>prisms, cubes, cuboids, cylinders;</i> (b) representation of 3-D figures on plane (2-D) surfaces; | 5.1 (a) (i), (ii) plus other 3-D figures: (iii) properties of <i>pyramids, cones, spheres</i> → (b) | 5.1 (a) (i) – (iii) → (b) |
| | 5.2 | | 5.2 (a) measurements associated with three-dimensional objects/solids: | → (a) (i)–(iii) plus (iv) [See top page 25] | → (a) (i) – (iv) |

C. GEOMETRY AND TRIGONOMETRY

| MAIN TOPICS IN STRAND | DISTRIBUTION OF CONTENT ACROSS GRADE LEVELS | | | | |
|--|---|----------------|--|--|---|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/FORM 4 | GRADE 11/FORM 5 |
| C.5.0 Solids / Three-Dimensional Figures (cont'd) | 5.2 (cont'd) | 5.2 | 5.2 (a)(i) the volume or space occupied by an object or container, with special reference to the <i>cube, cuboid, cylinder, prism</i> ; (ii) measurement of the space in cubic units; relationship between the area of the base, the height/length/depth and the volume; [See B. 5.1 (a)] (iii) preferred shapes for packaging goods; (b) the capacity of a container / the amount it can hold when full: (i) relationship between volume and capacity...the units of measurement; (ii) calculation of capacity of figures listed at (a)(i) above [See B. 5.2 (a)] (c) the mass of an object / the quantity of matter in it: (i) distinction between <i>mass</i> and <i>weight</i> [terms are often used interchangeably]; (ii) calculation of mass of figs. at (a)(i) above. [See B. 5.3 (a)] (iii) relationship between volume and mass: | 5.2 (a)(iv) special reference to the volume of <i>pyramids, cones, spheres</i> → (b) (i) – (ii) plus (iii) capacity of figures listed at (a) (iv) above; [See B. 5.3 (a)] (iv) capacity ↔ the volume of a container when the volume is affected by the thickness of the material of which that container is made → (c) (i) – (iii) plus (iv) calculation of mass of solids listed at (a)(iv) above. | → 5.2 (a)(i-iv) → (b) (i) – (iv) → (c) (i) – (iv) |

C. GEOMETRY AND TRIGONOMETRY

| MAIN TOPICS IN STRAND | DISTRIBUTION OF CONTENT ACROSS GRADE LEVELS | | | | |
|--|---|---|---|---|---|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/FORM 4 | GRADE 11/FORM 5 |
| C.5.0 Solids / Three-Dimensional Figures (cont'd) | 5.2(c) (cont'd) | 5.2(c) | 5.2(c) - unrelated units of measure: volume(cm^3), mass(grams) - identification of a rate : mass per unit of volume i.e. grams per cubic cm (the <i>density</i> of a substance) (d) (i) the total surface area of solids listed at 5.2 (a)(i) (e) problem-solving requiring application of concepts related to the properties of three-dimensional figures already introduced. | → 5.2(c) →(d) (i) plus (ii) total surface area of solids listed at 5.2(a)(iv) → (e) | → 5.2(c) →(d)(i) – (ii) → (e) |
| C. 6.0 Movement / Transformation | 6.1 | 6.1(a) Transformation ↔ change. introductory ideas: (i) a 1-1 mapping whose domain & range are the set of all points in the plane; (ii) types of movement that result in the changed position and/or shape and/or size by sliding, flipping, turning/rotating, enlarging, or reducing; (iii) congruence &/or similarity of the original shape & its image. | 6.1(a) (i) – (iii) | 6.1(a) (i) – (iii) | 6.1(a) (i) – (iii) |

C. GEOMETRY AND TRIGONOMETRY

| MAIN TOPICS IN STRAND | D I S T R I B U T I O N O F C O N T E N T A C R O S S G R A D E L E V E L S | | | | |
|---|---|---|--------------------|--|-------------------|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/FORM 4 | GRADE 11/FORM 5 |
| C. 6.0 Movement / Transformation (cont'd) | 6.2 | 6.2 (a) Transformation by translation . Key concepts: (i) a sliding movement or displacement over a given distance, in a given direction (ii) on a coordinate plane, distance and direction are given by an ordered pair; (iii) shape and size preserved/ original shape and its image are congruent and similar; (iv) symbolically, the original figure A has image, A' ; while the image of A' is A'' ; symbol, T , denotes a translation; | 6.2 (a) (i) – (iv) | 6.2 (a) (i) – (iv) plus (v) describing the movement under translation by a column vector | 6.2 (a) (i) – (v) |
| | | (b) making and interpreting translations: (i) finding the images of given points under a given translation; (ii) determining the ‘rule’ which moves an object to its image under a translation (iii) graphing a figure & its image, given the description of the translation; (iv) graphing the pre-image when given the image & the ‘rule’ for translation | → (b) (i) – (iv) | → (b) (i) – (iv) | → (b) (i) – (iv) |

