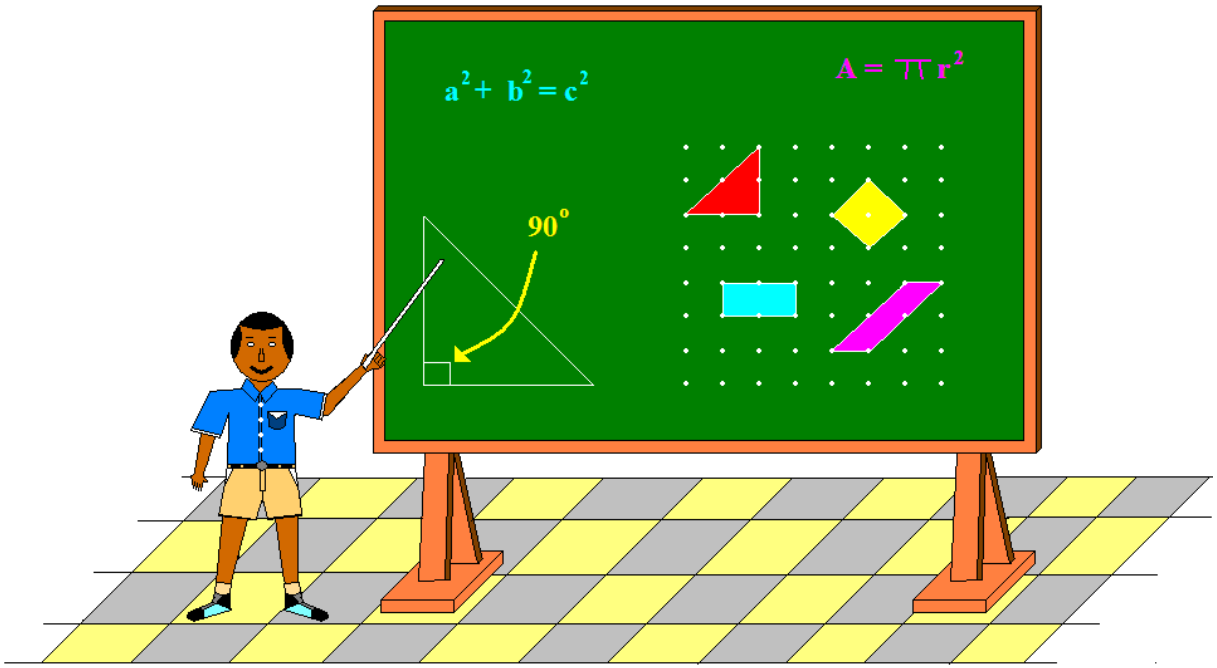
OECS EDUCATION DEVELOPMENT PROJECT (OEDP)



Lower Secondary Mathematics Curriculum
Grades: 7-9/Forms: 1- 3

Funded by the Government of
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Message from the Chief Education Officer

Globalization and the knowledge economy pose numerous challenges to small island developing states. St. Vincent and the Grenadines is no exception. With the transformation of entire economies and cultures, schools are expected to keep pace, and educators have to rethink and reform the education system to grapple with these challenges by increasing access and providing opportunities for the student population to acquire skills and gain knowledge for living and production.

The curriculum is a powerful instrument through which education reform is pursued. The curriculum has to provide opportunities for personalizing learning by introducing flexibility in what is taught. It has to be relevant and engaging for all pupils. The curriculum should create learning opportunities for each child by considering the range of abilities, aptitudes and diverse backgrounds of all students. The foundation skills-literacy, numeracy and ICT are also of utmost importance but initiative, creativity and problem solving must transform the way of thinking and doing.

The new curriculum and assessment framework makes provision for new approaches and the use of innovative modalities to encourage teachers to change from traditional to interactive approaches; to foster critical thinking and problem-solving while engaging teachers in proper assessment practices which will enable them to provide evidence-based-intervention strategies for all learners.

The framework also allows practitioners to hone the latent energies and abilities of students through the Design and Technology, Physical Education and Creative Arts curricula. This, it is hoped, will provide future citizens with skills and knowledge to be employable, competitive, self-sufficient and to increase civic and democratic responsibility.

Through the use of the curriculum, from Kindergarten to Grade 9, the education received will determine the citizens' capacity to prosper and to help the economy to bloom.

The new thrust to introduce teachers' guides into schools strengthens the initiative to provide the appropriate resources to allow teachers to implement all programmes of learning. I urge teachers to make maximum use of these resources so that the nation's children will continue to benefit from the opportunities provided in all classrooms.

Susan Dougan

Susan Dougan (Mrs.)
Chief Education Officer

FOREWORD

The phased introduction of Universal Secondary Education (USE), completed in 2005, highlighted the need for appropriate curricula to meet the varying needs and interests of the increased, more diverse student population entering secondary schools.

USE led to a further fragmentation of the current curricula as different secondary schools adopt different coping strategies to meet their diverse students' needs.

Hence for USE to be deemed effective there was an urgent need for the Government of St. Vincent and the Grenadines and in particular the Ministry of Education to provide a uniform curriculum framework for all secondary schools, thus providing more equitable access for all.

The Education Act of 1992 and the ESDP (2002-2007), sought to address these issues by providing for the development of a National Curriculum and Assessment Framework (NCAF), which provides flexibility for schools to customize the curriculum, subject to policy requirements, to best meet the needs of their students.

This National Framework, developed through a wide-ranging consultative process and participatory methodologies, led to the development of National Curriculum Programmes of Learning (POLs) and Teachers Guides in nine (9) subject areas: *Creative Arts (Dance, Art, Drama and Music), Design and Technology, Foreign Languages (French and Spanish), Health and Family Life Education, Language Arts, Mathematics, Physical Education and Sports , Science and Social Sciences.*

These Programmes of Learning seek to raise the performance and standards of teachers and students by providing Attainment Targets and basic Learning Outcomes and Achievement Indicators that ALL students are expected to achieve.

The *Attainment Targets* describe what each student should know, be able to do and the desirable attitudes they should display.
The *Learning Outcomes* are derived directly from the Attainment Targets. They indicate the basic depth and breadth of what students should know, be able to do, and the desirable attitudes they should demonstrate.
The *Achievement Indicators* state what the students should know, be able to do and the values and attitudes they must display in order that the teachers and students can know that a Learning Outcome has been achieved.

The Teachers' Guides are designed to enable ALL students to achieve the national goals for secondary education. They aim to illustrate the integration of teaching, learning and assessment.

Each Guide has been designed to suit the particular needs of each subject area. Furthermore, the Guides include sample lesson plans, assessment strategies, activities and the major resources/materials needed to effectively deliver the programmes. These documents should therefore serve as a guide for the development of instructional programmes to be implemented at the classroom level.

These Guides should therefore provide opportunities for the enhancement of teaching and learning at the classroom level and so contribute to the cognitive, affective and psychomotor development of the child.

The teacher, the main user of these Guides is envisaged as someone who:-

- Plans for teaching according to different learning styles and needs of his/her students
- Is flexible and creative
- Is knowledgeable of the subject he/she teaches.

The teacher of the NCAF is therefore someone who is confident in the delivery of the subject matter.

At the Ministry of Education, we are confident that these Guides will significantly enhance teaching and learning in secondary schools and eventually contribute towards the achievement of school graduates who are:-

- Literate and numerate in all domains
- Capable of sound moral and ethical judgments
- Confident and emotionally secure
- Capable of working independently and cooperatively
- Lifelong learners
- Hardworking with positive work ethics
- Knowledgeable and appreciative of their creative and artistic expressions

It is our hope that principals and teachers continue to play their roles in ensuring that these Guides are used for the enhanced development of the Nation's children as we work together to produce better citizens in St. Vincent and the Grenadines.

D Bacchus

Deborah Bacchus (Mrs.)
Senior Education Officer - Curriculum

TABLE 1 - EDUCATION STAGES

Education Stages (ES)	Students Ages (Years)	Approximate Grade/Form
ES 1	5 years – 7/8 years	Grades K – 2
ES 2	8 years –11/12 years	Grades 3 - 6
ES 3	12 years – 14/15 years	Grade 7 – 9 (Forms 1 - 3)
ES 4	15 years – 16/17 years	Grade 10 – 14 (Forms 4 – 5)

The Curriculum also includes the following elements:-

- Subject Strands
- Attainment Targets
- Learning Outcomes
- Achievement Indicators

(See Fig. 1)

SUBJECT STRANDS

The Subject Strands are the major branches into which the subject area is divided. Supporting each strand are the Attainment Targets, Learning Outcomes and the Achievement Indicators.

ATTAINMENT TARGETS

The Attainment Targets are the content standards to which the students should be focused. They are:-

- A package of subject strands for managing the curriculum.
- Aligned with the National Guides and Development Outcomes.
- Used to describe what each student should know, be able to do, and the desirable attitudes that should be displayed.
- The standards that should be displayed at the end of the period of compulsory schooling
- The same from grade to grade and Education Stage to Education Stage.
- Measured against the Learning Outcomes
- Interrelated, cumulative and interdependent

The purposes served by the Attainment Targets are:

- To ensure the articulation of the National Curriculum Goals
- To ensure alignment with Development Goals and the Vision of the graduate at the end of universal schooling.
- To improve teaching and learning for students in all schools.

