

NATIONAL STANDARDS CURRICULUM MATHEMATICS GRADES 7-9 APSE III



NATIONAL STANDARDS CURRICULUM GUIDE

GRADES 7-9 APSEIII

MATHEMATICS

©Ministry of Education, Youth and Information, 2019

Acknowledgements

Our connection with each other is unquestionable and so at the end of this arduous yet rewarding journey, the Ministry of Education, Youth and Information gratefully acknowledges the contributions of the following individuals and institutions who generously gave of their time and resources in the planning and development of the National Standards Curriculum (NSC):

- Mrs. Sharon Neil- former DCEO, Curriculum and Support Services, who provided leadership to the process during her tenure
- Mrs. Lena Buckle Scott- DCEO, Curriculum and Support Services, who provided leadership to the process
- Mrs. Winnie Berry DCEO, Curriculum and Support Services, who provided leadership to the process
- Mrs. Dasmine Kennedy- former (Acting)DCEO, Curriculum and Support Services, who provided leadership to the process during her tenure
- Dr. Clover- Hamilton Flowers- ACEO, Core Curriculum Unit, who provided oversight for the task
- Professor Zellynne Jennings- Craig, Dr. Joan Spencer- Ernandez, Dr. Deon Edwards Kerr, Dr. Doreen Faulkner and Mr. Delroy Alleyne who led the writing process in the capacity of curriculum consultants
- Education Officers of the Core Curriculum Unit who supported the writing of the curriculum and gave oversight to the development process:
 - Mrs. Janice Steele, SEO Mathematics & Technology
 - Dr. Lorna Thompson, EO Mathematics
 - Mr. Seymour Hamilton, EO Mathematics
- Principals/ school administrators, lecturers, teachers and other resources persons who participated in the in the various curriculum consultation sessions
- Regional directors and territorial education officers who contributed to the implementation of the curriculum
- The team of Mathematics coaches and specialists led by Dr. Tamika Benjamin who participated in the writing and review process
- Miss Jean Hastings, former Director of the Education System Transformation Programme, and Mr. Traceloy Solomon, current Programme Director who facilitated the processes of the Curriculum Units

- Mrs. Michelle Kerr, Senior Functional Education Officer and Mrs. Coleen Clarke Russell, Functional Education Officer who provided administrative leadership to the production process
- The members of the Curriculum Secretariat, the administrator and secretaries in the Core Curriculum Unit who provided administrative support during the development and implementation of the curriculum
- The team of curriculum formatters led by the Write Appeal
- The various stakeholder groups, who provided valuable information on societal needs in relation to the curriculum
- All others whose names do not appear, but who contributed to the production of the NSC



The curriculum of any country informs all aspects of operations and helps to shape the intellectual, social, psychological and spiritual dimensions of our society. By its design, the National Standards Curriculum (NSC) clearly conveys the knowledge, skills and attitudes deemed by our society as critical to addressing Jamaica's current realities. It is expected that as teachers and students interact efficiently with the curriculum that a culture of communication, collaboration, creativity and thinking critically will be honed.

Through the implementation of the NSC, education in Jamaica is being reframed and re-positioned as customized, diverse, relevant, equitable, outcomes-based, and inclusive. Significantly, this approach will signal the introduction of Spanish and Resource and Technology at the Primary level, the Alternative Pathways to Secondary Education (APSE), the integration of the Science Technology Engineering and Mathematics (STEM) methodology and a greater utility of Information and Communication Technology (ICT) tools to facilitate improved outcomes. Since there is no one subject that can be relied on to meet all the needs of our children as each child differs in learning style preferences, abilities, background and so on, schools are expected to use the curriculum to schedule learning episodes that allow all children to creatively express themselves through the Creative Art Forms; think critically in the context of the Exploratory Core areas; practice behaviours that lead to spiritual, physical, emotional and social well-being through Enrichment activities and demonstrate productive capabilities by working collaboratively on projects in settings with a Problem Solving/Work-Based focus, using the standards and principles of Resource and Technology.

The Ministry of Education, Youth and Information will continue to support our schools in the implementation process through the provision of continued training opportunities for school leaders and teachers, improved physical infrastructure and the provision of the necessary teaching/ learning resources to support pedagogy. We look forward to the support of all our stakeholders- members of the community, members of school boards, principals and teachers in ensuring a successful implementation of the NSC.

The Honourable, Karl Samuda, CD, MP

Minister without Portfolio with responsibility for Education, Youth and Information



I fully endorse the National Standards Curriculum (NSC) as being pivotal to advancing the education of our Jamaican children. The broad focus on critical thinking, collaboration, creativity and communication is indeed very critical in equipping young Jamaicans with the requisite twenty- first century skills as we seek to advance the achievement of Jamaica's Sustainable Development Goals by 2030. There is no denying that quality education is one of the most powerful and proven tools for the sustainable development of any country, and that through the re- alignment and re-scoping of the national curriculum, Jamaica is well on its way to ensuring that our goals are not just symbolic but are a reality lived by all Jamaicans, particularly our youth.

The NSC is on the cutting edge of curriculum design and represents the shift from a content- based focus to a competency- based one where skills and attitudes are placed at the forefront. This approach should ensure that our youth are fully equipped with a combination of the essential knowledge, skills and attitudes to be successful in every aspect of their lives. Users of the curriculum will be pleased to find the utilization of a Pathway Approach to Education with an emphasis on the integration of the Science, Technology, Engineering and Mathematics (STEM) Methodology, Information and Communication Technology (ICT), the Creative Arts and the Technical and Vocational areas. The provision of alternative pathways for our learners, supported by Learning Coaches/ Special Needs Educators is a significant achievement for the MoEYI and our ongoing support for this area concretizes our belief that every child can indeed learn.

The production of this curriculum document is not an indication that our journey has ended; rather it is a signal that we have advanced the very dynamic and obligatory process of the transformation of our education system. I anticipate the support of all our stakeholders in ensuring the curriculum implementation process is without major challenges.

The Honourable, Alando Terrelonge, MA, MP State Minister in the Ministry of Education, Youth & Information



It was the mandate of the Curriculum Units of the Ministry of Education, Youth and Information to spearhead the crafting of a new curriculum for the nation, in keeping with international standards, global trends in the educational landscape and societal goals and aspirations. The mandate had several facets: to establish clear standards for each grade, thereby establishing a smooth line of progression between Grades 1 and 9; to reduce the scope, complexity and amount of content; to build in generic competencies such as critical thinking across the subjects; to ensure that the curriculum is rooted in Jamaica's heritage and culture; to make the primary curriculum more relevant and more focused on skills development, and to ensure articulation between primary and secondary curricula, especially between Grades 6 and 7. To achieve this, the MoEYI embarked on an extensive process of panel evaluations of the existing curricula, consultation with stakeholders, (re)writing where necessary and external reviews of the end products.

Today, we are indeed proud that, the curriculum development teams have succeeded in crafting a curriculum which has met these expectations. Under the National Standards Curriculum (NSC) focus will be given to project-based and problem-solving learning, with an integration of Science, Technology, Engineering and Mathematics/Science, Technology, Engineering, Arts and Mathematics (STEM/STEAM) methodologies across the system. Learners will benefit from more hands-on experiences which should enhance the overall learning experience and cater to the different kinds of learners in our classroom. In addition, they will be exposed to work-based learning opportunities that will help them become productive citizens of Jamaica and the world at large.

It is anticipated that as school administrators and teachers system-wide implement the National Standards Curriculum that improvements will be evident in the general academic performance, attitude and behaviour of our students.

We anticipate the participation of all our stakeholders in this process as we work together to improve the quality of life and prospects for all the children of Jamaica and to realize our mantra that *every child can, and must, learn.*

Dr. Grace McLean Permanent Secretary (Acting), Ministry of Education, Youth & Information

MESSAGE



Education is the means by which the any society can re-create itself in future generations. Cognizant of this fact, the Ministry of Education, Youth and Information (MoEYI) has positioned the National Standards Curriculum (NSC) as an important avenue through which the identity of future generations can be positively impacted. Given its very vibrant and broad-based nature, the NSC targets the holistic development of learners with a view to develop successful lifelong learners and confident and productive individuals who are deeply rooted in their culture, identity and citizenship.

In preparing the education system for the implementation of the NSC the MoEYI continues to offer ongoing training/coaching support for all the relevant stakeholders involved in the implementation, including school administrators, teachers, parents and students. We are also committed to provisioning the system with the resources needed to ensure a successful implementation, particularly in the context of the inclusive and differentiated approaches endorsed by the NSC. We will continue to work with our partners in ensuring the resources available to schools are fully aligned to the content and philosophical underpinnings of the NSC.

This is an exciting time for education in Jamaica. As we advance the curriculum implementation process, we aim to provide all our learners with access to the best education possible. However, we recognize that meaningful and sustainable progress can only be realized from the collaborative effort of all our stakeholders. So as we forge ahead

with implementation we invite all our stakeholders to keep focused on our shared vision: "Every Child Can Learn; Every Child Must Learn."

Capt. Kasan Troupe, Ed.D, JP Chief Education Officer (Acting), Ministry of Education, Youth & Information

MESSAGE



Fundamental to the Ministry of Education, Youth and Information's (MoEYI) core value is the belief that all learners deserve the opportunity to achieve their full potential in all facets of their lives (spiritual, moral, cultural, intellectual and physical). With its dynamic, inclusive approaches, the National Standards Curriculum (NSC) provides a clear and robust blueprint to provide our young Jamaicans with the opportunities, responsibilities and experiences to make this a reality.

The accomplishment of this curriculum cannot be attributed to the effort of one or two individuals. The MoEYI brought together a wide cross section of our stakeholders who contributed their diverse skills in creating curriculum documents that will facilitate high standards of learning and enhance the quality of instructional delivery. Our main mandates concerning the revision of the Curriculum included better alignment of the curriculum in the lower grades secondary grades with the Caribbean Secondary Examination Certificate (CSEC) examinations syllabus used in the upper secondary grades; developing progressive standards for all subject areas; prioritizing the 21st century skills of collaboration, critical thinking, communication and creativity; integrating STEM, the Creative Arts, the Enrichment Areas and ICT in the curriculum documents. It also promotes the use of learner-centred approaches across the various disciplines and creates a more inclusive learning environment by catering to diversity in our learners.

Additionally, Civics will return to be a discrete discipline, while Technical and Vocational Education and Training (TVET), and Spanish will be formally introduced at the Primary level. The Health and Family Life (HFLE) Curriculum has been reviewed and re-scoped to ensure alignment to the philosophy of the NSC and inclusion of all the relevant life skills needed by the 21st century learner.