| MAIN TOPICS IN STRAND | D I S T R I B U T I O N O F C O N T E N T A C R O S S G R A D E L E V E L S | | | | |
|---|---|----------------|--|--|--|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/FORM 4 | GRADE 11/FORM 5 |
| <p>C. 7.0 Trigonometry (Measures of Sides and Angles of any Triangle)</p> | 7.1 | 7.1 | <p>7.1(a) Trigonometry or ‘triangular measure’. Introductory ideas:</p> <ul style="list-style-type: none"> (i) Hipparchus’ method of using the measurement of certain parts of a right-angled triangle to find the measurements of other parts of the triangle; (ii) an extension of Pythagoras’ Theorem which establishes the relationship between the lengths of sides only [See B.4.1 (b) (iii) – (iv)] (iii) relationship between sides and angles dependent on the ratio of the lengths of the sides of one right-angled triangle to the ratio of the lengths of corresponding sides in a similar rt. Δ. <p>(b) knowledge and use of the three trigonometric ratios:</p> <ul style="list-style-type: none"> (i) identification, in any right-angled triangle, of the side which is <i>adjacent to</i> or <i>opposite to</i> a given angle; (ii) recognition of the three trigonometric ratios: <i>sine, cosine, tangent</i> and their use to find missing sides and/or angles in any right-angled triangle; | <p>7.1 (a) (i) – (iii)</p> <p>→ (b) (i) – (iii) and</p> <ul style="list-style-type: none"> (iv) use of trig. ratios in special rt. Δ triangles: <ul style="list-style-type: none"> - the 30°, 60°, 90° Δ - the 45°, 45, 90° Δ; - finding the value of the sin, cos and tan of angles of 30°, 60°, 45° giving the results in fractional or surd form | <p>7.1 (a) (i) – (iii)</p> <p>→ (b) (i) – (iv) plus</p> <ul style="list-style-type: none"> (v) use of the sine and cosine rules to find missing sides & angles in non-rt. Δ triangles; (vi) finding the area of a non- right-angled Δ by using the sine or cosine rule or by using Hero’s formula |

D. ALGEBRA

| MAIN TOPICS IN STRAND | D I S T R I B U T I O N O F C O N T E N T A C R O S S G R A D E L E V E L S | | | | |
|---|---|---------------------|--------------------|--------------------|---------------------|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| D. 1.0. Symbolic Representation and Arithmetic - Type Operations | 1.1(a)The accustomed use of symbols to represent numbers, operations, relationships: (i) use of digits such as 5, 18, 139 and the value of each digit in the <i>place-value</i> system; (ii) use of operational symbols, +, −, x, ÷, and related vocabulary such as: <i>add, sum, total, subtract, difference, product, quotient</i> (iii) translation from words to symbolic language: <i>Add three to five times four</i> shown as $(5 \times 4) + 3$ | 1.1→(a) (i) – (iii) | 1.1→(a)(i) – (iii) | 1.1→(a)(i) – (iii) | 1.1→(a) (i) – (iii) |
| | (b)The widespread use of letters to represent numbers and/or quantities ↔ the study of Algebra; additional concepts and extended vocabulary: (i) <i>variable, term, coefficient, expression, like terms, constant, factors of a term;</i> (ii) translation of verbal phrases or expressions to algebraic terms and / or expressions and vice versa: e.g. <i>From c take the sum of a and b</i> is shown as, $c - (a + b)$. | →(b) (i) – (ii) | →(b) (i) – (ii) | →(b) (i) – (ii) | →(b) (i) – (ii) |

D. ALGEBRA

| MAIN TOPICS IN STRAND | DISTRIBUTION OF CONTENT ACROSS GRADE LEVELS | | | | |
|---|---|--|--|--|--|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| <p>D. 1.0. Symbolic Representation and Arithmetic - Type Operations (cont'd)</p> | <p>1.2(a) Application of the ‘Laws of Arithmetic’ when operating with algebraic terms and expressions:</p> <p>(i) to write expressions in their simplest forms using the four basic operations, A, S, M, D, and including the use of exponents;</p> <p>(ii) to simplify fractions of the forms,</p> $\frac{x}{3} + \frac{x}{5} - \frac{x}{10}, \frac{xy}{5} \times \frac{10}{x}$ <p>(iii) to apply the commutative, associative and distributive properties of numbers;</p> <p>(iv) to perform the basic operations with integers;</p> <p>(v) to combine operations, observing the conventional order of operations.</p> <p>(b)Evaluation of algebraic terms and expressions (numerical values for symbols) with special attention to:</p> <p>(i) the operations as used at 1.2(a) above;</p> <p>(ii) terms written in index form with positive indices and with the index zero</p> | <p>1.2→ (a) (i) – (v) plus:</p> <p>(vi) to form and simplify expressions with some or all terms in index form, including negative indices</p> <p>(vii) to simplify fractions such as</p> $\frac{3}{5} + \frac{2}{x}, 7 + \frac{y-3}{y+4}$ <p>→ (b) (i) – (ii) plus:</p> <p>(iii) evaluation of algebraic terms and expressions with integral indices</p> | <p>→ (a) (i) – (vii) plus</p> <p>(viii) to simplify expressions which require the use of binary operations besides A,S,M,D</p> <p>→ (b) (i) –(iii) & evaluation of (iv) terms written in index form with fractional indices</p> <p>(v) terms which are written with powers of powers eg the value of $(y^4)^2$ when $y = 2$;</p> | <p>→(a) (i) – (viii)</p> <p>→(b) (i) – (v) (observing all the Laws of Indices)</p> | <p>→(a) (i) – (viii)</p> <p>→(b) (i) – (v)</p> |