LEARNING OUTCOMES

Learning Outcomes are the students' performance standards. They:-

- Are derived directly from the Attainment Targets for measurement purposes.

- Indicate for each subject strand the agreed basic depth and breath of what students should know, be able to do and the desirable attitudes they should demonstrate or display during and at the end of the Education Stage.
- Measure a student's increasing performance against the Attainment Targets for the subject in the Education Stage.

The **purposes** of the Learning Outcomes are:

- To ensure the integration of teaching learning and assessment in the subject area.
- To ensure alignment between assessment and the expected outcomes for learning across the curriculum.
- To measure a student's achievement of the Attainment Targets

ACHIEVEMENT INDICATORS

Achievement indicators are the specific expectations used for measuring students' performance against the Learning Outcomes. They are the success criteria, which measure each student's performance at each grade/level of the Education Stage.

STRAND ONE (1): NUMBER & NUMBER SENSE

SUBJECT: MATHEMATICS	STRAND: 1- NUMBER and NUMBER SENSE	EDUCATION STAGE: 3

ATTAINMENMT TARGET: ***Students develop competency, confidence, knowledge, skills and understanding in mental and written computations as well as effective calculator use and numerical reasoning when working with numbers***

LEARNING OUTCOMES	ACHIEVEMENT INDICATORS **Grade 7**	ACHIEVEMENT INDICATORS **Grade 8**	ACHIEVEMENT INDICATORS **Grade 9**
1. NUMBER and NUMBER SENSE - Place Value of Whole Numbers			
LO: 01 Demonstrate an understanding of place value by reading, ordering, and writing whole numbers of any size; and using related vocabulary	**7.1.1** Use, read, write and spell vocabulary such as: place value, digit, number, tens, hundreds, thousands, tens of thousand, hundreds of thousand, million **7.1.2** Read and write correctly whole numbers and names of whole numbers up to million **7.1.3** State the value of a given digit in a whole number up to million **7.1.4** Write whole numbers up to millions in expanded notation **7.1.5** Put whole numbers in order of size largest/smallest first **7.1.6** Convert up to a two digit whole number from base 10 to bases 2 and 5; and vice versa **7.1.7** Write base 2 and base 5 numbers in expanded notation.	**8.1.1** Use, appropriately vocabulary associated with place value **8.1.2** Read and write correctly any whole numbers and names of any whole numbers **8.1.3** Convert whole numbers from base 10 to other bases and vice versa. **8.1.4** Write numbers in base 3,4and 5 in expanded notation.	**9.1.1** Write numbers in scientific notation, standard form and to a given number of significant figures **9.1.2** Read and interpret numbers displayed in scientific notation on the calculator **9.1.3** Convert numbers from base 10 to any other base and vice versa. (emphasis on base 8 and 16) **9.1.4** Write numbers in any base in expanded notation. **9.1.5** Identify the place value of each digit of any number (to include up to three decimal places)

SUBJECT: MATHEMATICS	STRAND: 1- NUMBER and NUMBER SENSE	EDUCATION STAGE: 3
ATTAINMENMT TARGET: ***Students develop competency, confidence, knowledge, skills and understanding in mental and written computations as well as effective calculator use and numerical reasoning when working with numbers***		
LEARNING OUTCOMES	ACHIEVEMENT INDICATORS **Grade 7**	ACHIEVEMENT INDICATORS **Grade 8**	ACHIEVEMENT INDICATORS **Grade 9**
1. NUMBER and NUMBER SENSE - Estimations and Approximations of Whole Numbers			
LO: 02 Use the vocabulary of estimation and approximation; make and justify estimates and approximations of numbers	**7.2.1** Use, read, write and spell correctly terms and instructions such as : guess, estimate, approximate, round, nearest, roughly, nearly, approximately, too many, too few, enough, not enough, and the symbol for 'is approximately equal to' (≈) **7.2.2** Estimate results of computations and explain orally or in writing how each estimate was worked out **7.2.3** Apply the skill of estimation as a first step to calculations **7.2.4** Estimate the position of a point on an undivided number line and explain the strategy used **7.2.5** Identify instances when it is useful to round numbers to the nearest 10, 100, 1 000 **7.2.6** Round whole numbers to the nearest multiple of 10, 100, 1 000 **7.2.7** Apply the skill of rounding off numbers as a means of estimating calculations	**8.2.1** Use, read, write, and spell correctly terms and instructions such as : guess, estimate, approximate, round, nearest, roughly, nearly, approximately, too many, too few, enough, not enough, and the symbol for 'is approximately equal to' (≈) **8.2.2** Make estimates about real life situations involving the use of whole numbers **8.2.3** Apply the skill of estimation as a first step in calculations and as a checking device **8.2.4** Explain orally and in writing how estimates are arrived **8.2.5** Identify instances when they will round numbers to the nearest 10, 100, 1 000, 10 000 **8.2.6** Round whole numbers to the nearest multiple of 10, 100, 1 000 **8.2.7** Apply the skill of rounding off numbers as a means of estimating calculations	**9.2.1** Use, read, write, and spell correctly terms and instructions such as : guess, estimate, approximate, round, nearest, roughly, nearly, approximately, too many, too few, enough, not enough, and the symbol for 'is approximately equal to' (≈) **9.2.2** Make estimates about real life situations involving the use of whole numbers **9.2.3** Apply the skill of estimation/ approximation as a first step in calculations and as a checking device **9.2.4** Justify/ defend strategies used to arrived at estimates **9.2.5** Write numbers to a given number of significant places **9.2.6** Identify instances when they will round numbers to the nearest 10 000, 100 000, 1 000 000 **9.2.7** Consolidate the skill of applying rounding as a means of estimating calculations

SUBJECT: MATHEMATICS	STRAND: 1- NUMBER and NUMBER SENSE	EDUCATION STAGE: 3
ATTAINMENMT TARGET: ***Students develop competency, confidence, knowledge, skills and understanding in mental and written computations as well as effective calculator use and numerical reasoning when working with numbers***		
LEARNING OUTCOMES	ACHIEVEMENT INDICATORS **Grade 7**	ACHIEVEMENT INDICATORS **Grade 8**	ACHIEVEMENT INDICATORS **Grade 9**
NUMBER and NUMBER SENSE – Whole number Computations			
LO: 03 Understand, select and apply appropriate strategies for the four basic operations; and develop ways to check accuracy of computations	**7.3.1** Use, read, write and spell vocabulary related to the four basic operations: sum, total, difference, product, quotient, divisor, dividend, subtract, minus, combine, multiple **7.3.2** Calculate the value of whole number statements containing up to three operations using the order of arithmetic operations (BODMAS) **7.3.3** Know the multiplication tables up to 10 × 10 **7.3.4** Identify emerging patterns when multiplying whole numbers by 10 and multiples of 10, and 100 and multiples of 100 **7.3.5** Apply different strategies to perform multiplication by two or more digits **7.3.6** Apply different strategies to perform division by up to two digit	**8.3.1** Use, read, write and spell vocabulary related to the four basic operations: sum, total, difference, product, quotient, divisor, dividend, subtract, minus, combine, multiple **8.3.2** Calculate the value of whole number statements containing up to four operations using the order of arithmetic operations (BODMAS) **8.3.3** Demonstrate different ways of performing multiplication of a whole numbers involving a multiplier consisting of two or more digits **8.3.4** Use examples to demonstrate that multiplication is the inverse of division **8.3.5** Use appropriately the principles of commutative, associative and distributive laws as applied to multiplications **8.3.6** Check multiplication by dividing	**9.3.1** Use, read, write, and spell vocabulary related to the four basic operations: sum, total, difference, product, quotient, divisor, dividend, subtract, minus, combine, multiple **9.3.2** Calculate the value of whole number statements containing up to four operations using the order of arithmetic operations (BODMAS) **9.3.3** Use examples to illustrate different rules relating to the order of operation (BODMAS) **9.3.4** Understand that multiplication is the inverse of division **9.3.5** Use simple proofs to illustrate the principles of commutative, associative and distributive laws as applied to multiplications **9.3.6** Develop approaches to

	7.3.7 Apply appropriate mental, written or calculator strategies to solve multiplication and division problems **7.3.8** Recognize and use different notations to indicate division **7.3.9** Perform computations involving the principles of commutative, associative and distributive laws **7.3.10** Apply different ways in checking for accuracy of computations **7.3.11** Use the calculator as a device for checking accuracy of computations	product by one of the numbers that was multiplied **8.3.7** Check division by multiplying quotient by divisor **8.3.8** Use rounding to approximate and establish a reasonable range within which actual calculation will fall **8.3.9** Check computations by performing an equivalent calculation **8.3.10** Use the calculator to check for correctness of computations performed	checking for accuracy of computations