It is with a deep sense of gratitude that I pay tribute to all the educators who have contributed to the timely development of this National Standards Curriculum which will invariably help all learners to maximize their potential.

Mrs Winnie Berry

Deputy Chief Education Officer, Curriculum and Support Services, Ministry of Education, Youth and Information



The National Standards Curriculum (NSC) rests on the belief that all learners are endowed with the capabilities, gifts and talents to fulfil their divine purpose. These attributes are to be further enhanced or improved in a nurturing, inspiring and inclusive environment; one that caters to the whole person (soul, spirit and body - spiritual, emotional, social, physical and mental). As learners assume their roles and responsibilities individually and as communities of learning in such an environment, they become critical-reflexive thinkers, creative problem solvers, effective communicators and natural collaborators.

A curriculum design of this nature calls for transformative change at the societal level (Elkind, 2004)¹ and not just at the school and classroom levels. This is a call for all stakeholders, as users of the curriculum, to adopt a critical -reflective and reflexive stance and join learners in the quest for meaning, purpose and stability as they help to shape the world. By integrating principles from various disciplines and their related methodologies, learners who interact with the curriculum are provided with enriching experiences, opportunities for creative expressions and authentic exploration of problems from a classical standpoint as well as in the context of workplace learning. This is due to the fact that the

NSC recognizes the importance of each discipline in the problem-solving process and in development.

Assessment as an element of the curriculum becomes primarily a learning process for charting progress through self-corrective measures that are informed by feedback from peers and teacher-facilitator. By providing assessment criteria statements in the curriculum, teachers are encouraged to facilitate learners functioning as self and peer assessors. This approach should see the learner developing self-direction with the support of mentors and coaches and forming an intrinsic desire to succeed. These attributes prepare them to face high stakes assessment as problems to be confronted with courage, a sense of readiness, insight and creative prowess.

These features of the NSC have the potential to influence learners' profile as Jamaicans who are gratified by an identity of cultural excellence that embodies moral obligations, intellectual rigour, innovativeness, environmental stewardship and productivity. The curriculum echoes the sentiments of our National Anthem, National Song and Pledge and serves as rich and credible source of the values and virtues that are woven together to convey the Jamaican identity. I wish for our school administrators, teachers, students and other stakeholders much success as they work with the document.

Dr Clover Hamilton Flowers

Assistant Chief Education Officer, Core Curriculum Unit, Ministry of Education, Youth & Information ¹ Elkind, D. (2004). The problem with constructivism. The Educational Forum, 68(4), 306–12.

National Standards Curriculum Glossary of Terms

TERMS	DEFINITIONS
Range of Content	Provides an overview of the concepts, knowledge, skills and attitudes that
	will be developed in a unit of study.
About the Unit	Gives a brief overview of the content, skills that are covered in the unit, the
	methodologies that are used as well as the attitudes to be developed.
Standards	Statements that explain what all students are expected to know and be
	able to do in different content areas by the end of a course of study e.g.
	by the end of period spanning grades $4 - 9$.
Attainment Targets	An attainment target is a desired or expected level of performance at the
	end of a course of work, within a given/specified teaching-learning period.
	Attainment targets identify the knowledge, skills and understanding which
	students of different abilities and maturities are expected to have by the end
	of each Grade. It is the standard that we expect the majority of children to
	achieve by the end of the grade.
Benchmarks	Behaviours students are expected to exhibit at different stages of
	development and age/grade levels.

TERMS	DEFINITIONS
Theme/Strands	Unifying idea that recurs throughout a course of study and around which
	content, concepts and skills are developed.
Prior Learning	It is what students are expected to already know through learning and
	experience about a topic or a kind of text.
Specific Objectives	Specific objectives state what the student is expected to know or
	understand as a result of the learning experience. The specific objective is
	usually framed in the areas of the knowledge, skills and attitudes that the
	students are expected to achieve. Specific objectives tell us what the children
	will learn or will be taught.
Suggested Teaching/Learning	A teaching/learning activity is an organised doing of things towards
Activities	achieving the stated objectives. They are suggested activities that are
	crafted in a way to be an efficient vehicle which can move the student
	between what is to be learnt (objective) and what the student is to become
	(outcome).
Key Skills	Indicate the important skills that students should develop during the course
	of a unit. Key skills are aligned to the suggested teaching and learning
	activities in the unit which are intended to develop the skill to which it is
	aligned. Included in the key skills are the 21st century skills such as critical
	thinking and problem solving, collaboration, communication and ICT.

TERMS	DEFINITIONS
Assessment	An assessment is a determination of whether intended results have been
	achieved. This section of the curriculum speaks to both the product that will
	be judged as well as the criteria against which it will be judged. It must be
	noted that this section does not introduce new activities. Instead, it speaks
	to the judging of the suggested teaching and learning activities.
	Formal assessment may be conducted with the aid of instruments (e.g. via
	written test, portfolio) or by requiring students to complete assigned tasks
	(e.g. performance), and is usually recorded against a predetermined scale
	of grading. Informal assessment (e.g. via observation or spontaneous
	student expression) may also reveal important evidence of learning.
Points to Note	This section provides technical information that must be considered in
	delivering the unit. It may also include information that provides additional
	explanation of key concepts that may be unfamiliar to the teacher as
	well as suggestions for infusion within the unit.
Extended Learning	These are opportunities for students to utilise the knowledge and skills they
	would have acquired in the unit in authentic situations/experiences.
Learning Outcomes	A learning outcome is a demonstration/ behavioural evidence that an
	intended result has been achieved at the end of a course of study. The
	learning outcome tells us if pupils have understood and grasped what they

TERMS	DEFINITIONS
Links to other Subjects	Suggests opportunities for integration and transfer of learning across and within different subject areas.
Key Vocabulary	This section consists of a number of words/phrases that addresses the skills, topics and content that must be covered in the unit.

TABLE OF CONTENTS

Acknowledgements	i
Messages	iii
National Standards Curriculum Glossary of Terms	ix

Grade 7 Units

Philosophical Statement	
Introduction	
Goals	
Organization	
Assessment	
Overview of Subject Content	
Term 1: Units of Work	5
Term 2: Units of Work	
Term 3: Units of Work	86

Grade 8 Units

Overview of Subject Content	121
Term 1: Units of Work	122
Term 2 Units of Work	165
Term 3: Units of Work	199

Grade 9 Units

Overview of Subject Content	241
Term 1: Units of Work	242
Term 2: Units of Work	274
Term 3: Units of Work	307

APPENDIX

Alternative Pathways to Secondary Education	333
The 5Es Overview: The 5E Learning Cycle	335
Special Education Tips	346
Lesson Plans	348

Philosophical Statement

- Internet access has so changed the information landscape, and technological developments have so revolutionized the means available to either create or solve problems, that mathematical literacy is today as important as the ability to read text. All students must possess understanding of basic computation, statistics and geometry in order to make an informed response to the global environment of the twenty first century in which they live.
- Mathematics contributes to the process of inquiry as a means of solving problems. It provides the opportunity for learners to be creative and inventive and in doing so, empowers them to construct their own mathematical knowledge to make sense of the physical, social, technological aspects of their environment.
- The Mathematics Curriculum serves as a real-life context for learners and teachers to engage in meaningful activities that are relevant to life, including their languages, cultures and everyday experiences beyond the walls of school. The Mathematics Curriculum from Grades 1-9 challenges and inspires learners to:
 - a) Use mathematical concepts and processes to interpret the world
 - b) Make connection between their previous mathematical knowledge to new situations
 - c) Communicate mathematical ideas and processes that have helped them to understand their experiences and refine their problem-solving skills
 - d) Explore in a variety of ways, the application of mathematics to problems in their everyday life
 - e) Reflect on their experiences and decisions and make adjustments to their prior conceptions or meanings of situations
 - f) Develop attitudes such as perseverance, honesty and courage as they manipulate mathematical concepts and skills and engage in critical reflective thought

Introduction

This programme uses the National Curriculum Framework for grades 1-8, and adapts this to the characteristics and level of students who are in the APSE SPIII programme. Although the students may be reading well below their age/grade level, their mathematics skills will vary considerably, with estimated beginning mathematics skills between Grades 2 to 4. In addition, these students are about ages 12 to 14, predominantly boys, and may have life experiences of using number and geometry, especially with money, consumer activities, and spatial awareness. The programme is written therefore to begin at about a Grade 2 mathematics level in Grade 7 (year 1) and move through to grade 6 level by Grade 9 (year 3).

Goals

The goal of the SPIII APSE mathematics programme is to provide opportunities for students to be competent in basic mathematics skills within three years depending on the students' initial knowledge, skills, strategies and basic understanding. It is possible that students could acquire skills on a competency basis within a year and not on a strict yearly basis, as students may move at different rates. The students who are moving well should be accommodated with more challenging strategies and activities.

Organization

The goals will be accomplished by a) consolidating basic skills, b) filling gaps in skills and understanding, and c) introducing new areas and topics. The Scope and Sequence organizes the mathematics skills and understanding for the following three years as follows:

- SPIII Grade 7 (Year 1): Beginning Mathematics skills usually assigned to the Grades 1-2;
- SPIII Grade 8 (Year 2): Intermediate 1 Mathematics skills usually found in Grades 3 and 4 programmes;
- SPIII Grade 9 (Year 3): Intermediate 2 Mathematics skills usually found in the grades 5 to 7 programme

While the programme begins in Grade 7 - Year 1, with basic number skills, the overall strategy uses materials, strategies and pacing that are age appropriate and suitable for older children.

Assessment

The approach to the details under the assessment column is to give examples of how (techniques, strategies, questions etc.) the objectives and learning outcomes should be assessed. We need to keep in mind that the purpose of assessment is to determine the extent to which students know, can do, and have achieved the target skills, and knowledge stated through the (instructional) objectives, and learning outcomes.