D. ALGEBRA

| MAIN TOPICS IN STRAND | D I S T R I B U T I O N O F C O N T E N T A C R O S S G R A D E L E V E L S | | | | |
|--|--|--|--|--|---------------------|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| D. 1.0. Symbolic Representation and Arithmetic - Type Operations (cont'd) | 1.2(c) Problem-solving involving the formation, evaluation and simplification of algebraic expressions using concepts, skills, procedures already introduced | →(c) | →(c) | →(c) | →(c) |
| | 1.3 Sequences and patterns: (a) (i) identification, continuation, creation of sequences and patterns - (numeric, algebraic, geometric): - from pattern to general rule to algebraic exp.; | 1.3 →(a)(i) plus (ii) finding the n th. term of a sequence (iii) use of sequences and patterns to solve a variety of problems across strands | 1.3→(a) (i) – (iii) | →(a) (i) – (iii) | →(a) (i) – (iii) |
| | 1.4(a) Factorisation or expansion of algebraic expressions to include: (i) factorisation of expressions of the forms $ax \pm bx$, $ax \pm bx \pm cx$, $x(a + b) + y(a + b)$, $ax \pm bx \pm ay \pm by$ and expansion of expressions of the forms: $x(a \pm b)$, $(a + b)(x + y)$, [See HCF at A.2.3 (b) (iv)] | 1.4→(a) (i) plus (ii) factorisation of expressions such as $15 - xy + 5y - 3x$, [rearrangement of terms needed] | 1.4→(a) (i) – (ii) plus (iii) factorisation of expressions such as $ax^2 + bx + c$, $ax^2 + 2ab + b^2$, $a^2 - b^2$, where a, b, c are integers and $a \neq 0$, and expansion of expressions such as $(x \pm 2)^2$, $(x-3)(x+4)$ (iv) use of factorisation to simplify expressions such as $\frac{3p+3q}{7p+7q}$ | 1.4→(a) (i) – (iv) plus (v) factorization of expressions such as $\frac{2x+10}{x^2-25}$, $\frac{x^2-6x+8}{x^2-x-2}$ (vi) use of factorisation & completion of squares to write expressions of the form, $ax^2 + bx + c$ in the form, $a(x+b)^2 + c$, where a, b , and $c \in R$ | 1.4→ (a) (i) – (vi) |
| (b) Problem-solving requiring the use of procedures at (a) | →(b) | →(b) | →(b) | →(b) | |

D. ALGEBRA

| MAIN TOPICS IN STRAND | D I S T R I B U T I O N O F C O N T E N T A C R O S S G R A D E L E V E L S | | | | |
|--|--|---|--|--|--|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| <p>D. 2.0 Equations : Identification, Formation & Solution</p> | <p>2.1(a) The concept, an equation:</p> <p>(i) the difference between an expression and an open sentence / equation;</p> <p>(ii) translation of verbal sentences to algebraic equations with one variable and vice versa;</p> <p>(iii) the concept: solving an equation</p> <p>(b) The solution of algebraic equations with one variable, of the forms:</p> <p>(i) $m - 17 = 20$, $-7t = 35$, $\frac{x}{3} = 9$;</p> <p>(ii) $2x - 7 = 25 - 6x$ $\frac{x}{4} - 2 = 10$;</p> <p>(iii) $2(p + 7) = 3(p - 1)$, $y - 3(2y + 4) = 8$</p> <p>(iv) $\frac{x}{5} + \frac{x}{3} = \frac{7}{10}$</p> <p>(c) Problem-solving involving the formation and solution of equations of the forms already introduced, across topics and strands</p> | <p>2.1(a) (i) – (iii)</p> <p>→(b) (i) – (iv) plus solution of equations of the forms,</p> <p>(v) $\frac{x-3}{4} = 7$, $\frac{y}{6} = \frac{y-2}{4}$ $\frac{5}{x} = -15$</p> <p>(vi) $x^3 = 27$, $y^{-2} = 16$,</p> <p>→(c)</p> | <p>2.1(a) (i) – (iii)</p> <p>→(b)(i) – (vi) plus solution of equations of the forms:</p> <p>(vii) $\frac{x}{x+4} = \frac{5}{3}$,</p> <p>(viii) $3^x = 81$</p> <p>(ix) $(x+3)^2 = 36$</p> <p>(x) $ax^2 + bx + c = 0$ by factorisation, where a, b and c are integers and $a \neq 0$</p> <p>→(c)</p> | <p>2.1(a) (i) – (iii)</p> <p>→(b) (i) – (x) plus solution of equations of the form, (xi) $ax^2 + bx + c = 0$ where a, b and c are Integers & $a \neq 0$ by completion of squares and by using a formula</p> <p>→(c)</p> | <p>2.1→(a)(i) – (iii)</p> <p>→(b) (i) – (xi)</p> <p>→(c)</p> |