SUBJECT: MATHEMATICS	STRAND: 1- NUMBER and NUMBER SENSE	EDUCATION STAGE: 3
ATTAINMENMT TARGET: ***Students develop competency, confidence, knowledge, skills and understanding in mental and written computations as well as effective calculator use and numerical reasoning when working with numbers***		
LEARNING OUTCOMES	ACHIEVEMENT INDICATORS **Grade 7**	ACHIEVEMENT INDICATORS **Grade 8**	ACHIEVEMENT INDICATORS **Grade 9**
Number and Number Sense – Types of Numbers			
LO: 04 Distinguish between; order and calculate; with different types of numbers	**7.4.1** Distinguish between odd and even; whole and natural; prime and composite numbers **7.4.2** Identify and make sets of prime numbers less than 100 **7.4.3** Complete patterns based on addition, subtraction, squaring, halving, doubling and tripling of whole numbers **7.4.4** Write multiples and factors of whole numbers **7.4.5** Determine the common multiple and the lowest common multiple of sets of 2 and 3 numbers **7.4.6** Determine common factors and the highest common factor of a set of up to four numbers	**8.4.1** Distinguish between factors and multiples of a given number **8.4.2** Identify common multiples and the lowest common multiple –of sets of 3 and 4 numbers **8.4.3** Determine common factors and the highest common factor of a set of numbers **8.4.4** Arrange a set of integers in ascending and descending order **8.4.5** Add and subtract integers **8.4.6** Key in integers into a calculator using + and – keys **8.4.7** Identify patterns in; and complete and extend sequences involving different types of numbers	**9.4.1** Key in integers into the calculator **9.4.2** Perform the four basic operations with integers **9.4.3** Apply order of operations to integers **9.4.4** Make general statements relating to results obtained from computations with integers **9.4.5** Perform computations involving indices and square root with and without the use of the calculator

SUBJECT: MATHEMATICS	STRAND: 1- NUMBER and NUMBER SENSE	EDUCATION STAGE: 3	
ATTAINMENMT TARGET: ***Students develop competency, confidence, knowledge, skills and understanding in mental and written computations as well as effective calculator use and numerical reasoning when working with numbers***			
LEARNING OUTCOMES	ACHIEVEMENT INDICATORS **Grade 7**	ACHIEVEMENT INDICATORS **Grade 8**	ACHIEVEMENT INDICATORS **Grade 9**
Number and Number Sense – Fractions, Decimals, and Percentages			
LO: 05 Model, compare and represent fractions, decimals and percentages	**7.5.1** Use, read, write and spell correctly vocabulary associated with fractions, proper fraction, improper fractions, mixed numbers, numerator, denominator, equivalent, reduce, half/halves, quarter, third fifth hundredth, thousandth **7.5.2** Model, compare and represent fractions with denominators up to two digits. **7.5.3** Model, compare and represent fractions with denominators 10 and 100 **7.5.4** Model, compare and represent decimals up to two places **7.5.5** Round numbers with up to two decimal places **7.5.6** Determine the place value of a digit in decimal numbers up to the hundredths place **7.5.7** Recognize number patterns formed when decimals are multiplied or divided by 10 or 100 **7.5.8** Relate common fractions and decimals to their percentage equivalence	**8.5.1** Use, read, write and spell correctly vocabulary associated with fractions, proper fraction, improper fractions, mixed reduce, numbers, numerator, denominator, half equivalent, quarter, third, fifth, hundredth, thousandth **8.5.2** Relate fractions to division **8.5.3** Recognize from practical work that some fractions can be simplified to an equivalent fraction by dividing both numerator and denominator by the same number **8.5.4** Apply mental, written or diagram strategies to compare and order up to four fractions, by converting them to fractions with common denominators. **8.5.5** Arrange fractional numbers on a number line between two given points **8.5.6** Link fractions to other areas of mathematics (time, distance, money, pie chart, enlargement)	**9.5.1** Use, read, write and spell correctly vocabulary associated with fractions, proper fraction, improper fractions, mixed numbers, numerator, denominator, equivalent, reduce, half/halves, quarter, third fifth hundredth, thousandth **9.5.2** Convert improper fractions (any denominator) to mixed numbers and vice versa **9.5.3** Write fractions in their lowest terms **9.5.4** Generate sets of equivalent fractions **9.5.5** Compare and order sets of fractions **9.5.6** Arrange a given set of fractions (common or decimal) between two points on a number line

	7.5.9 Recognize and generate sets of equivalent fractions **7.5.10** Use fractions and decimals in recording measurements of time, money, distance **7.5.11** Add and subtract numbers consisting of up to two decimal places (special emphasize on money)		**9.5.7** Use a calculator to explore and create patterns with fractions and decimals

SUBJECT: MATHEMATICS	STRAND: 1- NUMBER and NUMBER SENSE	EDUCATION STAGE: 3
ATTAINMENMT TARGET: ***Students develop competency, confidence, knowledge, skills and understanding in mental and written computations as well as effective calculator use and numerical reasoning when working with numbers***		

	Grade 7	Grade 8	Grade 9
LEARNING OUTCOMES	ACHIEVEMENT INDICATORS **Grade 7**	ACHIEVEMENT INDICATORS **Grade 8**	ACHIEVEMENT INDICATORS **Grade 9**
Number and Number Sense – FRACTIONS, DECIMALS and PERCENTAGES			
LO: 06 Compare, order and calculate with decimals, fractions and percentages	**7.6.1** Convert improper fractions to mixed numbers and vice versa (single digit denominators) **7.6.2** Speak of a mixed number as a combination of a whole number plus a fraction **7.6.3** Convert fractions to terminating decimals **7.6.4** Use mental, written or diagram strategies to add and subtract two fractions **7.6.5** Calculate a unit fractions of a quantity **7.6.6** Calculate the product of two common fractions **7.6.7** Multiply and divide decimal numbers by single digit numbers **7.6.8** Calculate simple percentages (multiples of 5 & 10) of given quantities	**8.6.1** Convert improper fractions (double digit denominators)to mixed numbers and vice versa **8.6.2** Apply mental, written or diagram strategies in adding and subtracting with up to three fractions **8.6.3** Convert fractions to both terminating and recurring decimals and percentages **8.6.4** Give examples of inverse/reciprocal of a fraction **8.6.5** Recognize that a fraction times its multiplicative inverse gives the identity; for example $\frac{3}{4}\times\frac{4}{3}=1$; $\frac{2}{5}\times\frac{5}{2}=1$ **8.6.6** Multiply and divide fractions **8.6.7** Use number sentences to solve problems relating to division and multiplication of fractions; for examples, if $\frac{3}{4}\times\frac{4}{3}=1$; then $1\div\frac{4}{3}=\frac{3}{4}$ *or* $1\div\frac{3}{4}=\frac{4}{3}$	**9.6.1** Convert improper fractions to mixed numbers and vice versa **9.6.2** Add and subtract up to four fractions and mixed numbers with unlike denominators **9.6.3** Multiply and divide fractions and mixed numbers **9.6.4** Apply the distributive property in multiplying fractions. For example: $1\frac{1}{2}\times\frac{1}{2}$ means $1\times\frac{1}{2}+\frac{1}{2}\times\frac{1}{2}$ or $\frac{3}{2}\times\frac{1}{2}$ $\frac{4}{5}\times2\frac{1}{3}$ means $\frac{4}{5}\times2+\frac{4}{5}\times\frac{1}{3}$ **9.6.5** Interpret the meaning of results obtained from division by a fraction **9.6.6** Apply the order of operations in performing mixed operations on fractions **9.6.7** Find the original quantity given the final

	7.6.9 Solve a variety of real life problems involving fractions, decimals and percentages	**8.6.8** Interpret $\frac{1}{2} \div \frac{1}{4} as \frac{1}{2} \times 1 \div \frac{1}{4}$ $\Rightarrow \frac{1}{2} \times (1 \div \frac{1}{4}) = \frac{1}{2} \times 4$ **8.6.9** Interpret the result that is obtained when a number is multiplied or divided by a number less than one **8.6.10** Write the percentage equivalent of fractions and decimals **8.6.11** Find the value of a quantity given a percentage increase or decrease **8.6.12** Express one quantity as a percentage of another quantity **8.6.13** Calculate a percentage of a given quantity **8.6.14** solve a variety of real life problems involving fractions, decimals and percentages	result and percentage increase or decrease **9.6.8** Solve problems involving percentage related to profit /loss, commission, bills, hire purchase, rates and taxes **9.6.9** Apply percentage to sales tax and discount **9.6.10** Solve a variety of real life problems involving fractions, decimals and percentages

SUBJECT: MATHEMATICS STRAND: 1- NUMBER and NUMBER SENSE EDUCATION STAGE: 3			
ATTAINMENMT TARGET: ***Students develop competency, confidence, knowledge, skills and understanding in mental and written computations as well as effective calculator use and numerical reasoning when working with numbers***			
LEARNING OUTCOMES	ACHIEVEMENT INDICATORS **Grade 7**	ACHIEVEMENT INDICATORS **Grade 8**	ACHIEVEMENT INDICATORS **Grade 8**
Number and Number Sense – Ratio and Proportions			
LO: 07 Demonstrate an understanding of ratio and proportion and apply the same in problem solving			**9.7.1** Recognize that a ratio can be written in the form ***a : b or a to*** *b* **9.7.2** Use the concept of ratio to compare between two quantities **9.7.3** Recognize that in a ratio the quantities are written in the same unit **9.7.4** Write ratios in the simplest form **9.7.5** Divide a quantity in a given ratio **9.7.7** Apply knowledge of ratio to scale drawings **9.7.8** Generate sets of equivalent ratios consisting of two or more quantities **9.7.10** Identify the total amount that has been shared given the ratio and one proportion **9.7.11** Share an amount of money or a number of objects in a given ratio **9.7.12** Apply knowledge of ratio in solving problems