ATTAINMENT TARGETS /STRANDS

National Curriculum Framework

	ATTAINMENT TARGETS	STRANDS	
AT1A:	Know the value of numerals, associate them with their names, numbers, ordinals and use concrete objects to model patterns expressions and numbers.	Number: Number Representation	
AT1B:	Use the basic operations, number relationships, patterns, number facts, calculators and appropriate software to compute and estimate in order to solve real world problems involving fractions, percentages and decimals.	Number: Number Operations and Application	
AT2:	Use the correct units, tools and attributes to estimate, compare and carry out the processes of measurement to given degree of accuracy.	Measurement	
AT3:	Explore paths, geometric shapes and space and make generalization about geometric relationships within the environment	Geometry	
AT4:	Employ algebraic reasoning through the use of expressions, equations, and formulae to interpret, model and solve problems involving unknown quantities.	Algebra	
AT5:	Collect, organize, interpret and represent data and make inference by applying knowledge of statistics and probability.	Data Handling and Probability	

98.79 63 330 100 00 194.70 ON/AC LN 3.4 95.91 197.68 3.44 820 101.07 F me CONST TAN-1 1.44 FIX C 5.76 TAN CE/C 95.91 -05.01 0.00 3.88 -95.91 95.91 check $\frac{n-1}{\overline{x}}^{R}$ -5.76 97.35 dieck 0.00 95.91 T G 95.91 -1 OXI 25 25 THEMATICS 0 0.00 95.91 2 1.44 7: TERM 1 194.70 97.35 GRA 95.91 98.79 223 194.70 95.91 197.58 1.44 ENG 200. 1.44 05.91 2

Mathematics Scope and Sequence for APSE III

Grade 7 (Year 1) – Term 1

APSE III –Gr. 7 TERM 1	Theme: What is Number?	Theme: Together and apart	Theme: Comparisons in Space Measures, and Number	Theme: Equal Groups
 Benchmarks: Understand whole number as the amount of objects in a group Use base 10 place value 	AT#1A : Know the value of numerals, associate them with their names, numbers, ordinals and use concrete objects to model patterns expressions and numbers.	AT#1B: Use number operations and relationships to compute and solve problems AT#4: Employ algebraic reasoning in with unknown quantities	AT#3: Explore paths, geometric shapes and space AT#2: Use units and instruments to measure	AT#1B: Use number operations and relationships to compute and solve problems AT#4: Employ algebraic reasoning with unknown quantities
system to write numbers • Compute and	Unit 1 : Counting and Whole Numbers to 50	Unit 2: Add, Subtract whole numbers to sum 18	Unit 3 : Shapes, distance and number in the environment	Unit 4: Multiply by 0 to 5
solve problems	(3 weeks)	(3 weeks)	(2 weeks)	(3 weeks)
numbers • Compare, and measure distances • Observe and draw shapes in the environment • Recognize and use Jamaican money	ve problems h whole mbers mpare, and asure tances(3 weeks)Content outline: Counting by ones, tens to tell how many objects in a group of objects; Amount in the group as the last number named in counting;Wironment cognize and e Jamaican meyMatching and writing numerals 0 - 9; 11 - 19; 20 - 50 with number names and amount of objects;Place value - tens and ones to show amounts of objects and word names to 11 - 50	Content outline : one more two more link counting with addition: Addition as joining two or more groups to tell how many in all; addition rules (adding 0, order of addition), strategies and terms. Addition facts to sum 18; number sentences. Subtraction as removing a group and telling how many before, how many removed, how many left; subtraction	Content outline : Distance as how far from to? Distance measures in the environment; compare distances on objects side to side and to a metre; Estimating distance of a metre, a centimetre; How to measure? – nonstandard units, standard metric units – metre, centimetre; instruments – ruler, tape measure. Points, lines, paths, shapes, square	Content outline: Relate multiplication to joining equal groups, repeated addition of equal amounts; equal grouping in two's, three's, four's fives; Multiplication rules (multiply by 1, 0, order of multiplication); strategies, and terms; multiplication sentences, and basic facts 0 to 9 by 1 to 5, products to 45; Patterns in the times tables; Difference between addition

APSE III –Gr. 7 TERM 1	Unit 1 : Counting and Whole Numbers to 50	Unit 2 : Add, Subtract whole numbers to sum 18	Unit 3 : Shapes, distance and number in the environment	Unit 4: Multiply by 0 to 5
	Money – recognize coins \$20, \$10, \$5, \$1, write number names and link to cost of goods. Use play coins to count in \$1's, \$10's.	number sentences; Subtraction rules and strategies; Related addition and subtraction facts to sum 18. Make up addition; subtraction number stories from pictures and number sentences and find answers.	corners in the environment; sort and name shapes by different attributes – straight lines, roundness, number of straight lines. Comparing whole number amounts using one-to-one correspondence; number line; solving comparison word problems	and multiplication situations; Make up multiplication number stories from pictures and multiplication number sentences and find answers.
	Skills: Counting by ones, tens', grouping by tens; writing numerals, number words using place value.	Skills : add by putting together, counting on; subtract by taking away, and/or crossing out.	Skills : comparing, measuring with the metre, centimetre; observing and drawing shapes	Skills : multiply by skip counting,
	Vocabulary (written):Vocabulary (written): add,Vocabulary (written): metreenumber names zero to nine;plus, sum; take away,how far? Shapeten, eleven to nineteen,subtractVocabulary (oral): point,twenty, thirty, forty, fiftyVocabulary (Oral)lines, shape, square corner,How many?subtraction, addition, minus,circle, square, rectangle,	Vocabulary (written): metre,	Vocabulary (written):	
		how far? Shape	Vocabulary (Oral) multiply,	
		subtract	Vocabulary (oral): point,	equal groups, product, factor
		Vocabulary (Oral) subtraction, addition, minus, total	lines, shape, square corner, circle, square, rectangle, triangle;	er,

UNIT 1 GRADE 7 TERM 1 (3 WEEKS)

UNIT 1 TITLE: COUNTING AND WHOLE NUMBERS TO 50

ATTAINMENT TARGET: Know the value of numerals, associate them with their names, numbers, ordinals and use concrete objects to model patterns, expressions and numbers.

Objectives	Objectives Teaching /Learning Activities		Assessment
Students will: Understand how to group and separate up	Have containers with a variety of different objects e.g. buttons to be sorted by colour, size shape Allow students to work in groups	Sort by one or two attributes	Correctly sort objects by specified attribute
to 50 objects by colour, size, and/or shape.	sorting the objects in different ways and telling why they put groups of objects together.	Group objects Describe members in/not in a group	Give reasonable description of a set of objects.
Identify objects in or not in the described set.		Collaborate in groups	
Write numerals, word names 0 to 9 and associate (match) these with the	Present a group of objects (e.g. 5) and tell students the number of objects, then present other sets of objects and ask: <i>Is this five?</i>	Describe members in a group using number	Correctly match numerals with number names
appropriate number of objects in a group.	Give students concrete and pictorial experiences with each number one at a time: 1, 2, 3, 4, 5, 6, 7, 8, 9, 0, so that they know what	Write (form) each basic numeral	
	each amount looks like with a variety of situations e.g. three persons; three cows, three cars, three fruits (2 oranges, 1 banana)	Write each basic word name	
	Show how to write the numerals, and words e.g. <i>5</i> , and the word <i>five</i> to describe the group	Match any two or three basic: numeral, amount of objects,	

Objectives	Teaching /Learning Activities	Key Skills	Assessment
	of five objects shown.	and word name	
Count by ones to tell how many objects are in a set or group of up to 50 objects	Introduce and model the idea of counting by ones to tell how many objects are in a group (up to 9, 10 to 50). Model counting by dropping one more into a container while saying the correct sequence, stopping to ask: <i>Which number is one more</i> <i>than</i> ? Demonstrate how to count out objects to tell the number in the set and observe students as they practise this skill i.e. moving the second object to be beside the first object etc. and note that the last number called when there are no more objects is the number of objects in the group.	Count by ones Tell the number in a group by counting Count on	Correctly state the number of objects in a set (orally) Correctly label sets of objects with numerals/number names
Count by tens (form groups of 10s) to tell how many objects are in a group of up to 50 objects. Write numerals and matching word names 10, ten; 11, eleven; 25 twenty-five; up to 50	Give students (in groups) up to fifty objects and ask them to count by first making groups of tens and then counting to tell how many groups with ten objects therefore how many in all. E.g. there are three groups of ten or thirty objects. Are any objects left over or not enough for another group of tens? Demonstrate how to write numerals 10 to 50, and word names for amounts a) 10 to 19; b)	Count by tens Group objects into tens Write two-digit numerals Write two-digit numbers	 Skip count by 10's (orally) without error Correctly match numerals to number names for multiples of 10 up to 50. Correctly state the number of groups of 10s and 1s in numbers 11 – 50.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
to tell number of objects. Understand ideas of writing amounts using place value – tens and ones.	then 20 to 50. Introduce the idea of place value – writing a numeral to show groups of tens, and ones; e.g. in the numeral 39, 3 tells the number of groups of ten, and 9 tells the ones (not enough to make another group of ten).		Correctly write numerals for numbers up to 50.
Relate number to money and coins - recognize coins \$20, \$10, \$5, \$1	Give students examples of the Jamaican coins and ask them to tell which coin it is, and how to recognize the coin. Ask students to show the value of the coins in other coins – \$20 can be twenty \$1; two \$10; or to show a given amount e.g. \$50 in different ways.	Identify money Know value of coins	Correctly identify target coins Correctly state the sum of money represented by a group of target coins. Correctly create sums of money in various ways using target coins

Learning Outcomes

Students will be able to:

- ✓ Use number to tell amounts up to 50 objects
- ✓ Write numerals up to 2 digits
- \checkmark Read and interpret numerals associated with amounts up to 50
- ✓ Relate number to the recognition and value of Jamaican notes and coins to \$50

Points to Note	Extended Learning		
 It is important that students have concrete and pictorial representation of numbers through grouping and ungrouping objects, cut out pictures of objects Subitizing is critical in developing students' understanding of number. The use of dice, cards and dominos help to develop students' ability to recognize, at a glance, numbers from 1-9 	 Count backwards only as an extension for students who already know how to count forward. Investigate patterns of numbers on a number board showing up to 50. Identify when and how we use numbers in everyday life. 		
Materials and Resources	Key Vocabulary		
Counters, ten frames, number sequence charts, dot pattern cards, objects with different attributes – colour, size, shape. Published mathematics stories.	Number, numeral, count, group, sort, number names - zero to nine; ten, eleven to nineteen, twenty, thirty, forty, fifty, how many? total		
Links to Other Subjects			
Digital citizenship : Many digital card games require the recognition of numbers and counting on and back. Students can explore games such as solitaire.			
Science: Being able to sort objects by various attributes is fundamental to the scientific process. Scientists use this basic skill to isolat different populations-categories/identify different species, find correlations, and draw conclusions about observed phenomena.			

Sports/physical education: Traditional games like dominoes require quick identification and numbers, other games like ludi use dice and thus also call on one's ability to recognize numbers

UNIT 2 GRADE 7 TERM 1 (3 WEEKS)

SECTION A UNIT TITLE: ADD WHOLE NUMBERS TO SUM 18

ATTAINMENT TARGET 1B: Use basic number operations, relationships and patterns and/or technological instruments to compute and estimate in order to solve real world problems.