D. ALGEBRA

| MAIN TOPICS IN STRAND | D I S T R I B U T I O N O F C O N T E N T A C R O S S G R A D E L E V E L S | | | | |
|---|---|--|---|---|---|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| D. 2.0 Equations : Identification, Formation & Solution (cont'd) | 2.2(a) | 2.2(a) Use of two variables to write two equations to represent information given verbally; | 2.2→(a) | 2.2→(a) | 2.2→(a) |
| | (b) | (b)(i)Solution of simultaneous linear equations in two variables (algebraically) by elimination | →(b)(i) plus (ii) solution of linear equations in 2 variables by substitution | →(b)(i) – (ii) | →(b)(i) – (ii) plus (iii) solution of a pair of equations in two variables where one equation is linear & the other quadratic non-linear |
| | (c) | (c)(i)Word problems involving the formation & solution of two linear equations, each with two variables | →(c)(i) | →(c)(i) | →(c)(i) plus word problems involving: (ii) the formation and solution of equations described above at 2.2(b)(iii) |
| | 2.3(a) | 2.3(a) Identification and use of simple formulae/ equations which state the relation between two or more variables: (i) development of formulae to represent observed relationships (ii) the value of a variable in a given formula, using the numerical information about the other variable(s) | →(a) (i) – (ii) | →(a) (i) – (ii) plus more work with formulae (iii) solving for a selected variable in a formula or <i>changing the subject of a formula</i> , including terms with square roots and exponents | →(a) (i) – (iii) |

D. ALGEBRA

| MAIN TOPICS IN STRAND | D I S T R I B U T I O N O F C O N T E N T A C R O S S G R A D E L E V E L S | | | | |
|--|---|---|--------------------|---|-----------------|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| D. 2.0 Equations : Identification, Formation & Solution (cont'd) | 2.3(b) | (b) | (b) | (b) Algebraic identities: (i) comparing equations and identities; (ii) proving identities | →(b) (i) – (ii) |
| | (c) | (c) | (c) | (c) Formulae that represent proportional relationships: (i) concepts: <i>varies as</i> and use of the symbol, \propto , <i>direct</i> and <i>inverse variation</i> , <i>constant of variation</i> ; (ii) problem - solving involving direct and inverse variation | →(c) (i) – (ii) |
| D.3.0 Inequalities (Identification, Formation & Solution) | 3.1(a) | 3.1(a) Algebraic Inequalities: (i) identification and/or oral description of quantities that are not equal; (ii) use of one or more of the symbols, \neq , $<$, $>$, \leq , \geq : to convert a verbal statement to an algebraic inequality with one variable or to read and interpret an inequality given by symbols; | 3.1→(a) (i) – (ii) | →(a) (i) – (ii) | →(a) (i) – (ii) |

D. ALGEBRA

| MAIN TOPICS IN STRAND | D I S T R I B U T I O N O F C O N T E N T A C R O S S G R A D E L E V E L S | | | | |
|---|---|--|-----------------|------------------|-----------------|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| D. 3.0 Inequalities: Identification, Formation & Solution (cont'd) | 3.1(b) | 3.1(b) solution of an inequality with one variable noting that: (i) the techniques used for solving equations are applicable; (ii) the solution set has a number of elements | →(b) (i) – (ii) | →(b) (i) – (ii) | →(b) (i) – (ii) |
| | (c) | (c) problem-solving involving (i) changing from words to an inequality and solving the inequality algebraically (ii) representing the solution on a number line | →(c) (i) – (ii) | →(c) (i) – (ii) | →(c) (i) – (ii) |

| MAIN TOPICS IN STRAND | D I S T R I B U T I O N O F C O N T E N T A C R O S S G R A D E L E V E L S | | | | |
|---|---|--|------------------|------------------|-----------------|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| E. 1.0 Relations and Functions | 1.1(a) Examination of the connection or relationship (i) between members of a set; (ii) between the members of two sets... identification of the <i>rule</i> which governs a connection or relationship; [See A. 4.1] | →(a)(i) – (ii) plus connection (iii) between a relation & an equation showing the same information | →(a) (i) – (iii) | →(a)(i) – (iii) | →(a)(i) – (iii) |
| | (b) Pictorial representation of a relation by <i>arrow/ mapping diagrams</i> : (i) concepts and related vocabulary: <i>element, image, image set, domain, range / co-domain</i> ; (ii) classification of a member of the domain and its corresponding member in the range as an <i>ordered pair</i> ; (iii) representation of ordered pairs on mapping diagrams or on (function) tables; | →(b)(i) – (iii) | →(b) (i) – (iii) | →(b)(i) – (iii) | →(b)(i) – (iii) |
| | (c) Types of relations: (i) as shown by mapping diagrams: 1-1, 1-M, M-1, M-M; | →(c)(i) plus : (ii) relations which are functions: * special properties of functions; * identification of the | →(c)(i) – (v) | →(c) (i) – (v): | →(c) (i) – (v) |