SUBJECT: MATHEMATICS	STRAND: 1- NUMBER and NUMBER SENSE		EDUCATION STAGE: 3
ATTAINMENMT TARGET: ***Students develop competency, confidence, knowledge, skills and understanding in mental and written computations as well as effective calculator use and numerical reasoning when working with numbers***			
LEARNING OUTCOMES	ACHIEVEMENT INDICATORS **Grade 7**	ACHIEVEMENT INDICATORS **Grade 8**	ACHIEVEMENT INDICATORS **Grade 9**
Number and Number Sense – Consumer Arithmetic			
LO: 08 **Solve consumer arithmetic problems involving earning and spending money; taxes, interest, appreciation and depreciation.**	**7.8.1** Explain the meaning of the terms Income Tax, Value Added Tax (VAT) Property Tax **7.8.2** Calculate the VAT given the selling price and tax rate **7.8.3** Calculate the actual sales tax, given the total cost and selling price of an object **7.8.4** Perform simple calculations to obtain total annual salary **7.8.5** Calculate commission given amount of sales and percentage commission **7.8.6** Calculate a bill given the cost of a number of items **7.8.7** Determine the change due after buying a number of items **7.8.8** Solve problems based on personal expenditures **7.8.9** Compare using calculations the value of commonly used currency **7.8.10** Perform the four basic	**8.8.1** Solve problems involving the calculation of VAT, Property and Income Tax **8.8.2** Calculate the actual sales tax, given the total cost and selling price of an object **8.8.3** Calculate wages based on hourly rate and overtime rate **8.8.4** Perform simple calculations to obtain total annual salary **8.8.5** Calculate commission given amount of sales and percentage commission **8.8.6** Read and interpret utility bills **8.8.7** Use calculations to compare the prices of similar items to select best value for money **8.8.8** Make simple budget for personal expenditure **8.8.9** Solve problems based on utility bills and shopping	**9.8.1** Complete Income Tax return on salary **9.8.2** Solve problems involving rates and taxes **9.8.3** Calculate total savings and interest on saving accounts **9.8.4** Calculate total cost of utility bills given rates of consumption **9.8.5** Solve problems relating to household bills **9.8.6** Perform computations to make decision relevant to value for money **9.8.7** Solve problems involving hire purchase **9.8.8** Make conclusions based on comparison between cash and hire purchase prices **9.8.9** Convert the currency of one country to another **9.8.10** Compare the prices of similar

	operations using money **7.8.11** Given the exchange rate rounded to the nearest cent, convert from one currency to another **7.8.12** Perform the four basic operations using money	**8.8.10** Perform conversion from one currency to another using exchange rate corrected to two decimal places **8.8.11** Perform the four basic operations using money	articles quoted in different currencies **9.8.11** Solve simple problems involving currency conversions. **9.8.12** Perform the four basic operations using money

STRAND TWO (2): MEASUREMENT

SUBJECT: MATHEMATICS	**STRAND: 2 - MEASUREMENT**		**EDUCATION STAGE: 3**
ATTAINMENMT TARGET: ***Students develop knowledge, skills and understanding in identifying and communicating the attributes of shapes and objects and employ measurement strategies to explore, investigate and solve theoretical and real life***			
LEARNING OUTCOMES	ACHIEVEMENT INDICATORS **Grade 7**	ACHIEVEMENT INDICATORS **Grade 8**	ACHIEVEMENT INDICATORS **Grade 9**
2. Measurement 2.1 Length, Perimeter and Area			
LO: 09 Estimate, measure, compare and record lengths, distances, and perimeters using appropriate units and devices	**7.9. 1** Use, read, write and correctly spell vocabulary: perimeter, total distance around, length, width, breadth, height, base, vertical height, dimension, surface area, enclosed, boundary **7.9. 2** Estimate lengths and distances using visualisation strategies **7.9. 3** Know the relationship between mm and cm; mm and m; cm and m; cm and km; m and km.; inch, ft and yd **7.9. 4** Use appropriate units of measurement of length (metric & imperial) **7.9. 5** Compare and contrast metric and imperial units (AS LISTED ABOVE) for real life applications **7.9. 6** Convert between metric units of length	**8.9.1** Use, read, write and correctly spell vocabulary: perimeter, total distance around, length, width, breadth, height, base, vertical height, unit square, dimension, surface area, enclosed, boundary **8.9.2** Estimate then measure the perimeter of plane shapes **8.9.3** Recognize the circumference of a circle as the perimeter of the circle **8.9.4** Calculate the perimeter of circles, semi-circles and sectors of circles **8.9.5** Use knowledge of the formula used for calculating the area of rectangle to deduce the area of compound shapes	**9.9.1** Estimate then measure the perimeter and area of plane shapes and circles **9.9.2** Calculate perimeters of shapes consisting of straight lines and circular arcs **9.9.3** Use knowledge of the formula for calculating the area of rectangles to deduce the area of other quadrilaterals **9.9.4** Calculate the circumference and length of an arc of a circle

	7.9. 7 Convert between imperial units of length **7.9. 8** Estimate then measure the perimeter of plane shapes **7.9. 9** Solve problems involving perimeter of plane shapes		

SUBJECT: MATHEMATICS	*STRAND: 3 – GEOMETRY (shapes and Space)*	*EDUCATION STAGE: 3*	
ATTAINMENMT TARGET: ***Students develop geometric knowledge, skills and understanding; and readily apply geometric reasoning to solve problems relating to spatial visualization***			
LEARNING OUTCOME	ACHIEVEMENT INDICATORS **Grade 7**	ACHIEVEMENT INDICATORS **Grade 8**	ACHIEVEMENT INDICATORS **Grade 9**
3. Geometry – Construction			
LO: 10 Estimate, measure, compare and record accurately measurements of areas of surfaces using appropriate units	**7.10. 1** Determine area of regular and irregular shapes by counting unit squares **7.10. 2** Deduce from practical activities a general statement (formula) to calculate the area of rectangles **7.10. 3** Make general statements about the relationship between the area of rectangle and area of triangle with the same base and height **7.10. 4** Solve simple problems involving area	**8.10. 1** Estimate then measure the area plane shapes **8.10. 2** Use the symbols to record square area (cm^2) square meter (m^2), square feet and square yard. **8.10. 3** Calculate the area of 2-D shapes (rectangles, triangles, parallelogram, trapezium, compound shapes) **8.10. 4** Make general statement about the relationship between the area of rectangles and parallelograms with the same base and height **8.10. 5** Solve problems involving perimeter of plane shapes **8.10. 6** Solve problems involving area of plane shapes **8.10. 7** Calculate the total surface area of cubes and cuboids **8.10. 8** Investigate the surface area of prisms ;- cubes, cuboids ,cylinders	**9.10. 1** Calculate the area of 2-D shapes (rectangles, triangles, parallelogram trapezium) **9.10. 2** Investigate approaches to finding the area of regular polygons other than square and equilateral triangles **9.10. 3** Calculate the area of a circle given the radius or the diameter **9.10. 4** Solve problems related to the calculation of perimeter and area **9.10. 5** Calculate the total surface area of prisms:- cube & cuboid, cylinder and cone **9.10. 6** Calculate area of circles, semi-circles and quarter of a circle

SUBJECT: MATHEMATICS	**STRAND: 2 - MEASUREMENT**	**EDUCATION STAGE: 3**	
ATTAINMENMT TARGET: ***Students develop knowledge, skills and understanding in identifying and communicating the attributes of shapes and objects and employ measurement strategies to explore, investigate and solve theoretical and real life***			
LEARNING OUTCOMES	ACHIEVEMENT INDICATORS **Grade 7**	ACHIEVEMENT INDICATORS **Grade 8**	ACHIEVEMENT INDICATORS **Grade 9**
2. Measurement - Volume & Capacity			
LO: 11 Estimate, measure, compare and record measurements of capacity, volume and	**7.11.1** Use, read, write names of standard units of measurement associated with measurement of volume, capacity and mass and their abbreviations for example , kilogram (kg), gram (g); ounces, pounds, litre, milliliter, quarts and gallons. **7.11.2** Estimate, measure and record accurately the weight of different objects **7.11.3** Record mass using decimal notation to one decimal places; for example: 1.5 kg **7.11.4** Measure and compare the mass of objects in kilograms and grams using suitable measuring instruments **7.11.5** Interpret commonly used fractions of a kilogram including $\frac{1}{2}, \frac{1}{4}, \frac{3}{4}$ and relate these to the equivalent number of grams **7.11.6** Convert between kilograms and grams; millilitres and litre; quarts and gallons; ounces and pounds	**8.11.1** Use, read and write names of standard units of measurement and their abbreviations. For example; Kilogram (kg), gram (g) ounces, pounds, litre, millilitre, quarts and gallons; metric tonne; cubic yard, cubic feet. **8.11.2** Estimate, measure and record accurately the mass and volume of objects **8.11.3** Calculate volume and capacity of cubes and cuboids **8.11.4** Distinguish between volume and capacity **8.11.5** From practical activities deduce the relationship between cm^3 and litre **8.11.6** Convert from cm^3 to litre and vice versa **8.11.7** Make reasonable estimate of the , capacity, mass and volume of solid shapes **8.11.8** Use the tonne/ ton to record	**9.11.1** Use, read and write names of standard units of measurements and their abbreviations. For example; ounces, pounds, litre, millilitre, quarts and gallons., kilogram (Kg), gram(g) **9.11.2** Measure and record accurately the length, volume and mass of objects **9.11.3** Calculate volume and capacity of cubes cuboids, cylinders **9.11.4** Make general statements about the relationship between volume of cylinder and volume of cone with the same base area and height **9.11.5** Use knowledge 1000 cm^3 = 1 litre to convert volume from cm^3 to litre and vice versa **9.11.6** Recognize that 1/3 of the volume of cylinder = the volume of a cone with same height and base **9.11.7** Convert between kilograms and grams and between kilograms and tones **9.11.8** Record mass using decimal notation to three decimal places eg