ATTAINMENT TARGET 4: Employ algebraic reasoning through the use of expressions, equations, and formulae to interpret, model and solve problems involving unknown quantities.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will:	Have containers with a variety of different	Add two groups of	Correctly model addition using
Join two or more sets	objects e.g. buttons to be sorted by colour,	objects	concrete manipulatives
of any number of objects to make a larger set and associate this with addition.	size, shape. Allow students to work in groups sorting the objects in different ways and telling why they put groups of objects together. Allow students to work in pairs or groups with a variety of objects to add by <i>joining together</i> .	Collaborate in groups Write addition number sentences using symbols	Use the symbols "+" and "=" correctly in addition sentences. Correctly write the addition sentence to match pictorial or
Model addition strategies such as 'counting on' using pictures, concrete objects.	different groups to make a larger joined group noting the number of members in the groups before joining, and in the larger group. (<i>Typically students will recount the larger</i> (<i>joined</i>) set of objects.)	Memorize and recall basic addition facts Use addition rules when adding	concrete representations of addition Recall, accurately addition of two single digit numbers with a sum not greater than 18.
Write addition sentences with numerals '+' and '=' signs to show the joining of two sets to make a larger set.	Discuss with students other strategies to add such as 'counting on', when the number in the first set is known. Demonstrate the process of 'counting on' by <i>adding more</i> to a group.	Create addition number stories Add fluently	Correctly identify the addend, sum and total in an addition sentence. Perform the correct operation addition for word problems

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Use terms 'addend', 'sum' and 'total', correctly in addition sentences Explore addition facts of two single digit numbers with a sum not greater than 18.	Students work individually from pictures or concrete representation on the addition of groups up to the sum of 18- write the number sentence that shows the situation; or create the situation given the number sentence. Introduce the following strategies for memorizing all the addition facts by first demonstrating with concrete or pictorial representations.		Correctly match equivalent number sentences (represented pictorially or numerically). Model counting on strategies (building, grouping. shading etc.) correctly to find missing addends.
Know and use the rule that: numbers added in any order gives the same results e.g. 7 + 8 = 8 + 7 (commutative rule for addition $a + b$ = $b + a$.) Know and use the rule that: adding 0 gives the same number e.g. 6 + 0 = 6 (additive identity. $a + 0 = a$) Create number stories from pictures and /or	 Adding 0 is the easiest by knowing the rule that: adding 0 gives the same number. Adding 1 gives the counting forward sequence (one more) Reduce the unique facts to be learned by using the rule that: numbers added in any order gives the same result i.e. 3 + 2 = 5; 2 + 3 = 5; therefore If you know the answer to 3 + 2, you also know the answer to 2 + 3. (show this on the chart) Learn the doubles e.g. 4 + 4 = 8; 3 + 3 = 6 Use the doubles to help your memory e.g. 4 + 4 = 8; so 4 + 5 = 4 + (4 + 1) = 8 + 1 		

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Identify equivalent addition statements. E.g. $3+2=4+1$ Compute fluently when adding Find the missing addend in an addition sentence by counting on. (e.g. $5 + \Box = 7$)	 memorization) by: i. Writing 15 of the facts on a sheet of paper and timing the class to see how quickly they can answer all fifteen correctly. ii. Using team quizzes or other games iii. Having students work in pairs using addition flash cards ordinary playing cards with an adding game. Allow students to use number lines or strips of grid paper to help them find missing addends. E.g. Give students a strip of grid paper (see resources list). Present students with the problem: 3 + □ = 8. Guide students in outlining sum. Have them shade the amount they have (3) squares green and shade the number they need to get to the sum in another colour. 		

Learning Outcomes

Students will be able to:

- ✓ Add two numbers (both 0 to 9) fluently
- ✓ Recognise addition situations in everyday life
- ✓ Create own addition stories

	Points to Note		Extended Learning
•	 Addition is the joining of smaller amounts or parts to make larger amounts, and so addition of non-zero whole numbers always gives you more. Addition strategies include: Joining together – putting (pushing) together. Joining to - piling more onto one of the sets. 	•	Add three numbers fluently Investigate patterns of sums on an addition number board up to sum 18 Select a number. Have students find as many addition facts that sum to the selected number in 3 minutes or as fast as they can.
•	Skill in addition of large numbers relies on fluent recall of these basic addition facts. Learning the combinations in commutative pair reduces the number of facts to memorize and aid in memory.		

Materials and Resources	Key Vocabulary
Addition facts chart	add, addition, plus, join, sum, sequence, commutative, digit, number
Prepare one chart or	names : zero – nineteen, symbol '+' '='
approach it in two or	
three charts as in the	
5 6 7 8 9 10 6 7 8 9 10 11 12 7 8 9 10 11 12 12	
Addition flash cards are the size	
of playing cards but with the	
addition facts in numerals on one side and the answers on	
the other side.	
Board games such as snakes and ladders, bingo can also be used to consolidate addition skills.	
Strips of grid paper	
(different lengths)	
Ten Frames.	
Links to Other Subjects	
Digital citizenship:	
Physical education/games : Most games, by their very definition must be kept. Numerals are used to represent scores.	n require that someone wins. This often means that a running score

UNIT 2 GRADE 7 TERM 1 (3 WEEKS)

SECTION B UNIT TITLE: SUBTRACT WITH WHOLE NUMBERS TO SUM 18

ATTAINMENT TARGET 1B: Use basic number operations, relationships and patterns and/or technological instruments to compute and estimate in order to solve real world problems.

<u>ATTAINMENT TARGET 4</u>: Employ algebraic reasoning through the use of expressions, equations, and formulae to interpret, model and solve problems involving unknown quantities.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Partition a large group of objects (take out a part or parts of the group) and associate this process with subtraction. In partitioning a group of objects tell how many were in the group, how many were taken out and how many are left. Model subtraction using pictures, or concrete objects, or 'crossing out' from a larger group.	Allow students to work in pairs or groups with a variety of objects to subtract (take out, or cross out) different amounts from a large group noting and recording the numbers of members in the large group, the group taken out, the group left. E.g. The large group has 7 objects; I take out 5, and will have 2 left. A worksheet would be useful e.g. The large group has I take out left. Students work individually from pictures or concrete representation on subtraction with groups of up to 18 objects – to write the number sentence that shows the situation; or create the situation given the number sentence.	Subtract one group of objects from a larger group Make up own subtraction stories Collaborate in groups Write subtraction number sentences using symbols Memorize and recall basic subtraction facts Use subtraction rules Use a variety of strategies when subtracting	Use the terms subtraction /take away/ minus to describe the separation of groups. Correctly model subtraction by separating concrete objects into groups Use pictorial representations to model subtraction Write accurate subtraction number sentences for modelled problems Correctly identify related addition and subtraction number facts Correctly match equivalent subtraction number sentences (pictorial or numerical) e.g. 6-4 = 7-5

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Write and understand when written a subtraction sentence with numerals, '' and '=' signs to show the partitioning of a set.	 Allow students to use number lines or strips of grid paper to help them find missing subtrahend/minuend. E.g. Give students a strip of grid paper Present students with the problem: 9 - 2 = 3. 		Correctly model grouping/counting on to find missing subtrahend/minuend
Understand and use the relationship between addition and subtraction	Guide students in outlining minuend. Have them shade the difference (3) count the amount remaining (the subtrahend)		
Identify related addition and subtraction number facts.			
Identify and use zero as the identity for subtraction			
Find the missing subtrahend in a subtraction sentence (e.g. 4 - 🛛 = 2)			

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Advanced Group			
Identify the			
'subtrahend', and			
'difference' in a			
subtraction sentence.			
Understand and use subtraction when comparing two amounts, measures, etc. to tell more / less to find the difference			

Learning Outcomes

Students will be able to:

- ✓ Subtract a number from a larger number (both 0 to 9) fluently
- ✓ Recognise subtraction situations in everyday life
- ✓ Create subtraction stories
| Points to Note | Extended Learning | | |
|---|---|--|--|
| Subtraction is the separation of a large group into one or more smaller parts. Subtracting non-zero whole numbers always gives you less. When objects are compared, subtracting will tell the difference. At the early stage of understanding number operation – addition and subtraction, four related facts are learned together and so are linked together in memory. e.g. 7 + 2 = 9; 2 + 7 =9 9 - 2 = 7; 9 - 7 =2 | Identify when and how we use subtraction in everyday life Check answer to a subtraction problem by adding Link subtraction with counting backwards or counting down Link subtraction with finding the difference of two amounts, or measures | | |
| Materials and Resources | Key Vocabulary | | |
| <u>Subtraction flash cards</u> are the size of playing cards but with
the subtraction facts in numerals on one side and the
answers on the other side.
Counters, strips of grid paper, ten frames | subtract, subtraction, minus, take away, number names - zero to nine;
ten, eleven to nineteen, Symbols '-' '=' | | |
| Links to Other Subjects/Areas | | | |
| Digital citizenship: Understand how to use board and computer addition and subtraction games safely and with ethical behaviour | | | |
| Science: Incorporate and match the use of addition and subtra | ction in the study of science. | | |
| Reading: Read and understand mathematical concepts and words related to addition, counting, subtraction | | | |
| Physical Education: Count in sequence, and use addition, and subtraction while exercising or participating in physical education minor | | | |

or major games.

UNIT 3 GRADE 7 TERM 1 (2 WEEKS)

SECTION A UNIT TITLE: DISTANCES IN THE ENVIRONMENT

ATTAINMENT TARGET 2: Use the correct units, tools and attributes to estimate, compare and carry out the processes of measurement to given degree of accuracy.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Describe distance as: how far, how wide, how long, how high etc. from one point to another.	Discuss with students the different ideas of distance. What is distance? How far can you throw a ball, kick a ball, run? How tall are you?	Show distances	
Compare objects side by side and tell the longer/est, shorter/est, wider/est, taller/est, same length as.	Give students a variety of objects, or pictures of objects that have different length, width, height etc. and ask them to compare two or three objects side by side and tell the longer/est, shorter/est, taller/est, 'same length/width as	Compare objects directly	Correct execution of the measurement of objects- there are no gaps, and no overlaps in the placement of the 'footprints'

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Estimate the length of various objects given specific landmarks.	 A. Ask students to find out facts such as: the length of a football field the length of netball court from goal post to goal post the depth of Kingston Harbour the height of the Blue Mountains. B. Examine the measures obtained Part A. What is a metre? What other units of measurement are used when the facts in Part A are presented? 	Measure given distances	Students satisfactorily compete drawing freehand a distance of a) one metre, b) one centimetre on the chalkboard. These are measured and the closest ones get math points/stars.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Understand that a measurement has a number and a unit.	Introduce the process of measuring by using a non-standard unit repeatedly to compare the distance to be measured. Students work in pairs to use "Footprints" to measure the length or width of the classroom. Students cut from newspaper about ten or more copies of their right foot print, then use it to 'measure' the given distance. (Note that the footprints are placed heel to toe, without gaps). Count the number of footprints that cover the given distance in a straight line from beginning to end. The length (width, height) of the classroom isfootprints. What do you notice? Did everyone get the same number of footprints? Introduce the need for a standard unit so that everyone uses the same unit distance.	Compare distances	Students accurately measure and record the measure of given distances.