| MAIN TOPICS IN STRAND | D I S T R I B U T I O N O F C O N T E N T A C R O S S G R A D E L E V E L S | | | | |
|--|--|---|---|--|------------------------------|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| E.2.0 Graphs of Linear Functions/ Equations | 1.1 (c) (cont'd) | function rule; (iii) use of function notation: $f(x) = x - 4$, $y = f(x)$, $f: x \rightarrow x - 4$, to represent the function rule; (iv) evaluation of $f(x)$ for a given value of x and the function rule (the <i>input</i> \rightarrow <i>output</i> relationship); (v) use of function rule to construct and interpret <i>flow diagrams</i> . | | | |
| | (d) Problem-solving involving concepts and procedures already introduced | \rightarrow (d) | \rightarrow (d) | \rightarrow (d) | \rightarrow (d) |
| | 2.1 Other pictorial representation of relations and/or functions: (a) use of the number line (vertical or horizontal) : (i) to give the position of a point along a path; (ii) to show as a picture or graph the relation between given integers. | 2.1 \rightarrow (a)(i) – (ii) plus pictorial representation of a function by: (iii) showing a set of ordered pairs on a coordinate/Cartesian plane; joining 2 or more ordered pairs to show a straight line/linear function (1 – 1, M – 1); | \rightarrow (a) (i) – (iv) plus further study of the equation of the form, $y = mx + c$ and its graph to determine: (v) the gradient/slope; (vi) the distance between 2 points on the line; (vii) the coordinates of the midpoint of the line; (viii) the y-intercept | \rightarrow (a) (i) – (viii) plus (ix) determining the equation of a straight line when given * the slope and the y – intercept; * the coordinates of 2 points on the line; * the gradient and any point on the line | \rightarrow (a) (i) - (ix) |

| MAIN TOPICS IN STRAND | D I S T R I B U T I O N O F C O N T E N T A C R O S S G R A D E L E V E L S | | | | |
|---|---|--|---|---|--|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| E.2.0 Graphs of Linear Functions/ Equations (cont'd) | 2.1(a)cont'd | → (a)(iv) drawing graphs to show linear functions of the form, $y = ax + b$, where a and b are integers; | [See p.41] | [See p.41 | [See p.41] |
| | 2.1(b) Solving problems which involve: (i) the use of the number line for their solution | → (b) (i) plus solving problems which require (ii) representing a linear function (as described by a set of ordered pairs or a table of values) on a Cartesian plane and reading / interpreting the graph | →(b) (i)–(ii) plus solving problems which require: (iii) information gained at 2.1(a) (i) –(viii) above | →(b)(i) - (iii) plus solving problems which require (iv) information gained at 2.1(a)(ix) above | →(b) (i) - (ix) |
| | 2.3 (a) | 2.3(a) Further work with linear functions: (i) reviewing formation of equations from information given [See D.2.1(a) and D.2.2(a)] (ii) representing 2 linear functions on the same coordinate plane and determining their point of intersection [A graphical solution of simultaneous linear equations (two variables)] | →(a) (i) – (ii) plus use of graphs of straight lines to: (iii) to convert one unit of measure to another, including conversion of currency | →(a)(i)-(iii) plus use of (iv) <i>distance-time</i> and <i>speed-time</i> graphs to determine: - distance; - time; - speed; - acceleration | →(a) (i) –(iv) plus special relationship between (v) the gradient of a line and the tangent ratio |

| MAIN TOPICS IN STRAND | D I S T R I B U T I O N O F C O N T E N T A C R O S S G R A D E L E V E L S | | | | |
|---|---|----------------|----------------|--|--|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| E.3.0 Graphs of Non-linear Functions | 3.1(a) | 3.1(a) | 3.1(a) | 3.1(a) Graphs of quadratic functions of the form, $y = ax^2 + bx + c$ and their use to determine in each case: (i) the elements of the domain that have a given image and (ii) the intervals of a domain for which the elements of the range may be * positive or negative; * $>$ or $<$ a given value; (iii) the roots of the function; (iv) the turning point; maximum a n d minimum values of the function; (v) the equation of the axis of symmetry | →(a) (i) – (v) plus use of non-linear functions to (vi) show and/or derive the relationship between the tangent of an angle and the gradient of the curve at the point of contact |
| | 3.1(b) | 3.1(b) | 3.1 (b) | 3.1(b) | 3,1(b) Graphs of quadratic functions expressed in the form, $a(x + h)^2 + k$: (i) sketching each graph; (ii) determining - the axis of symmetry; - the maximum or minimum value; - the roots |

| MAIN TOPICS IN STRAND | DISTRIBUTION OF CONTENT ACROSS GRADE LEVELS | | | | |
|---|--|--|--|--|---|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| E.3.0 Graphs of Non-linear Functions/ Equations (cont'd) | 3.1(c) | → (c) | → (c)..... | →(c) | →(c) Graphs of other non-linear functions: $y = ax^n$, where $n = -1, -2, \text{ and } 3$ |
| E.4.0 Graphs of Inequalities | 4.1(a) The number line/simple line graph used to show and solve simple inequalities with one variable: use of (i) an arrowed line; (ii) shaded and ‘empty’ circles | →(a)(i)–(ii) plus use of a graph on the Cartesian plane to show by shading or otherwise: (iii) the region representing the solution to an inequality such as $y < 2x + 1$ or $y > 2x + 1$ | →(a) (i) – (iii) plus use of graphs to represent the solution set of the region enclosed by two or more inequalities | →(a) (i)-(iv) plus (v) use of graphs of inequalities in linear programming | →(a) (i) – (v) |
| | 4.2(a) Problem-solving involving (i) translation from words to Inequalities (one variable) (ii) the use of set notation; (iii) the use of the number line to show inequalities with one variable and the ability to interpret inequalities shown on a number line | 4.2(a) (i)- (iii) plus problem – solving which requires (iv) translation from words to inequalities with two variables; (v) interpretation of the solution sets shown by the graphs | → (a) (i) – (v) | →(a)(i) – (v) plus problems involving (vi) two variables and linear programming techniques. | →(a) (i) – (vi) |