	7.11.7 Identify the metric and imperial units associated with volume, capacity and mass **7.11.8** Read and use measuring cylinders to determine the volume and capacity of objects **7.11.9** Make reasonable estimates of the capacity, mass andvolume of solid shapes **7.11.10** Solve problems involving capacity, volume and mass	large masses; for example: vehicles, crates **8.11.9** Convert between kilograms and grams and between grams and milligrams **8.11.10** Record mass using decimal notation to three decimal places. For example: 1.352 kg **8.11.11** Solve problem involving measurements of capacity, volume and mass	1.352 kg **9.11.9** Solve problems involving different units of mass, volume and capacity

SUBJECT: MATHEMATICS	**STRAND: 2 - MEASUREMENT**	**EDUCATION STAGE:**	
ATTAINMENMT TARGET: ***Students develop knowledge, skills and understanding in identifying and communicating the attributes of shapes and objects and employ measurement strategies to explore, investigate and solve theoretical and real life***			
LEARNING OUTCOMES	ACHIEVEMENT INDICATORS **Grade 7**	ACHIEVEMENT INDICATORS **Grade 8**	ACHIEVEMENT INDICATORS **Grade 9**
2. Measurement - Time			
LO: 12 **Read and record time; perform calculations involving mixed units of time; and use twenty-four time and am and pm notations and constructs accurately**	**7.12.1** Know and use commonly used phases associated with periods of time; for example: (1 millennium- 1000yrs, 1 decade – 100 yrs, 1 leap year occur every 4yrs) **7.12.2** Use suitable units to estimate, measure and record time. Estimate time to the nearest sec./ minutes/ hour. **7.12.3** Read the time/ dates from clocks, watches, calendars, timetables and schedule **7.12.4** Write time using different notations **7.12.5** Read and interpret charts and other display that involve time **7.12.6** Perform addition and subtraction of time involving mixed units (hrs. mins. secs; days & weeks) **7.12.7** Solve simple problem involving time	**8.12.1** Use commonly used phases associated with periods of time (1 millennium-1000yrs,1 decade-100 yrs, 1 leap year 4yrs) **8.12.2** Use suitable units to estimate, measure and record time **8.12.3** Read the time from 12 and 24 hour clocks **8.12.4** Read and interpret charts and other display that involve time (calendars, timetables, schedules) **8.12.5** Convert between am/pm notation and 24-hour time **8.12.6** Perform simple calculations using the formula: Distance = Average Speed × Time **8.12.7** Perform addition and subtraction of time involving mixed units (hrs. mins. secs; days & weeks) **8.12.8** Solve problems involving time	**9.12.1** Use commonly used phases associated with periods of time (1 millennium-1000yrs, 1 decade-100yrs, 1 leap year 4yrs **9.12.2** Interpret and use tables, charts relating to time **9.12.3** Compare and calculate time in different time zones for major cities of the world **9.12.4** Interpret calculator displays for calculations with time. For example; 2.25 on a calculator as a display for time means $2\frac{1}{4}$ hours **9.12.5** Interpret and use tables relating to time. For example: tide charts, sunrise/sunset tables, bus, train and airline timetables, standard time zones **9.12.6** Construct and interpret simple distance-time graphs **9.12.7** Solve problems involving time

SUBJECT: MATHEMATICS	**STRAND: 2 - MEASUREMENT**		**EDUCATION STAGE: 3**
ATTAINMENMT TARGET: ***Students develop knowledge, skills and understanding in identifying and communicating the attributes of shapes and objects and employ measurement strategies to explore, investigate and solve theoretical and real life***			
LEARNING OUTCOMES	ACHIEVEMENT INDICATORS **Grade 7**	ACHIEVEMENT INDICATORS **Grade 8**	ACHIEVEMENT INDICATORS **Grade 9**
2. Measurement - Temperature			
LO: 13 **Record, interpret and calculate measurements of temperature**	**7.13.1** Use the thermometer to measure temperature **7.13.2** Record accurately the temperature reading as shown on the thermometer **7.13.3** Make reasonable estimates of temperature equivalence on Celsius and Fahrenheit scales **7.13.4** Read and interpret thermometer readings **7.13.5** Solve problems involving temperature	**8.13.1** Use the thermometer to measure temperature using the thermometer **8.13.2** Record temperature reading using negative and positive numbers **8.13.3** Add and subtract temperature to include the use of negative and positive numbers **8.13.4** Make reasonable estimates of temperature equivalence between degrees Celsius and degrees Fahrenheit **8.13.5** Record temperature reading **8.13.6** Solve problems involving the rise and fall of temperature	**9.13.1** Make reasonable estimates of temperature equivalence between degrees Celsius and degrees Fahrenheit **9.13.2** Convert from Celsius to Fahrenheit and vice versa using the formula **9.13.3** Solve problems involving temperature

STRAND THREE (3): GEOMETRY

SUBJECT: MATHEMATICS	*STRAND: 3 – GEOMETRY (shapes and Space)*	*EDUCATION STAGE: 3*	
ATTAINMENMT TARGET: ***Students develop geometric knowledge, skills and understanding; and readily apply geometric reasoning to solve problems relating to spatial visualization***			
LEARNING OUTCOME	ACHIEVEMENT INDICATORS **Grade 7**	ACHIEVEMENT INDICATORS **Grade 8**	ACHIEVEMENT INDICATORS **Grade 9**
3. Geometry – Shape and Space			
LO: 14 **Use accurately the vocabulary and labeling conventions for lines and line segments**	**9.14.1** Use, read, write and spell correctly associated vocabulary; line, line segments, parallel perpendicular plane, horizontal, vertical, diagonal, adjacent, apposite, point, intersect, vertex, vertices, side, vertically opposite angle, base angles **9.14.2** Speak of the length of a line as being infinitely long **9.14.3** Distinguish between a line and a line segment **9.14.4** Draw representations of lines and line segments **9.14.5** Label correctly line segments, using letters **9.14.6** Use ruler and set square to draw parallel and perpendicular lines **9.14.7** Know that two lines which intersect at 90^o are perpendicular to each other	**8.14.1** Use, read, write and spell correctly associated vocabulary; line, line segments, parallel perpendicular plane, horizontal, vertical, diagonal, adjacent, apposite, point, intersect, vertex, vertices, side, vertically opposite angle, base angle **8.14.2** Label correctly line segments **8.14.3** Use knowledge of perpendicular lines to identify base and vertical height of plane shapes **8.14.4** Use correctly symbols (same number of strokes on equal lines) to indicate equality of length of two or more line segments **8.14.5** Use correctly symbolic representation (arrows) to indicate parallel and equal lines **8.14.6** Draw a line segment to a given scale **8.14.7** Sketch drawings to illustrate	**9.14.1** Use, read, write and spell correctly associated vocabulary; line, line segments, parallel perpendicular plane, horizontal, vertical, diagonal, adjacent, apposite, point, intersect, vertex, vertices, side, vertically opposite angle, base angles **9.14.1** Construct parallel lines using a ruler and a set square **9.14.1** Construct a perpendicular bisector to a given line **9.14.1** Construct a copy of a given triangle

	9.14.8 Draw examples of horizontal and vertical lines	the meaning of the term transversal **8.14.8** Construct parallel lines using a ruler and set square **8.14.9** Construct a bisector to a given line	