Objectives	Teaching /Learning Activities	Key Skills	Assessment	
Measure distances using non-standard units	 A. Help students to develop a visual of the standard metric unit: metre by comparing different aspects of objects with a length of one metre. Ask students to estimate whether or not the lengths of different objects are shorter than, longer than or same as one metre then check their responses using a metre rule. Objects could be: the height of the table, the length of the table top, the height of the door, the height of a student. B. Help students to develop a visual of the standard metric unit: centimetre by comparing different aspects of objects with a length of one centimetre. Ask students to work in pairs finding distances in objects that are close to one centimetre, and testing them with a length of paper that is one centimetre. Objects could be: a paperclip, across your fingertip. 	Estimate distance	Students satisfactorily demonstrate that they can measure in <i>metre</i> and in <i>centimetre</i> .	

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Reasonably estimate the distance that is one metre, one centimetre.	Reintroduce the distance of one metre symbol <i>m</i> and the metre stick that gives the standard unit that is recognized internationally as one metre show that distance from one end of the metre stick to the other. To measure the length of the classroom or the corridor in metres there are two options : i) give a group a metre stick and have them mark with chalk the end of the metre stick, moving and marking to the end of the distance. ii) in groups provide a piece of string about 5 metres long, and have students use the metre stick to first tie a piece of coloured thread (or make a knot) at the end of each metre, then use this string to measure the given distances, counting how many metres covered the given distance (ii is closer to what the ruler does.)	Measure and record distance	Students effectively measure, read a ruler and tell or record the distance. (Use actual objects or pictures).
Measure and record distances using standard metric unit for distance metre (m) and a metre stick.	Introduce the use of the ruler or tape measure to measure smaller distances using the centimetre and symbol cm. Point out the beginning or zero distance, and the equal distances of one centimetre on the ruler from 0 to 1, from 1 to 2, from 8 to 9.	Use a measuring instrument- ruler, tape	

Objectives	Teaching /Learning Activities	Key Skills	Assessment
	After practical experiences measuring actual objects, pictorial representations can be used to practise reading and writing distances along the ruler.		

- ✓ Understand the concept distance.
- ✓ Measure distances by comparing directly shorter than etc.
- ✓ Measure distances by comparing against standard units metre, centimetre
- ✓ Record measures using a number and a unit (name of symbol)

	Points to Note		Extended Learning
•	The learning point in the activity to find out some of these distances from maps, or other sources is to reinforce that measurements have a number and a unit, e.g. 25 metres	•	Compare the cm and m and find out how many centimetres are equivalent to a distance of 1 m.
•	The process of measurement involves repeatedly comparing the distance to be measured to a given unit distance. This repetition is easier with the use of a scale i.e. a ruler or a metre stick or tape measure. Beginning with non-standard units gives students the feel of repeatedly putting the units without any gaps alongside the distance to be measured. This is done automatically with a ruler etc. Having a visual of the distance that is equivalent to a metre		
	(metric standard unit) helps students with estimation and measurement skills.		
•	A Standard Unit is recognised and used by many countries		

 across the world. There are two international systems – the older British system e.g. feet, inches (which United States of America still uses) and the metric SI system which most other countries including Jamaica have adopted. 			
Materials and Resources	Key Vocabulary		
Altimeter, metre stick, rulers, tape measures showing centimetres, sheets of old newspaper, paper, scissors, chalk or other markers	measurement, ruler, tape measure, metre, metre stick, centimetre, metric, metric system, estimation		
Links to Other Subjects/Areas			
Social Studies: Apply knowledge of measurement to ascertain the lengths and heights of various physical features in Jamaica such as rivers and mountains			
Science: Use measurement skills for measuring distances in the study of science, e.g. height of plants, length of leaves etc.			

Reading: Read and understand mathematical concepts and words related to comparisons and measures --- taller, shorter, etc.

UNIT 3 GRADE 7 TERM 1 (2 WEEKS)

SECTION B UNIT TITLE: PATHS, LINES, AND SHAPES IN THE ENVIRONMENT

ATTAINMENT TARGET 2: Explore paths, geometric shapes and space and make generalization about geometric relationships within the environment

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Observe, draw, and model with concrete materials: points, lines, and paths in the natural or built environment Observe, draw and Identify a corner, square corner in the natural or built environment Understand the idea of a shape, different from a line, and a point.	Give students opportunities to observe, discuss and describe points, lines, paths, corners, square corners (two or more lines meet) in their environment. After observation, students can be asked to draw or model (with plasticine or pipe cleaners) some of these features that were seen. Ask: What does a line look like? Are all lines straight? Or go in the same direction? What does part of a line look like? Discuss the idea of a shape? How does a line become a shape? Allow students to accurately describe or draw /trace simplest shapes seen in fences, on buildings – windows, doors, in trees etc. Students can work in groups using drawings or other models to sort shapes by different attributes. Allow students to say why they put different shapes in the same group.	Describe geometric features Observe similarities and differences Draw shapes, lines etc. Model lines, points, shapes Sort shapes Name and recognize the names of shapes	Answer correctly questions such as those shown below: Which of these shows a line? (more than one answer) A. • B. • C. D. D. Effectively sort different shapes using different attributes. Sample: a) What is a polygon? b) Draw or name two examples of a shape that is polygon. c) Draw a shape that is not a polygon d) How many straight line sides does a have? e) What is the name of a polygon that has four sides?

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Draw, model and sort	Introduce the word polygon to describe shapes		
shapes in the	with all straight lines, and ask student to		
different attributes –	polygons.		
straight lines, roundness (can roll), number of straight lines etc.	Ask students to sort a group of polygons by the number of lines and corners and introduce the name of different groups of polygons; i.e. triangle (3 sides), quadrilateral (four sides),		
Understand polygons	pentagon (five sides), octagon (eight sides).		
sides are straight lines;			
Sort, classify and name polygons by the number of straight sides: triangles, quadrilaterals, pentagon, octagon.			
Use words orally associated with lines and shapes (some could be sight words)			

- ✓ Observe, draw, model geometric features
- ✓ Sort shapes by using similarities and differences in geometric features
- ✓ Name basic shapes

Points to Note	Extended Learning		
 Shapes and Regions A shape is made up of thin closed lines, curved or straight. e.g. a circle A region e.g. Ohas a shape as its outline but the inside is completely filled in. The example above shows a <i>circular</i> region 	 Point, line, path, shape, polygon (oral), triangle, quadrilateral (oral), rectangle, square, pentagon (oral), octagon (oral) Square corners of 1 <i>m</i>. 		
Materials and Resources	Key Vocabulary		
Materials for modelling shapes etc., pipe cleaners, thread, cardboard cut-out masters for students to trace the outlines for the shapes.	Point, line, path, shape, polygon (oral), triangle, quadrilateral (oral), rectangle, square, pentagon (oral), octagon (oral), square corners		
Links to Other Subjects/Areas			
Extended thinking and problem solving: Use geometric features when solving problems in different situations			
Digital citizenship:			
Science: Use shape and size to classify, and group in the study of science.			
Reading: Read and understand mathematical concepts and words related to geometric features.			
Physical Education: Use shape, size and space while exercising or participating in physical education minor or major games or dance.			

UNIT 3 GRADE 7 TERM 1 (2 WEEKS)

SECTION C UNIT TITLE: COMPARE NUMBERS, AND MEASURES IN THE ENVIRONMENT

ATTAINMENT TARGET 2: Use the correct units, tools and attributes to estimate, compare and carry out the processes of measurement to given degree of accuracy.

ATTAINMENT TARGET 2B: Use, number relationships, patterns, and...... to solve real world problems

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Use one-to-one correspondence to	Describe or draw two groups of objects and ask students: Which of these two groups has more? Are there more chairs than students? How can	Compare numbers Use a number line	Students effectively match one-to- one (concrete objects or pictures) and tell which has more
compare two groups of objects telling a) which group has more/same/less, b) how to make each	we be sure? Demonstrate the technique of matching objects in each set one-to-one. Which has more?		
group have the same amount.			

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Use a number line segment to order whole numbers to 50, filling in missing numbers, telling which has more/less	 A. Introduce the number line and demonstrate: a) how equal distances are used to represent equal amounts b) how a given distance can represent any amount. e.g. see the line below. 0 10 20 30 Complete the number line above, by filling in numbers in the boxes. B. Demonstrate a line segment to show numbers between 30 and 40, with each unit distance showing ones, (begin at 30). 		Correctly complete missing numbers on a number line with units of one, units of 10, some not beginning at 0.
Use comparisons to solve problems, with measures, and numbers.	Ask students to challenge each other by putting in missing numbers on a number line		Give students problems to solve that involve comparisons of number and/or measures.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
	 Make up number stories that use comparisons to solve them. Some of these situations could be: a) John ran 40 metres and Peter ran 38 metres, who ran furthest? b) A circus ride indicates that children shorter than 35 <i>cm</i> cannot go on the ride. Which of the following children can ride? <i>Pat - 35 cm</i>, <i>Jay - 30 cm and Howie - 36 cm</i> c) Points in a game are Team A: 12, Team B: 15, Team C: 8. If the team with the most points wins the game, which team won? (this information could be in a table). 	Solve problems or Make decisions based on information given	<u>Challenge</u> Find out who is the tallest basketball player currently in the National Basketball Association in the USA?

- ✓ Compare amounts using one-to- one correspondence
- ✓ Compare whole numbers on a number line section

Points to Note	Extended Learning		
<u>Number Line</u> Notice that as we move right the numbers are larger, while as we move left the numbers are smaller. The line or line segment does not have to begin at 0 on all occasions, however the distances between marks have to be equal and represent equal amounts.			
Materials and Resources	Key Vocabulary		
number lines, cut out of objects for comparisons	number line, one-to-one correspondence		
Links to Other Subjects/Areas			
Extended thinking and problem solving: Use comparison skills whe	en solving problems in different situations		
Digital citizenship: Understand how to use computer number games safely and with ethical behaviour			
Science: Compare number and distances (metres, centimetres) in the study of science.			
Reading: Read and understand mathematical concepts and words related to comparison.			