F. STATISTICS AND PROBABILITY

| MAIN TOPICS IN STRAND | DISTRIBUTION OF CONTENT ACROSS GRADE LEVELS | | | | |
|---|--|---|--|------------------|------------------|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| F.1.0 Statistics (Introductory Ideas) | 1.1 General examination of the widespread use of <i>data</i> or numerical / quantitative information: * by whom, from what sources, for what purpose(s); * distinguishing between facts and opinions | →1.1 | →1.1 | →1.1 | →1.1 |
| F.2.0 Data Collection, Organisation And Interpretation | 2.1(a) Identification of important or interesting phenomena (i) in the immediate environ – ment that could/should be investigated | →(a) (i) plus important issues to be investigated (ii) at the community level; the need for and use of <i>market research</i> | →(a) (i)-(ii) plus gathering date (iii) at the national level: issues of national and international significance | →(a) (i) – (iii) | →(a)(i) – (iii) |
| | (b) Collection of <i>discrete</i> ('countable') <i>data</i> ; (i) concepts: <i>raw data, relevant data, population, sample population, random sampling, convenience sampling</i> (ii) sources of data including existing records/information, and methods of collection including observation and interviews; (iii) preparation and use of tally sheets and check lists to record <i>raw data</i> . | →(b)(i)–(iii) plus (iv) concepts: <i>reliable data, representative and / or systematic sampling;</i> (v) preparation and use of short questionnaires; | →(b)(i)-(v) plus collection of data from a very large population: (vi) concept ; <i>continuous data;</i> (vii) use of polls and large-scale surveys; census-taking | →(b) (i) – (vii) | →(b) (i) – (vii) |

F. STATISTICS AND PROBABILITY

| MAIN TOPICS IN STRAND | D I S T R I B U T I O N O F C O N T E N T A C R O S S G R A D E L E V E L S | | | | |
|-----------------------|---|--|---|---|-----------------|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| | 2.1(c) Arrangement/organisation of raw data: (i) use of a simple <i>frequency distribution table</i> to show a collection of single facts (data usually arranged in ascending order) | → (c) (i) | →(c)(i) plus (ii) use of a frequency table for <i>grouped data</i> , with special attention to: * size & number of groups * class intervals, class boundaries and limits (iii) attention to storage and retrieval of data (e.g. a computerised data bas | →(c)(i)- (iii) plus (iv) use of a <i>cumulative frequency table</i> for ungrouped or grouped data | →(c) (i) – (iv) |
| | 2.1(d) Analysis & interpretation of the available (arranged) data: (i) comparing data e.g. the greatest/least of the set as shown by the frequency; (ii) identifying a pattern or trend which might lead to a possible conclusion (iii) computing the <i>arithmetic mean</i> (commonly used <i>average</i> / measure of central tendency) (iv) using the average / mean) to describe a set of data (v) solving problems involving knowledge and skills at 2.1(d) (i)-(iv) above. | →(d)(i) – (v) plus (vi) use of other measures of central tendency, the <i>median</i> and the <i>mode</i> and determining which of the three best describes what is typical of the set of data; (vii) identifying misleading statistics (viii) determining from the available data the proportion or percent - age of the items above/ below a given value (ix) solving problems which require application of concepts and skills at 2.1(d) (vi) – (viii) | →(d) (i)- (ix) plus (x) analysis and description of grouped data: * finding the midpoint of each class interval * finding the mean, median and mode of grouped data | →(d) (i)-(x) plus (xi) determining the spread/measures of dispersion of grouped and ungrouped data: * the <i>range</i> * the <i>interquartile range</i> * the <i>semi-interquartile range</i> | (d) (i) – (xi) |

F. STATISTICS AND PROBABILITY

| MAIN TOPICS IN STRAND | DISTRIBUTION OF CONTENT ACROSS GRADE LEVELS | | | | |
|--|---|--|---|--|-------------------|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| F.3.0 Graphical Presentation and Interpretation of Data | 3.1(a) | 3.1(a) Construction of statistical diagrams to aid understanding and use of the available data:: (i) the bar graph , (vertical and horizontal) with special attention to * the use of the vertical and horizontal axes; * the scale or key used; * the title of the graph (ii) the pie chart | 3.1→(a) (i)-(ii) plus construction of (iii) line graphs , one or more lines as needed (iv) histograms to show ungrouped and/or grouped data (equal classes) (v) frequency polygons (grouped data in equal class intervals) | 3.1→(a) (i) – (v) plus (vi) the cumulative frequency curve or ogive to illustrate a cumulative frequency distribution [Special attention to scale on each axis and to the use of the class boundaries as the domain] | 3.1→(a)(i) – (vi) |
| | 3.2(b) | →(b)(i) Determining which of the two (bar or pie chart) is more appropriate for displaying a set of data &/or for making inferences & predictions | →(b)(i) plus (ii)use of the line graph to represent data & detecting when line graphs misrepresent given data (iii) choice of graphs to display data &/or to make inferences, decisions & predictions | →(b)(i) – (iii) plus (iv) use of the cumulative frequency curve to - estimate the median from a set of grouped data; - estimate the quartiles | →(b)(i) – (iv) |
| F.4.0 Probability | 4.1(a) Probability : considering the element of uncertainty in everyday experiences; (i) classification of events as <i>certain, impossible, as likely to happen as not, having a good/poor chance of happening / having a high or low probability of happening</i> ; | →4.1(a) | →(a) | →(a) | 4.1→(a) |