SUBJECT: MATHEMATICS	*STRAND: 3 – GEOMETRY (shapes and Space)*	*EDUCATION STAGE: 3*	
ATTAINMENMT TARGET: ***Students develop geometric knowledge, skills and understanding; and readily apply geometric reasoning to solve problems relating to spatial visualization***			
LEARNING OUTCOME	ACHIEVEMENT INDICATORS **Grade 7**	ACHIEVEMENT INDICATORS **Grade 8**	ACHIEVEMENT INDICATORS **Grade 9**
3. Geometry – Shape and Space			
LO: 15 **Identify properties of angles and use such knowledge to solve related problems**	**7.15.1** Explain the term angle in terms of the amount of turns between two interesting lines or planes **7.15.2** Identify and label angles **7.15.3** Estimate the size of angles less than 180^o **7.15.4** Use the protractor to measure and draw angles less than 180^o **7.15.5** Identify and draw different types of angles (acute, obtuse, reflex, right, straight) **7.15.6** Recognize that the sum of the angles in a straight angle equals 180^o **7.15.7** Know that the angles at a point add up to 360^o **7.15.8** Identify the relationship between pairs of angles when two lines intersect **7.15.9** Know that the sum of angles	**8.15.1** Use protractor to measure and draw angles less than 180^o **8.15.2** Identify vertically opposite, corresponding and alternate angles **8.15.3** Show that the sum of angles in a quadrilateral equals 360^o **8.15.4** Given sufficient information, calculate the size of interior and exterior angles of triangles and quadrilaterals **8.15.5** Identify types of angles that are formed when sets of parallel lines are cut by a transversal **8.15.6** Calculate the size of missing angles in diagrams that comprised of two intersecting lines and parallel lines cut by a transversal **8.15.7** Apply knowledge of straight angle to calculate the size of exterior angles of polygons **8.15.8** Solve problems involving calculations of angles	**9.15.1** Use the protractor to draw and measure angles **9.15.2** Show that the exterior angle of a triangle is equal to the two interior opposite angles **9.15.3** Given sufficient information, calculate the missing interior/ exterior angles of a polygon **9.15.4** Know the size of the interior angle of regular polygons consisting of up to six sides **9.15.5** From practical work, deduce that $(n - 2) \times 180$ gives the sum of the interior angles of a polygon (where n is the no. of sides of the polygon) **9.15.6** Solve problems involving calculations of angles **9.15.7** Construct a copy of a given angle **9.15.8** Construct a bisector to a given angle

	in a triangle equals 180^o **7.15.10** Know that the sum of angles in a quadrilateral equals 360^o **7.15.11** Given sufficient information, calculate the magnitude of a missing angle	**8.15.9** Construct angles of 60^o and 90^o **8.15.10** Construct a bisector to a given angle	

SUBJECT: MATHEMATICS	*STRAND: 3 – GEOMETRY (shapes and Space)*	*EDUCATION STAGE: 3*	
ATTAINMENMT TARGET: ***Students develop geometric knowledge, skills and understanding; and readily apply geometric reasoning to solve problems relating to spatial visualization***			
LEARNING OUTCOME	ACHIEVEMENT INDICATORS **Grade 7**	ACHIEVEMENT INDICATORS **Grade 8**	ACHIEVEMENT INDICATORS **Grade 9**
3. Geometry – Polygons			
LO: 16 **Identify and use the geometric properties of polygons in problem solving**	**7.16.1** Use, read, write and spell correctly associated vocabulary: polygon, regular, irregular, circle, triangle, isosceles, equilateral, scalene, right-angled, quadrilateral, square, rectangle, parallelogram, rhombus, trapezium, opposite **7.16.2** Sketch 2-D shapes in different orientations **7.16.3** Determine the number of lines of symmetry in common 2 – D shapes **7.16.4** Identify properties of triangles and quadrilaterals in terms of angular, linear and symmetrical properties **7.16.5** Know the properties of the different types of triangles **7.16.6** Sketch the different types of triangles	**8.16.1** Identify properties of triangles and quadrilaterals in terms of angular, linear and symmetrical properties **8.16.2** Know that the longest side in a triangle is opposite to the largest angle; and the shortest side is opposite to the smallest angle **8.16.3** Note that the sum of any two sides in a triangle is greater than the length of the third. **8.16.4** Sketch the right angled triangle in different orientations **8.16.5** Classify quadrilaterals by their geometric properties **8.16.6** Use the properties of the different types of triangles to solve related problems **8.16.7** Distinguish between regular and irregular polygons **8.16.8** Identify the side of a triangle that is opposite or adjacent to a given angle in the triangle	**9.16.1** Sketch of right angled triangles in different orientations **9.16.2** Identify the side of a triangle that is opposite or adjacent to a given angle **9.16.3** Recognize that not any three lengths can form a triangle **9.16.4** Use properties of triangles and quadrilaterals in solving problems **9.16.5** From practical work, deduce Pythagoras Theorem **9.16.6** List triples which satisfy Pythagoras Theorem **9.16.7** Apply Pythagoras Theorem in solving problems **9.16.8** Classify quadrilaterals according to linear and angular properties as well as lines of symmetry and order of rotational symmetry

	7.16.7 Recognize the hypotenuse in the right angled triangle **7.16.8** Sketch diagonals of different types of quadrilateral and other polygons **7.16.9** Given sufficient information, solve problems related to polygons	**8.16.9** Know that the base and height of a triangle are perpendicular to each other **8.16.10** Recognize similarities and differences of the properties of diagonals of quadrilaterals and other polygons	**9.16.9** Identify the Trigonometry ratios **9.16.10** Use trigonometry ratios to calculate size of missing angles and sides

SUBJECT: MATHEMATICS	*STRAND: 3 – GEOMETRY (shapes and Space)*	*EDUCATION STAGE: 3*	
ATTAINMENMT TARGET: ***Students develop geometric knowledge, skills and understanding; and readily apply geometric reasoning to solve problems relating to spatial visualization***			
LEARNING OUTCOME	ACHIEVEMENT INDICATORS **Grade 7**	ACHIEVEMENT INDICATORS **Grade 8**	ACHIEVEMENT INDICATORS **Grade 9**
3. Geometry – Shape and Space			
LO: 17 Identify and use properties of circles		**8.17.1** Identify the parts of the circle **8.17.2** Recognize the circumference of the circle as the perimeter of the circle **8.17.3** Recognize that the sum of the angles formed at the centre of the circle equals 360^{o} **8.17.4** State the relationship between the diameter and the radius of a circle **8.17.5** Speak of a semi-circle as comprising of the diameter and half the circumference of the circle **8.17.6** Know that a segment comprised of an arc and a chord; while a sector comprised of two radii and an arc	**9.17.1** Recognize the relationship between the diameter and the circumference of a circle **9.17.2** Recognize pie (π) as a constant relationship between the diameter and the circumference of a circle **9.17.3** Know that all chords other than the diameter divides the circumference of the circle into a minor arc and major arc; and the circle into a minor segment and a major segment **9.17.4** Solve problems relating to the circle

SUBJECT: MATHEMATICS *STRAND: 3– GEOMETRY (shapes and Space)* *EDUCATION STAGE: 3*			
ATTAINMENMT TARGET: ***Students develop geometric knowledge, skills and understanding; and readily apply geometric reasoning to solve problems relating to spatial visualization***			
LEARNING OUTCOME	ACHIEVEMENT INDICATORS **Grade 7**	ACHIEVEMENT INDICATORS **Grade 8**	ACHIEVEMENT INDICATORS **Grade 9**
3. Geometry – Similarity & congruency			
LO: 18 **Apply properties of similarity and congruency of geometric plane shapes in problem solving**		**8.18.1** Recognize properties of similarity **8.18.2** Identify triangles and quadrilaterals that are similar **8.18.3** Produce a shape that is similar to a given shape **8.18.4** Recognize properties of congruency **8.18.5** Identify triangles and quadrilaterals that are congruent **8.18.6** Divide given shapes into halves that are congruent **8.18.7** Produce a shape that is congruent to a given shape	**9.18.1** State the properties of similarity **9.18.2** Recognize that enlargement produces similar shapes **9.18.3** Apply knowledge of similarity in solving problems relating to geometry **9.18.4** State the properties of congruency **9.18.5** Recognize that transformation such as translation, reflection and rotation produce congruent shapes **9.18.6** Apply knowledge of congruency in solve problems

SUBJECT: MATHEMATICS	*STRAND: 3 – GEOMETRY (shapes and Space)*	*EDUCATION STAGE: 3*	
ATTAINMENMT TARGET: ***Students develop geometric knowledge, skills and understanding; and readily apply geometric reasoning to solve problems relating to spatial visualization***			
LEARNING OUTCOME	**ACHIEVEMENT INDICATORS Grade 7**	**ACHIEVEMENT INDICATORS Grade 8**	**ACHIEVEMENT INDICATORS Grade 9**
3. Geometry – Solid shapes			
LO: 19 **Recognize the properties of solids and apply such knowledge to solve problems**	**7.19.1** Recognize solid shapes as having three dimensions **7.19.2** Identify simple solids (cube, cuboid, cone, cylinder) **7.19.3** Identify the main properties of solids (cube, cuboid, cone, sphere) **7.19.4** Draw the net of solids **7.19.5** Apply knowledge of solids in solving related problems	**9.19.1** State the properties of solids **9.19.2** Recognize the cube as a peculiar cuboid **9.19.3** Sketch 3-D shapes **9.19.4** Sketch nets of the various solids **9.19.5** Apply knowledge of the properties of solids in solving problems	**9.19.1** State the properties of solids **9.19.2** Recognize the cube as a peculiar cuboid **9.19.3** Sketch 3-D shapes **9.19.4** Sketch nets of the various solids **9.19.5** Apply knowledge of the properties of solids in solving problems **9.19.6** Classify solids as prisms and pyramids **9.19.7** Make examples of prisms and pyramids