UNIT 4 GRADE 7 TERM 1

UNIT TITLE: MULTIPLY BY 1 TO 5 AND 0

ATTAINMENT TARGET 1B: Use the basic operations, number relationships, patterns, number facts, calculators and appropriate software to compute and estimate in order to solve real world problems involving fractions, percentages and decimals.

<u>ATTAINMENT TARGET 4</u>: Employ algebraic reasoning through the use of expressions, equations, and formulae to interpret, model and solve problems involving unknown quantities.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Objectives Students will: Recognize multiplication as: a) Joining groups of equal amounts to tell how many in all b) Repeated addition Write a multiplication write a multiplication fumber sentence for given multiplication situations. Identify the 'factor' and the 'product' in a	Teaching /Learning Activities Have students work in pairs or in groups. Give each group two different coloured dice (e.g. 1 red and 1 green), counters/seeds and containers (empty egg cartons are ideal). Have students roll the dice and model as follows: • The number of groups as shown on one die (red) • The number of items in each group as shown on the other (green) Have students complete word sentences to match the modelled situations: • There are groups. • Each group has seeds • There are seeds in all groups of =	Key Skills Multiply Cooperate in groups Memorize basic facts Recall and use basic facts Write multiplication sentences Use rules of multiplication Multiply fluently Modelling	AssessmentCorrectly model multiplication using objects or picturesWrite correct number sentences to match pictorial or concrete representation of multiplicationCorrectly identify equivalent multiplication factsMake accurate observations about patterns in multiplication tablesAccurately recite multiplication factsCorrectly model given multiplication scenarios
multiplication sentence.	Guide students to create number addition and multiplication number sentences that correspond with modelled problems.	Problem solving	Correctly identify situations that involve the use of multiplication

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Explore and use the	Demonstrate rules for multiplying and show		
commutative property	how to use these rules to aid memorization on		
of multiplication: two	the multiplication tables by first demonstrating		
numbers multiplied in	with concrete or pictorial representations.		
any order gives the	a) Multiplying by 1 gives the same number		
same results i.e. a x b =	b) Multiplication by 0 gives zero.		
b x a.	c) Numbers multiplied in any order gives		
Explore and use	the same result i.e. $4 \times 2 = 8$; $2 \times 4 = 8$		
multiplicative identity :	Give students multiplication table charts/		
multiplication by 1	Napier Bones and ask them to discuss any		
gives the same	patterns that they see. If necessary, ask them		
number	probing questions such as "What numbers do		
	you see in the ones place?"		
Explore and use the	,		
rule that: any number	Practise these facts (rehearse to aid		
multiplied by zero is	memorization) by:		
zero.	a) Writing 15 of the facts on a sheet of		
	paper and timing the class to see how		
Explore and extend	quickly they can answer all fifteen		
patterns in the	correctly.		
multiplication tables	 b) Using team quizzes or other games 		
up to 5 times.	c) Having students work in pairs using		
Memorise and recall	multiplication flash cards.		
multiplication tables			
up to 5 times with			
nroducts no greater			
than $45 (9 \times 5)$			

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Create multiplicationGstories from picturesmand multiplicationresentences.GIdentify addition andpmultiplicationmsituations.G	Give students various situations and have them model them using concrete or pictorial representations. Give students the multiplication sentence or a picture and ask them to make up or create the multiplication word story that fits the situation.		

- ✓ Multiply whole numbers
- ✓ Solve word problems using multiplication

	Points to Note	Extended Learning
٠	This unit introduces multiplication as repeated addition of	
	groups with equal number of object	
٠	Like many other areas of mathematics, technology and tables	
	are at students' fingertips that can perform basic number	
	facts. Technology, however, does not replace the need for	
	students to explore and memorize basic multiplication facts.	
	This activity is fundamental in the development of students'	
	number sense. Additionally, pattern recognition is a	
	fundamental skill for later algebra and mathematics in	
	general.	
•	Allow students to both explore patterns on printed tables and	
	then to recite/generate tables based on observed patterns	

Materials and Resources	Key Vocabulary			
multiplication tables/chart, multiplication flash cards, arrays/ dot pattern cards, napier bones	multiply, multiplication, equal amounts, factor, product			
Links to Other Subjects/Areas				
Digital citizenship:				
Home Economics: Adults use multiplication to create shopping lists based on daily/weekly consumption patterns of their household				







MATHEMATICS GRADE 7 TERM 2











Mathematics Scope and Sequence for APSE III Grade 7 (Year 1) – Term 2

APSE III – Gr. 7 TERM 2	Theme: What is number?	Theme: More about Equal Groups	Theme: What is number?	Theme: Data and Measures
 Benchmarks: Use base 10 place value system to write numbers Compute and solve problems with 2 digit whole numbers Construct bar chart and 	AT1A : Know the value of numerals, associate them with their names, numbers, ordinals and use concrete objects to model patterns, expressions and numbers.	AT#1B: Use the basic number operations, relationships, patterns, facts; calculators and software to compute and estimate in order to solve real world problems.	AT1A : Know the value of numerals, associate them with their names, numbers, ordinals and use concrete objects to model patterns, expressions and numbers.	AT#2: Use the correct units, tools and attributes to estimate, compare and carry out the processes of measurement to given degree of accuracy.
 interpret data by making comparisons Read a 12 hr clock and a calendar Recognize money value, compute and solve problems with money Multiply / Divide with 1-digit numbers (basic facts) 	AT1B : Use the basic number operations, relationships, patterns, facts, calculators and software to compute and estimate in order to solve real world problems.	AT#4: Employ algebraic reasoning through the use of expressions, equations, and formulae to interpret, model and solve problems involving unknown quantities.	AT1B : Use the basic number operations, relationships, patterns, facts, calculators and appropriate software to compute and estimate in order to solve real world problems.	AT#5 : Collect, organize, interpret and represent data and make inference by applying knowledge of statistics and probability.

APSE III – Gr. 7 TERM 2	Theme: What is number?	Theme: More about Equal Groups	Theme: What is number?	Theme: Data and Measures
	Unit 1A: Place (position) value -Tens, and ones. Unit 1B & 1C: Tens and ones to add and subtract	Unit 2A : Multiplication of whole numbers Unit 2B : Division of whole numbers	Unit 3A : Introducing fractions to tenths; Unit 3B Add, subtract money	Unit 4A : Time on the clock and calendar Unit 4B Bar Charts
	(3 weeks)	(3 weeks)	(2 weeks)	(3 weeks)
	Content outline : Number skills up to 99; base 10 place value system to write standard, extended numerals, and word names; Review addition and subtraction concepts, rules, strategies, basic and related facts; Add to make ten. Add two or three 2 digit numbers or a mix of 2 and 1 digit numbers by using place value (tens and ones), without and with regrouping - sum to 99; Subtract a 1 or 2 digit number, by regrouping from tens; Solve problems using subtraction to find the differences when comparing.	Content outline: Review multiplication skills, facts and products to 45; multiplication on an array; extend facts to 6, 7, 8, and 9 times table; multiplication sentences, multiply 2 digit by 1 digit without and with regrouping. Introduce division as sharing and as repeated subtraction of equal groups, I how many groups/ in each group. Division rules, terms, sentences; division as the opposite of multiplication, related facts to product 81. Make up division number stories from pictures and division number sentences and find answers.	Content outline: Fractions to tenths using paper folding, and fraction pieces. Writing, naming fractions – numerator, denominator, difference between parts, wholes; making one whole. Solve problems involving the identification of fractional parts. Money – recognize coins \$20, \$10, \$5, \$1, and note \$50. Add coins and notes to make \$99. Exchange coins and groups of coins with equivalent value e.g. \$10 and \$20 in \$1 coins. Solve problems involving adding and subtracting money in purchasing situations.	Content outline: Read the 12 hr clock and tell /show time in hour, half hour, minutes, Link time with events during the day; units of time hour, minutes, 60 minutes = 1 hr. Read and interpret data on a calendar in different formats; units - week, day, month year and relationships, write the date; link with events; Solve problems using the calendar. Collect data relevant to students such as birth months and build and interpret data on a bar chart that compare numbers or amounts

APSE III – Gr. 7 TERM 2	Theme: What is number?	Theme: More about Equal Groups	Theme: What is number?	Theme: Data and Measures
	Skills : Write numbers as tens and ones, add and subtract with 2 digits by using place value; problem solving	Skills: Recall multiplication, division facts, Using arrays, Divide by sharing, repeated subtraction.	Skills : show fractions; recognize value of money; solve problems with money	Skills : read and write time on the clock, calendar; collect and represent, and interpret data on a bar chart;
	Vocabulary: add, plus, sum; total, take away, subtraction, addition, minus, subtract	Vocabulary: multiply, divide	Vocabulary: fraction, fraction names to tenths	Vocabulary: time, calendar, hour, month, day, year, week, minutes

UNIT 1A GRADE 7 TERM 2 (3 WEEKS)

UNIT 1A TITLE: PLACE (POSITION) VALUE - TENS AND ONES

ATTAINMENT TARGET 1A: Know the value of numerals, associate them with their names numbers, ordinals and use concrete objects to model patterns expressions and numbers

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will:	Allow students to count and group objects in	Write numerals, and	Correctly model 2-digit numbers
Group and separate	tens up to 99.	word names for	using base 10 resources
up to 99 objects by		numbers	
colour, size, shape.	Students will recall basic numerals 0 through 9		Accurately count by 10s up to 90
	and the amount they each represent. Show	Read and write 2-	
Recall numerals, word	them that two of these basic numerals are used	digit numbers	Correctly match numerals to
names 0 to 9 and	repeatedly to write numbers with two digits		number names up to 99
associate these with	e.g. Ask: Which two basic numbers do you see		Use two sets of basic numeral (0
the appropriate	in 95, 57, 69, 76, 80?		(0)
number of objects in a			given 2-digit numerals
group.	As a follow-up to #2 ask: is the 7 always in the		given z-ugit numerais.
	same position? What about the 9? To introduce		Correctly distinguish between
Count in tens (form	the idea that position matters.		numbers made composed of the
groups of 10s) to tell	Use 10 place value cards (with digits 0, to 9)		same digits
now many objects are	two numerals on each card and have student		
In a group of up to 90	show that for example 21 is different from 12		Correctly state the number of
objects.	Also explain this with concrete objects		groups of 10s and ones in a given
Write numerals and	Also explain this with concrete objects		number
matching word names	• 21 is two groups of ten and one single		
fifty sixty up to	 12 is one group of ten and two singles 		
ninety to tell number			
of objects	Reinforce that the position of the basic		

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Show numbers 11 through 99 as tens and ones using expanded notation 56 = 5 tens + 6 ones (50 + 6) or 56 ones	numeral or digit matters. Using the place value cards show how to write different two digit numbers by putting the digits in different positions knowing that the same digit can be repeated in different positions e.g. 55		
Understand that in place value method of showing numbers a) digit position matters, b) 1 group with ten objects is the same as ten single objects.	Build students vocabulary e.g. sixty (link to six groups of ten), also for seventy, eighty, ninety. Explain the difference between <i>six</i> and <i>sixty</i> ; <i>seven</i> and <i>seventy</i> .		