| MAIN TOPICS IN STRAND | D I S T R I B U T I O N O F C O N T E N T A C R O S S G R A D E L E V E L S | | | | |
|----------------------------|---|---|-----------------|------------------|------------------|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| F.4.0 Probability (cont'd) | <p>4.1(b) Experimental probability or use of experiments to help determine the probability of an event:</p> <p>(i) use of terms: <i>experiment, sample space, event, outcome, possible outcome, successful or favourable outcome,</i></p> <p>(ii) observation and recording of the results of activities to determine the likelihood of one particular outcome occurring;</p> <p>(iii) expressing the experimental probability of an outcome (E) in the form, $P(E) = \frac{\text{number of observations favourable to E}}{\text{total number of observations}}$</p> <p>(iv) expressing the fraction derived at (iii) in decimal or percentage form</p> | <p>→(b) (i)- (iv) plus ideas related to the theoretical probabilities of events :</p> <p>(v) use of set notation to describe a probability: $p(R) = \frac{n(R)}{n(U)}$ where R = { required outcomes} and U = {all possible outcomes}</p> <p>(vi) use of formula at (v) to calculate probabilities in ‘word’ problems</p> | →(b) (i) – (vi) | →(b) (i) – (vi) | → (b) (i) – (vi) |

G. CONSUMER ARITHMETIC

| MAIN TOPICS IN STRAND | DISTRIBUTION OF CONTENT ACROSS GRADE LEVELS | | | | |
|--|--|--|---|---|-----------------|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/FORM 4 | GRADE 11/FORM 5 |
| G.1.0 The Consumer: Spending for Goods & Services | 1.1(a) Use of money for items such as food, clothing, utilities, health care, entertainment: (i) pricing systems: formats for quoting prices such as \$100 <i>per doz.</i> , 5 for \$89; (ii) preparation and use of bills, invoices, receipts | 1.1→(a)(i) – (ii) plus (iii) use ATM machines; (iv) payment by cheque, debit and/or credit card | →(a)(i)-(iv) plus (v) shopping from a catalogue or via the internet; (vi) conversion from one currency to another, given the exchange rate; [See E.2.3(a)(iii)] | →(a) (i) – (vi) | →(a) (i) – (vi) |
| | (b) Application of number properties and operations to compute and compare: (i) unit cost, total cost, estimated or approximate cost; bulk/wholesale vs single-item purchasing; (ii) GCT &/or other tax (iii) change due from cash tendered for goods | →(b) (i) – (iii) plus (iv) noting payments and balances on cheque stubs | →(b) (i) – (iv) plus (v) calculation of amount to be paid on charge account (minimum payment and/or interest on outstanding balance | →(b) (i) – (v) | →(b)(i) – (v) |
| | (c) Critical examination of <i>sales, specials, bargains</i> : (i) influence of <i>brand name</i> ; (ii) determination of ‘better buys’; (iii) actual amount and percent of original price saved; actual discount and discount%; [See A.3.2(a) (i)-(iv)] | →(c) (i) – (iii) plus Trading...buying and selling transactions: (iv)computation of: - selling price when cost and actual profit or loss or percentage profit or loss are known; - cost price when selling price and actual profit or loss or percentage profit or loss are known; | →(c) (i) – (iv) plus (v) Purchase of goods by hire-purchase agreement: - <i>stated cost</i> , - <i>down payment</i> , - <i>instalments</i> , - <i>final cost</i> | →(c) (i)-(v) plus (vi) Purchase of major assets such as houses: - <i>loan financing</i> , - <i>mortgage payment</i> , - <i>interest on loan</i> ; - <i>home owner’s insurance policy</i> | →(c) (i) – (vi) |

G. CONSUMER ARITHMETIC

| MAIN TOPICS IN STRAND | D I S T R I B U T I O N O F C O N T E N T A C R O S S G R A D E L E V E L S | | | | |
|---|---|---|----------------|-----------------|-----------------|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/FORM 4 | GRADE 11/FORM 5 |
| G.1.0 The Consumer: Spending for Goods & Services (cont'd) | 1.1(d) Problems involving concepts and operations already introduced | →(d) | →(d) | →(d) | →(d) |
| | 1.2(a) | 1.2(a) Use of money for utilities: (water, light, telephone) (i) utility bills: - items that contribute to the total bill; - computation of cost per item and of total cost; - scheduled payment date; sanctions for non-payment by due date (ii) - average consumption/ month over a period | →(a) (i)- (ii) | →(a) (i)- (ii) | →(a) (i)- (ii) |
| | 1.2(b) | →(b) Use of money for services: (i) identification of type of services needed from tradesmen , farmers, professionals, institutions (ii) estimated & actual cost vis-à-vis agreed rate of payment | →(b)(i)- (ii) | →(b) (i)- (ii) | →(b) (i)- (ii) |
| | 1.2(c) | →(c) Problem-solving involving concepts and skills already introduced. | →(c) | →(c) | →(c) |