SUBJECT: MATHEMATICS	*STRAND: 3 – GEOMETRY (shapes and Space)*	*EDUCATION STAGE: 3*	
ATTAINMENMT TARGET: ***Students develop geometric knowledge, skills and understanding; and readily apply geometric reasoning to solve problems relating to spatial visualization***			
LEARNING OUTCOME	**ACHIEVEMENT INDICATORS Grade 7**	**ACHIEVEMENT INDICATORS Grade 8**	**ACHIEVEMENT INDICATORS Grade 9**
3. Geometry – Solid shapes			
LO: 20 **Identify the properties of different transformations and use such properties to solve problems relating to geometry**	**7.20.1** Identify and discuss reflection, translation and rotation **7.20.2** Given a mirror line +mirror and object reflect same and draw image(horizontal vertical and diagonal lines) **7.20.3** Translate objects by moving same , draw image **7.20.4** Rotate objects about a vertex and draw the object and its image **7.20.5** Compare and contrast the positions and shape of an object and its images after a translation, reflection or rotation	**8.20.1** List the properties of a reflection, translation, and rotation **8.20.2** Reflect, translate and rotate an object in the x and y axes **8.30.3** Compare and contrast the positions and shape of an object and its images after a translation, reflection or rotation **8.30.4** Given an object and the translation vector draw the image	**9.20.1** Given the image and the mirror line, draw in correct position, the object **9.20.2** Given the object and the mage determine the mirror line **9.20.3** Draw on grid paper an object and its image after a reflection in the line $y = b$ where b is a constant **9.20.4** Reflect and rotate an object in the line $y = x$ line **9.20.5** Compare and contrast the coordinates of the object and the image under the reflection in the y =x axis **9.20.6** State the properties of translation **9.20.7** Given an object and its image determine the translation vector **9.20.8** Given the image and the translation vector draw the object **9.20.9** State the order of rotational symmetry of an object **9.20.10** Rotate an object about the origin (90^o, 180^o, 270^o, 360^o) and draw its image

			9.20.11 State the scale factors of an enlargement **9.20.12** Given an object, the centre of enlargement and the scale factor draw the image

SUBJECT: MATHEMATICS	*STRAND: 4 – PATTERN and ALGEBRA*	*EDUCATION STAGE: 3*	
ATTAINMENMT TARGET: Students develop knowledge, skills and understanding in interpreting and constructing patterns, generalizations and graphical representations			
LEARNING OUTCOME	ACHIEVEMENT INDICATORS **Grade 7**	ACHIEVEMENT INDICATORS **Grade 8**	ACHIEVEMENT INDICATORS **Grade 9**
4. PATTERNS & ALGEBRA			
LO: 21 **Generate, describe and complete number and geometrical patterns using a variety of strategies**	**7.21.1** Identify, describe and complete patterns generated by counting in different ways (counting backward or forward or a combination of both) **7.21.2** Generate number patterns using whole numbers, fractions, decimal, percentages **7.21.3** Use the equal sign to mean 'is the same as" For example: 15 – 2 = 4 + 9 **7.21.4** Use knowledge of multiplication facts up to 10 × 10 to recognize pattern and apply the commutative property eg 5 x 3 = 3 x 5	**8.21.1** Build simple geometric pattern **8.21.2** Complete a table of values **8.21.3** Describe number patterns in a variety of ways **8.21.4** Deduce a rule from a table of values **8.21.5** Construct a number sentence to match a problem that is presented in words and requires finding an unknown **8.21.6** Identify and use inverse operations to assist with the solution of number sentences **8.21.7** Model and record number patterns using diagrams	**9.21.1** Model and record number patterns using diagrams **9.21.2** Complete tables of values and describe the pattern in words **9.21.3** Describe and justify the choice of a particular rule for values in a table **9.21.4** Make and verify generalizations about numbers and number relationships **9.21.5** Model geometric patterns

STRAND FOUR (4): PATTERN & ALGEBRA

SUBJECT: MATHEMATICS	*STRAND: 4 – PATTERN and ALGEBRA*	*EDUCATION STAGE: 3*	
ATTAINMENMT TARGET: Students develop knowledge, skills and understanding in interpreting and constructing patterns, generalizations and graphical representations			
LEARNING OUTCOME	ACHIEVEMENT INDICATORS **Grade 7**	ACHIEVEMENT INDICATORS **Grade 8**	ACHIEVEMENT INDICATORS **Grade 9**
4. PATTERNS & ALGEBRA			
LO: 22 **Construct, simplify and transpose algebraic expressions, using letters to represent numbers**	**7.22.1** Recognize that letters are used to stand for number numbers in algebra **7.22.2** Translate verbal statements to algebraic expressions and vice versa **7.22.3** Recognize and use algebraic conventions such as ***1a = a; 3 × a = 3a*** **7.22.4** Use the equal sign appropriately **7.22.5** Simplify linear expressions by grouping like terms **7.22.6** Substitute positive numbers for letter in linear algebraic expressions (up to 2 different letters) **7.22.7** Add, subtract and multiply algebraic terms	**8.22.1** Translate verbal statements to algebraic expressions and vice versa **8.22.2** Write algebraic expressions as a combination of letter symbols, numbers and operation signs **8.22.3** Distinguish between particular unknown and variables **8.22.4** Use algebraic expressions of the form ***ay*** as ***a × y; n× n as*** n^2 **8.22.5** Simplify linear expressions by grouping like terms **8.22.6** Multiply a single term over a bracket such as ***3(p + 4)*** **8.22.7** Substitute positive numbers into simple expressions involving powers **8.22.8** Substitute positive & negative numbers into linear algebraic expressions	**9.22.1** Translate verbal statements to algebraic expressions and vice versa **9.22.2** Distinguish between particular unknown and variables **9.22.3** Expand algebraic expression – brackets **9.22.4** Factorize algebraic expressions **9.22.5** Perform binary operations **9.22.6** Add simple algebraic fractions **9.22.7** Subtract simple algebraic fractions **9.22.8** Substitute positive & negative numbers into linear expressions **9.22.9** Substitute negative & positive numbers into expressions involving indices

SUBJECT: MATHEMATICS	*STRAND: 4 – PATTERN and ALGEBRA*	*EDUCATION STAGE: 3*	
ATTAINMENMT TARGET: Students develop knowledge, skills and understanding in interpreting and constructing patterns, generalizations and graphical representations			
LEARNING OUTCOME	ACHIEVEMENT INDICATORS **Grade 7**	ACHIEVEMENT INDICATORS **Grade 8**	ACHIEVEMENT INDICATORS **Grade 9**
4. PATTERNS & ALGEBRA			
LO: 23 **Construct, simplify and solve algebraic equations and inequalities**	**7.23.1** Make up linear equations from given information **7.23.2** Solve linear equations with a single unknown on one side of the equation and a positive solution (verify solution) **7.23.3** Balance linear equations by adding to or subtracting from both sides **7.23.4** Apply knowledge of linear equations t in solving geometrical and other problems	**7.23.1** Generate and solve linear equations in one unknown on one side of the equation **7.23.2** Solve linear equations with unknown on both sides of the equation **7.23.3** Balance linear equations by adding, subtracting, multiplying and dividing **7.23.4** Apply knowledge of linear equations in solving geometrical and other problems **7.23.5** Apply familiar formulae from mathematics in solving problems **7.23.6** Substitute number into familiar mathematics formulae	**9.23.1** Form and solve linear equations with unknown on both sides **9.23.2** Form and solve equations with negative signs in the equation and negative or positive solutions **9.23.3** Generate and solve linear inequalities in one variable **9.23.4** Represent the solution to inequalities on number lines Apply familiar mathematics formulae in solving mathematics problems **9.23.5** Change the subject of a given formula **9.23.6** Substitute numbers into formulae such as $F = \frac{9c}{5} + 32$, A $= \pi r^2$

SUBJECT: MATHEMATICS	*STRAND: 4 – PATTERN and ALGEBRA*	*EDUCATION STAGE: 3*	
ATTAINMENMT TARGET: Students develop knowledge, skills and understanding in interpreting and constructing patterns, generalizations and graphical representations			
LEARNING OUTCOME	ACHIEVEMENT INDICATORS **Grade 7**	ACHIEVEMENT INDICATORS **Grade 8**	ACHIEVEMENT INDICATORS **Grade 9**
4. PATTERNS & ALGEBRA			
LO: 24 **Express functions; and represent mappings diagrams graphically**		**8.24.1** Use vocabulary – input, output, mapping, functions **8.24.2** Draw simple mapping diagrams **8.24.3** Determine the function from a given set of inputs and outputs **8.24.4** Generate pairs of coordinates that satisfy a simple linear relationship **8.24.5** Express simple functions in words and symbols **8.24.6** Construct graphs of mapping diagrams	**9.24.1** Plot the graph of linear functions **9.24.2** Identify the intercepts of linear graphs **9.24.3** Determine the gradient of linear graphs **9.24.4** Construct functions arising from real life problems and plot their corresponding graphs **9.24.5** Investigate linear graphs of the form $y = mx + c$