- ✓ Use place value (base 10) to write numerals and matching word names e.g. fifty up to ninety nine to tell number of objects.
- Understand /demonstrate that when using the place value system a) position matters, b) each position is 10 times the one on its left.
- ✓ Skip count by tens in sequence.

Points to Note	Extended Learning
 This section of the unit reviews numbers and their numerals up to 50 (Grade 7 Term1) and extends this to 99, emphasizing tens and ones in standard and expanded notation. The similarity between the words for basic numerals (digits) and multiples of ten are noted (e.g. two and twenty; four and forty; six and sixty). It is important for students to know that when using the place (position) value for writing numerals – the position of the basic numeral matters and so 56 shows a different number than 65 although they both use a 6 and a 5. 	• Explore how the place value system can be expanded to show hundreds.
Materials and Resources	Key Vocabulary
 Place value digit cards, sufficient to give one set for each group, with the numerals 0 through 9 (on each side) of the ten cards. Do not put the same numeral on both sides of the same card, so that a card can be used more than once. Dienes blocks (tens and ones) or homemade set of objects showing tens and ones made of card stock or bundles of straws/ fudge sticks of tens and ones etc. 	numeral, number, amount, word names – sixty, seventy, eighty, ninety

Links to Other Subjects

Digital citizenship: Understand how to use computer number games safely and with ethical behaviour

Science: Use numbers in science

Sports/physical education: Use numbers in games

Main Content and Skills	Suggestions for Differentiation			
Content	Time /Pace of Instruction	Output/Assessment		
Number to 99	Give students time to review basic numbers 1 to	Allow some students to show understanding		
Count in tens	9 & 0 ; numbers to 50 and move on to 99, new	practically using concrete objects and		
Place value – tens and ones	words would be sixty, seventy, eighty and ninety	manipulative - while other may use both		
	Quantity of work	manipulative, and place value chart, or may use		
Skills		worksheets.		
Counting	Vary the quantity of work based on students'			
Reading and writing 2 digit	skills and level of focus, gradually increasing the	Level of Support		
numbers	amount as interest and mastery are obtained.	Give more support to some groups of students		
		while they work on the tasks using concrete		
		manipulatives along with worksheets or practice		
		exercises. Other students may be able to use the		
		worksheets with semi concrete models such as		
		individual place value charts.		
		Input (Instructional delivery)		
		Plan to have students spend more time using		
		concrete materials - counters, dienes blocks,		
		bundles of sticks, straws etc. to demonstrate		
		place value – tens and ones, before transferring		
		to use the place value chart – with pockets		
		showing tens and ones, with number cards.		

UNIT 1B GRADE 7 TERM 2 (3 WEEKS)

UNIT 1 TITLE: ADD USING TENS AND ONES

ATTAINMENT TARGET 1B: Use the basic operations, number relationships, patterns, number facts, calculators and appropriate software to compute and estimate in order to solve real world problems.

ATTAINMENT TARGET 4: Employ algebraic reasoning through the use of expressions, equations, and formulae to interpret, model and solve problems involving unknown quantities.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Write addition sentences with numerals '+' and '=' signs to show the joining of two or more sets to make a larger set. Use terms 'addend', 'sum' correctly in addition sentences. Recall memorised addition facts 0 to 9 plus 0 to 9 up sum 18, and use these to add larger numbers.	Review basic addition facts and terms extending numbers to 99. Introduce procedure to add three numbers by adding any two then the other e.g. $5+7+2$ can be added $(5+7)+2 = 12 + 2 = 14$ or $(5+2)+7 =$ 7+7 = 14 Use the strategy of the associative rule in objective 5 to make addition easier by adding to make ten e.g. to add $6+9+4$ recognizing that 6 +4 = 10 makes it easier to get the answer as 19. Introduce or reinforce the strategy of using place value to add $57 + 12$; expand both numbers and add ones to ones, tens to ten. This can be shown first with concrete objects grouped in tens and ones then written e.g. 57 = 5 tens + 7 ones 12 = 1 ten + 2 ones 69 = 6 tens + 9 ones	Add numbers 0 to 9 to each other fluently from memory Know different combinations of two numbers that make a sum of 10 Add two digit numbers Add three numbers Solve problems to find the sum	Use base 10 manipulatives to correctly model addition of two or more numbers that do not require regrouping Model addition with regrouping of two or more numbers using base 10 resources Accurately write addition number sentences for given situations. Correctly identify addends and sums in addition sentences Accurately add two or more numbers that do not require regrouping Accurately add two or more numbers that require regrouping

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Know and apply addition rules (properties such as order of addition, adding 0 (see Term1). Know and use the rule that: when adding three or more numbers add two at a time in any order (associative) e.g. 7 + 8 +9 = (7 + 8) + 9 or (7 + 9) + 8 Add a group of numbers by adding to make 10. Add two or more numbers using place value with and without regrouping. Solve problems adding	Extend the place value strategy to explain addition with regrouping ones e.g. add $45 + 38$: • $45 = 4 \text{ tens} + 5 \text{ ones}$ • $38 = 3 \text{ tens} + 8 \text{ ones}$ • $7 \text{ tens} + 13 \text{ ones}$ • $83 = 7 \text{ tens} + 1 \text{ ten} + 3 \text{ ones}$ Note: At this stage write 13 ones as 1 ten + 3 ones and add the 1 ten to the 7 tens to get 8 tens After students have practised with the extended formats introduce the shortened format. • 4^15 add ones: $8+5 = 13$ + 3.8 13 ones is 1 ten 3 ones 8.3 add tens: $3 + 4 + 1 = 8 tensPractise changing more than ten ones tonumber of tens and ones e.g. 25 ones = 2 ten 5ones.Practise adding with two-digit numbers withand without renaming ones as tens and ones.$		Use 10 facts to accurately add two numbers mentally Correctly identify problem solving situations that employ addition concepts. Apply appropriate addition concepts to problem solving situations Use 100 chart correctly to count
to find the whole, where two or more parts are given.			

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Solve problems that require finding one part when the other part and the whole is given.	Allow students to work on worded problems in groups in which addition is used to find the whole as one or more parts are given. e.g. For the class book sale, Park House brought in 67 books and Spencer House brought in 24 books. How many books have been collected from these two groups? Have students use hundred charts to find addends (e.g. If I was on 61 and I moved to 84, how many spaces did I move?)		

- ✓ Add 1 and 2-digit numbers fluently with and without regrouping partial sums.
- \checkmark Add three or more numbers using the associative rule

	Points to Note		Extended Learning
•	When larger numbers, or many numbers are to be added we repeatedly add groups of smaller numbers. Therefore, knowledge of basic addition facts (e.g. 7+8), and a good understanding of place (position) value are needed. Regrouping- changing how a number is written is needed for addition in some instances.	•	Adding tens and ones regrouping tens e.g. 91 + 70 Adding hundreds, tens, ones without regrouping in any position, or just regrouping ones.

Materials and Resources	Key Vocabulary		
place value charts – tens and ones, dienes blocks, picture or homemade materials to show tens and ones e.g. bundles of straws, fudge sticks etc.	add, tens, ones, regrouping, expand, rename		
Links to Other Subjects			
Extended thinking and problem solving: Demonstrate, explain how to add 2-digit numbers with regrouping			
Digital citizenship: Understand how to use computer number games safely and with ethical behaviour			
Science: Use addition			
Reading: Understand number words and concept of addition in a story or other materials when read.			
Physical Education: Use addition in games- adding scores etc.			

Main Content and Skills	Suggestions for Differentiation		
ContentTime /Pace of InstructionAdd 2-digit numbers with and without regroupingIn this unit students are learning two new strategies in addition:Add three numbersi)adding using place value – adding ones to ones, tens to tensSkillsii)ii) regrouping ones to make tens and ones when necessary.		Output/AssessmentAsk students to show the addition using manipulatives then with abstract numbers.However, students who are dependent on previous strategies need to learn this new strategy using place value as it is very efficient when adding large numbers.Word problems could be simplified or read for	
	Students may be familiar with adding by counting on and may want to stick with this strategy. Help them to move on to the new strategy but they could check their work doing it both ways. e.g. 17 + 8 can be done by counting on from 17; or by adding using place value and regrouping; both strategies will give the same answer.	students who may be having difficulties reading/ understanding some words. <u>Level of Support</u> Vary the use and type of manipulatives moving gradually to just abstract notation. Give groups as much practice with manipulatives as they need; some students may need to use partial sums as shown below as an interim stop, o.g.	
Quantity of work Present work as students master each that they are not frustrated. Begin wit renaming 27 + 5; 38 + 2; that can be c before giving harder ones such as 27 + 42.		68 <u>+ 26</u> 14 (8 + 6) add ones <u>80</u> (60 +20) add tens 94 (Final answer) <i>Input (Instructional delivery)</i> Place students in groups using manipulatives as necessary. For some groups vary the quantity of work, and skills as shown in that category.	

UNIT 1C GRADE 7 TERM 2 (3 WEEKS)

UNIT TITLE: SUBTRACT USING TENS AND ONES

ATTAINMENT TARGET 1B: Use the basic operations, number relationships, patterns, number facts, calculators and appropriate software to compute and estimate in order to solve real world problems.