G. CONSUMER ARITHMETIC

| MAIN TOPICS IN STRAND | D I S T R I B U T I O N O F C O N T E N T A C R O S S G R A D E L E V E L S | | | | |
|--|--|---|--|--|------------------|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/FORM 4 | GRADE 11/FORM 5 |
| G.2.0 The Consumer: Working And Earning | 2.1(a) Some sources of income: (i) full or part-time employ – ment to an employer; (ii) self-employment (trade, profession, informal vending) | →(a) (i)-(ii) plus (iii) formal business ventures (concept of entrepreneurship) | →(a)(i) – (iii) | →(a)(i) (iii) | →(a) (i) – (iii) |
| | (b) Money earned: (i) distinction between <i>wages</i> and <i>salary</i> ; (ii) computation of regular wage for a fixed time, at a fixed rate; (iii) computation of monthly or yearly salary; (iv) commission at agreed rate (v) total income over a specified time and average income per week/month over a given time | →(b) (i)-(v) plus (vi) additional wages for - ‘overtime’ work (<i>time & half</i> and <i>double time</i> rates); - piecework, - tips and computation of extra wages; (vii) understanding and use of concepts: - <i>gross</i> and <i>net pay</i> , - <i>deductions, allowances</i> - <i>taxable income</i> , - <i>income tax</i> | →(b) (i) – (vii) | →(b) (i) – (vii) | →(b) (i) – (vii) |
| | (c) | →(c) Money management to include: (i) preparation of budget (list of items & amount of net income for each); (ii) use of pie chart to show relative size of budget categories | →(c) (i)-(ii) plus attention to savings & investments: (iii) dividends, simple and compound interest (iv) application of CI principles to concepts of <i>appreciation</i> and <i>depreciation</i> in value | →(c) (i)-(iv) plus wise use of money: (v) decisions such as - cash vs installment purchases; - home ownership vs rental; - type of insurance | →(c) (i) – (v) |
| | (d) Problems based on the concepts and skills in 2.1(a)-(c) | →(d) | →(d) | →(d) | →(d) |

H. VECTORS AND MATRICES

| MAIN TOPICS IN STRAND | D I S T R I B U T I O N O F C O N T E N T A C R O S S G R A D E L E V E L S | | | | |
|-----------------------|---|---|--|------------------|-----------------|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| H.1.0 Vectors | 1.1(a) | 1.1(a) Vectors: quantities with both size and direction: (i) relation to scalars; (ii) use of arrows to indicate movement from one point/position to another; (iii) symbolic representation: magnitude & direction as an ordered pair; (iv) simple scale drawings to represent movement of a given size in a given direction; | 1.1 →(a)(i) – (1v) plus (v) the unit vector as a vector of unit length | →(a) (i)-(v) | →(a)(i)-(v) |
| | 1.2(a) | 1.2(a) Position Vectors shown on the Cartesian plane: (i) relationship between position vectors and coordinates; (ii) use of vector notation: $\begin{pmatrix} 3 \\ 5 \end{pmatrix}$ (a column) to denote movement from (0 , 0) to (3, 5); (iii) use of position vectors to define the vertices of shapes; (iv) discrimination between position vectors and displacement vectors | →(a) (i) – (iv) plus Combination of vectors: (v) addition &/or subtraction of vectors (the resultant vector); (vi) use of <i>triangle law</i> or <i>parallelogram law</i> to calculate resultant vector (vi) use of vectors to solve problems in Geometry. | →(a) (i) – (vi) | →(a) (i) – (vi) |

H. VECTORS AND MATRICES

| MAIN TOPICS IN STRAND | D I S T R I B U T I O N O F C O N T E N T A C R O S S G R A D E L E V E L S | | | | |
|-----------------------|---|----------------|--|--|-------------------|
| | GRADE 7/FORM 1 | GRADE 8/FORM 2 | GRADE 9/FORM 3 | GRADE 10/ FORM 4 | GRADE 11/FORM 5 |
| H.2.0 Matrices | 2.1 (a) | 2.1(a) | 2.1(a) a Matrix, a type of table: (i) use of a matrix to show numerical information/ statistical data in rows and columns (ii) the order of a matrix.... number of rows and columns in that sequence; (iii) the type of matrix based on its order; (iv) addition and subtraction of matrices of the same order; (v) multiplication of matrices of the same order and of any matrix by a constant; (vi) use of matrix addition, subtraction and multiplication to solve simple algebraic problems | →(a) (i) – (vi) | →(a) (i) – (vi) |
| | 2.2(a) | 2.1(b) | 2.1(b) | 2.1→(b) Further work with matrices to: (i) evaluate the determinant of a ‘2 x 2’ matrix; (ii) find the inverse of a non-singular ‘2 x 2’ matrix; (iii) associate a ‘2x2’ matrix with a specific trans - formation (iv) use matrices to solve linear simultaneous equations | 2.1→(b)(i) – (iv) |