STRAND FIVE (5): DATA HANDLING

SUBJECT: MATHEMATICS	*STRAND: 5 – DATA HANDLING*	*EDUCATION STAGE: 3*
ATTAINMENMT TARGET: ***Students develop knowledge, skills and understanding in collecting, representing, analyzing and evaluating information in order to make informed decision, reasonable predictions, draw logical conclusions and solve problems***		
LEARNING OUTCOMES	ACHIEVEMENT INDICATORS **Grade 7**	ACHIEVEMENT INDICATORS **Grade 8**	ACHIEVEMENT INDICATORS **Grade 9**
5. DATA HANDLING - SETS			
LO: 25 **Use sets, set language and set notations to organize and present information; and solve problems**	**7.25.1** Describe a set as a collection of objects having a common feature **7.25.2** Represent a set using various methods – loop, brackets **7.25.3** List members of a set **7.25.4** Make subsets from given sets **7.25.5** Determine the number of elements in a set **7.25.6** Identify and make different types of sets (equal sets, equivalent sets, finite sets, infinite sets, null sets) **7.25.7** List members of special mathematical sets (set of multiples, set of factors, set of prime numbers, set of quadrilaterals, set of polygon) **7.25.8** Define and give examples of the null set, infinite set, finite set **7.25.9** Draw simple Venn diagrams	**8.25.1** Draw Venn diagrams to represent intersecting or non-intersecting sets **8.25.2** Respond to questions about given Venn diagrams **8.25.3** Calculate the number of subsets that can be obtained from a given set **8.25.4** Form union of two sets with and without common elements **8.25.5** Make subsets from given sets **8.25.6** Draw Venn diagrams to show two intersecting and non intersecting sets **8.25.7** Use correctly set notations for intersection, union, universal set, compliment of ; is a subset of **8.25.8** Answer questions based on information presented in Venn diagrams **8.25.9** Solve problems involving	**9.25.1** List the members of a set given the description of the set and vice versa **9.25.2** Use correct notation and symbols for listing and describing sets **9.25.3** Write mathematical expressions using correct set notation **9.25.4** Represent given propositions in Venn diagrams **9.25.5** Use Venn diagrams of propositions to draw valid conclusions **9.25.6** Use words to describe shaded regions in Venn diagram **9.25.7** Interpret Venn diagrams involving two intersecting or non-intersecting sets **9.25.8** Use Venn diagrams to show relationships between two sets **8.25.10** Use knowledge of set in solving

	7.25.10 Answer questions based on information presented in Venn diagrams	union, intersection and compliment and subsets	problems

SUBJECT: MATHEMATICS	**STRAND: 5 – DATA HANDLING**		**EDUCATION STAGE: 3**
ATTAINMENMT TARGET: Students develop knowledge, skills and understanding in collecting, representing, analyzing and evaluating information in order to make informed decision, reasonable predictions, draw logical conclusions and solve problems			
LEARNING OUTCOME	ACHIEVEMENT INDICATORS **Grade 7**	ACHIEVEMENT INDICATORS **Grade 8**	ACHIEVEMENT INDICATORS **Grade 9**
5. Data Handling Sets and Probability			
LO: 26 **Design and use simple instrument for relevant data collection**	**7.26.1** Use different data collection methods to obtain data **7.26.2** Make and use tally charts to count items in a data set	**8.26.1** Use different data collection methods to gather data **8.26.2** Make and use tally charts to count items in a data set	**9.26.1** Use different data collection methods to gather data **9.26.2** Make and use tally charts to count items in a data set **9.26.3** Design simple instruments suitable for collecting data for a stated purpose

SUBJECT: MATHEMATICS	**STRAND: *5* – DATA HANDLING**	**EDUCATION STAGE: 3**	
ATTAINMENMT TARGET: Students develop knowledge, skills and understanding in collecting, representing, analyzing and evaluating information in order to make informed decision, reasonable predictions, draw logical conclusions and solve problems			
LEARNING OUTCOME	**ACHIEVEMENT INDICATORS Grade 7**	ACHIEVEMENT INDICATORS **Grade 8**	ACHIEVEMENT INDICATORS **Grade 9**
5. Data Handling, Sets and Probability			
LO: 27 **Organize and display data using different forms of presentations**	**9.27.1** Construct ungrouped frequency distribution tables **9.27.2** Represent data in the form of ungrouped frequency tables, pictographs, bar charts and pie charts	**8.27.1** Use tally chart and raw data to create grouped and ungrouped frequency tables **8.27.2** Represent data in the form of pictographs, line graphs, bar charts and pie charts **8.27.3** Tabulate data extracted from familiar sources in the immediate surroundings	**9.27.1** Draw ungrouped and grouped frequency tables from a given set of data **9.27.2** Represent data in the form of histograms, pie charts, line graphs and bar charts **9.27.3** Construct simple pie chart (up to six sectors) from given data

SUBJECT: MATHEMATICS	**STRAND: 5 – DATA HANDLING**		**EDUCATION STAGE: 3**
ATTAINMENMT TARGET: Students develop knowledge, skills and understanding in collecting, representing, analyzing and evaluating information in order to make informed decision, reasonable predictions, draw logical conclusions and solve problems			
LEARNING OUTCOME	ACHIEVEMENT INDICATORS **Grade 7**	ACHIEVEMENT INDICATORS **Grade 8**	ACHIEVEMENT INDICATORS **Grade 9**
5. Data Handling, Sets and Probability			
LO: 28 **Calculate, interpret and use relevant statistical measures**	**7.28.1** Determine the mean, median, mode, maximum and minimum scores of a set of data **7.28.2** Identify extreme values in a data set	**8.28.1** Identify a typical representation of a given population **8.28.2** Determine the mean, median and mode of a set of data **8.28.3** Calculate mean, mode and median from a frequency table **8.28.4** State the maximum and minimum value in a set of values Use vocabulary – input, output, mapping, functions	**9.28.1** Determine the mode from a given set of grouped data **9.28.2** Make statements to show how extreme values affect the mean **9.28.3** Determine the mean, median, mode from ungrouped data

SUBJECT: MATHEMATICS	**STRAND: 5 – DATA HANDLING**	**EDUCATION STAGE: 3**	
ATTAINMENMT TARGET: Students develop knowledge, skills and understanding in collecting, representing, analyzing and evaluating information in order to make informed decision, reasonable predictions, draw logical conclusions and solve problems			
LEARNING OUTCOME	**ACHIEVEMENT INDICATORS Grade 7**	**ACHIEVEMENT INDICATORS Grade 8**	**ACHIEVEMENT INDICATORS Grade 9**
5. Data Handling, Sets and Probability			
LO: 29 Interpret, and make relevant comments on data presented in different forms	**9.29.1** Respond to questions based on information in frequency tables, ungrouped data, pictographs, bar charts and pie charts. **9.29.2** Discuss patterns (trends) identified in a given set of data **9.29.3** Use data to make predictions	**8.29.1** Make relevant and appropriate comment about given set of data **8.29.2** Interpret information presented in frequency tables and simple pie charts, bar charts, line graphs **8.29.3** Use data to make predictions	**9.29.1** Extract information from pictographs, bar charts, frequency tables **9.29.2** Interpret data presented in different forms (tables and simple pie charts, bar charts, line graphs) **9.29.3** Interpret information presented in pie chart up to six sectors **9.29.4** Use data to make predictions

SUBJECT: MATHEMATICS	**STRAND: 5 – DATA HANDLING**		**EDUCATION STAGE: 3**
ATTAINMENMT TARGET: Students develop knowledge, skills and understanding in collecting, representing, analyzing and evaluating information in order to make informed decision, reasonable predictions, draw logical conclusions and solve problems			
	Grade 7	**Grade 8**	**Grade 9**
LEARNING OUTCOME	ACHIEVEMENT INDICATORS **Grade 7**	ACHIEVEMENT INDICATORS **Grade 8**	ACHIEVEMENT INDICATORS **Grade 9**
5. Data Handling, Sets and Probability			
LO: 30 Interpret data, draw conclusions and make comments on data	**7.30.1** Identify a sample space **7.30.2** Use diagrams and/or tables to represent outcomes of experiments. **7.30.3** Identify and discuss impossibilities and certainties of outcomes **7.30.4** Write the probability of an event occurring as a fraction or decimal **7.30.5** Identify a sample space and speak of the probability of different events occurring relevant to a sample space	**8.30.1** Identify a sample space **8.30.2** Use diagrams and/or tables to record and represent outcomes of experiments **8.30.3** Identify and discuss impossibilities and certainties **8.30.4** Solve simple probability problems	**9.30.1** Use diagrams and/ or tables to record represent outcomes of experiments **9.30.2** Identify and discuss impossibilities and certainties of an event occurring **9.30.3** Compute the probability of an event occurring **9.30.4** Determine probability of events occurring and not occurring; from data derived from frequency tables and other statistical diagrams and information for ungrouped data **9.30.5** Solve simple probability problems

$a^2 + b^2 = c^2$

$A = \pi r^2$

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