ATTAINMENT TARGET 4: Employ algebraic reasoning through the use of expressions, equations, and formulae to interpret, model and solve problems involving unknown quantities.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will:Give sModel subtractionto 90using pictures, orShowconcrete objects, orpictor'crossing out' from aones.larger group.a)Write and understandwhen written, asubtraction sentencewith numerals, '' and'=' signs to show theb)partitioning of a set.c)subtraction facts up tosubtraction facts up tosum 18 and use thesewhen subtracting withlarger numbers.a)	students objects which are multiples of 10 0 from which to subtract. E.g. $20 - 8$ w students how to subtract with concrete / orial objects and with place value – tens and 5. a) With concrete /pictorial objects: 00000 00000 00000 00000 20 - 8 = 12 (20 with 8 crossed out leaves 12). b) With place value 20 = 2 tens + 0 ones -8 = 8 ones c) Change 1 (of the 2) tens to 10 ones to get 20 = 2 tens + 0 ones = 1 ten + 10 ones (use manipulatives here) -8 = - 8 ones 12 = 1 ten + 2 ones	Add numbers 0 to 9 to each other fluently from memory Use different combinations of two numbers that make a sum of 10 Add two digit numbers Add three numbers Solve problems to find the sum	Use base 10 manipulatives to correctly model addition of two or more numbers that do not require regrouping Accurately model addition with regrouping of two or more numbers using base 10 resources Accurately write addition number sentences for given situations Correctly identify addends and sums in addition sentences Accurately add two or more numbers that do not require regrouping Accurately add two or more numbers that require regrouping

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Subtract from 10, 20, and other multiple groups of tens. Subtract by using place value – tens and ones without /with regrouping amount in tens to get more than 9 ones. Identify the 'subtrahend', and 'difference' in a subtraction sentence. Solve problems that require finding one part when the other part and the whole is given. Solve problems that require the use of subtraction to compare (finding the difference of) two amounts, measures, etc. to tell more/less/ same.	Present the shorter version only when students have sufficient practice with concrete/pictorial and expanded notation methods. The short version is shown below: 2 0 Not enough ones shown 2 ¹¹ 0 Change 1 ten to 10 ones leaving 1 ten <u>- 8</u> Take 8 ones from 10 ones to get 2 1 2 Take 0 ten from 1 ten to get 1 ten Give students practise with subtracting with regrouping tens in other numbers such as 45- 19; 50- 27; and with word problems that require subtraction to find the answer. Present problems such as: Farmer Rose had 87 June plums in her basket in the morning. She sold some and has 9 June plums in the basket in the evening. How many did she sell? (Ask students to draw a diagram to solve the problem).		Use 'make 10 facts' to accurately add two numbers mentally Correctly identify problem solving situations that employ addition concepts Apply appropriate addition concepts to problem solving situations Use 100 chart correctly to count

Objectives	Teaching /Learning Activities	Key Skills	Assessment
	 Present a scenario such as: A coconut tree has 36 fruits and a June plum tree has 96 fruits. How many more fruits than the coconut tree does the June Plum tree have? Use UPAC (Polya's four steps) to solve the problem: a) <u>Understand</u> the problem: <i>What do we know? Which tree has more fruits?</i> b) <u>Plan</u>: <i>I will draw a picture, and write a math sentence</i> c) <u>Answer</u>: Draw the picture etc. put in the numbers, do the math. <i>Fruits on fruits on June Plum tree Coconut tree</i> d) <u>Check</u>: <i>Is my answer correct?</i> Demonstrate other situations in which subtraction is used to find the difference e.g. difference in height of trees, building and light pole; fence and wall. Give students hundred charts. Tell them the starting and ending points and have them count backwards to determine how many spaces were moved.		
- ✓ Subtract from a 2 digit multiple of ten
- ✓ Subtract from a 2 digit number with or without regrouping in the tens place
- ✓ Use subtraction in problem solving to :
 - a) find one part
 - b) compare and find difference

Points to Note	Extended Learning
 T 0 1 7 - 9 1 2 Practise adding back the numbers to <u>check the</u> <u>subtraction</u> as follows: if 17 - 9 is 12, then 12 + 9 would give you 17. 12 + 9 is not 17, and so your answer of 12 is not correct. 	 Subtract from 3- digit numbers- hundreds, tens, ones without regrouping Give students cards to write how much money they came to school with and how much money they had after lunch. Have students exchange cards and try to figure out what was bought for lunch.
Materials and Resources	Key Vocabulary
place value chart	subtract, regrouping, tens, ones, difference, compare

Links to Other Subjects

Digital citizenship: Understand how to use computer number games safely and with ethical behaviour

Science: Use subtraction to compare and find differences

Reading: Understand use of subtraction ideas when reading

Physical Education: Use subtraction in minor games- difference in scores etc.

Main Content and Skills	Suggestions for Differentiation		
 Content Subtract tens and ones with and without regrouping Subtract to find unknown part in a word problem Subtract to compare and find differences Subtraction with regrouping Problem solving with subtraction 	 <u>Time /Pace of Instruction</u> Two new subtraction strategies are introduced: a) Subtracting using place value - ones from ones / tens from tens b) Regrouping tens in larger number "top number" in order to subtract. <u>Quantity of work</u> Present work as students master each skill so that they are not frustrated. Begin with easier renaming such as 30 - 5; 52 - 3; that can be checked by counting backwards, before giving harder ones such as 60 -15; 52 -23. 	 Output/Assessment Ask students to show subtraction with regrouping using counters; manipulatives such as bundles of sticks in tens and ones; and with the numerals alone. Word problems can be read to students or presented in a simplified format with pictures or diagrams, if these students are having difficulty reading. Level of Support Provide counters/ manipulatives for students who need to use them to subtract. Gradually move students to see formal algorithms. Provide intermediate scaffolding such as using a coloured background to write the subtraction which may remind students that one number is larger than the other even through there may be less ones shown. e.g. 82 is larger than 68; even through there are 2 ones shown in 82 and 8 ones shown in 68. The trick is to rewrite 82 to show more ones. Input (Instructional delivery) Place students in groups using manipulatives as necessary. For some groups vary the quantity of work and skills as shown in that category. 	

UNIT 2 GRADE 7 TERM 2

UNIT TITLE: MULTIPLY WHOLE NUMBERS

ATTAINMENT TARGET 1B: Use the basic operations, number relationships, patterns, number facts, calculators and appropriate software to compute and estimate in order to solve real world problems.

ATTAINMENT TARGET 4: Employ algebraic reasoning through the use of expressions, equations, and formulae to interpret, model and solve problems involving unknown quantities.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Model multiplication using rows and columns in a rectangular array.	 Have 4 students stand in a line behind each other and count off 1, 2, 3, 4. We another 4 students form a line adjacent to the first and once again count off the number of students in all. Have students place their hands on the shoulders of the person in front of them. Draw a rectangle on the board and ask students how many columns of students there are and separate the rectangle accordingly. Have students join hands with the person beside them. Ask how many rows of students there are and separate rectangles accordingly. 	Multiply whole numbers Understand an array as columns and rows Link numbers in an array with multiplication	Correctly model arrays to represent multiplication problems

Objectives	Τe	eaching /L	earning	Activities	Key Skills	Assessment
	Write the m and total m Have an ad and once a students in Once again rows there board. Build a tabl of columns array as sho	umber of p umber of p ditional 4 s gain count total. ask the nu are and ac e with the and total p own below	columns, persons. students off the n imber of ld to the number of	number of rows join the others number of columns and rectangle on the of rows, number of students in the		Create accurate number sentences for multiplication arrays
	, Dowe	Columns	Tatal	Г		
	A	Loiumns 1		_		
	4	2	8	-		
	4	3	12	-		
	4	4				
	4	5				
	4	7				
	Have stude with 4 and arrays using check their	nts comple 5 columns g concrete answer.	ete the ta and 4 ro objects c	able for arrays ws, then build or pictures to		

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Objectives	Have students discuss patterns they have noticed that they used, or could use to determine the total number of students in each array. NB. Students are likely to notice the vertical pattern (repeated addition) before the horizontal pattern. In this case, they may need to be guided to recognize the relationship between repeated addition and multiplication.	Key Skills	Assessment
	Have students use the rule- # of Rows x # of Columns = Total in Array- to complete the table for larger arrays. Allow them to explore the rule with arrays with different numbers of rows. e.g. If there are 5 columns and 6 rows, how many objects/persons would be there? Have students model arrays with concrete objects to check their answers.		

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Memorize and recall multiplication facts to 9 times table Know and use the rule: to multiply 2 digit numbers multiply each digit in the numeral (distributive rule with multiplication) Multiply a 2 digit whole number by a one digit whole number with and without regrouping. Check the product in a multiplication by repeated addition Create multiplication number stories from pictures and number sentences and find answers.	Revise multiplication facts already known by students (up to 5 times table to product 45). Use the commutative property to explore facts in the 6, 7, 8 and 9 times. Show students the patterns in the tables especially the nine times table, and how to add on one group of the divisor to build facts that are not recalled. e.g. $6 \times 6 = 36$; then $6 \times 7 = 36$ + 6 (42). Use manipulatives, expanded notation and the distributive rule to show students how to multiply two digit numbers by a one digit number, first without regrouping, e.g. $43 = 4$ tens + 3 ones $\times 2 \qquad x \qquad 2$ 86 = 8 tens + 6 ones • The product can be checked by adding. That is, 43×2 is the same as $43 + 43$. • Demonstrate regrouping ones to tens and ones when multiplying. e.g. 26×3 . That is, $20 \times 3 + 6 \times 3$. $20 \times 3 = 60$ (6 tens and 0 ones) $6 \times 3 = 18$ (1 tens and 6 ones) adding tens and ones result in 7 tens and 6 ones. $26 \times 3 = 7$ tens + 6 ones = 76 Show students a picture of items, or an array and allow students to work in pairs to write out multiplication problems based on the picture.	Memorize and recall multiplication facts to 81	Accurately recall number facts up to 9 times tables Accurately multiply 2 digit number by a 1-digit number without regrouping Accurately multiply a 2-dgit number by a 1-digit number with regrouping Use repeated addition to check the answers of multiplication accurately. Create appropriate multiplication number stories based on pictures. Correctly identify problem situations involving multiplication Accurately solve problem situations with the use of multiplication.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
	Have each pair of students write out their multiplication problems and the solution on the board.		

- ✓ Memorize and recall basic products of 1 digit numbers
- ✓ Multiply 2 digit by 1 digit numbers without and with regrouping ones
- ✓ Create and solve multiplication problems presented as an array
- ✓ Understand multiplication as used in an array

Points to Note	Extended Learning
 Multiplication is used in an array to find products (total amounts) An array is one method of using multiplication and multiplication facts. Many math problems are linked to arrays e.g. finding area of rectangular shapes; and many real world situations use arrays – planting orange trees in a grove, planting corn seeds in rows and columns with more than one corn seed planted in the same space, marching bands, soldiers etc. 	 Multiplying 2 digit numbers by 1 digit number- regrouping twice: ones to tens and tens to hundreds. Link use of arrays in multiplication (find total) and division (number of finding rows or columns)
Materials and Resources	Key Vocabulary
Stories with practical situations using arrays – marching bands,	Array, row, column, multiply, distributive rule
soldiers in rows and columns. e.g, The Best of Times by Greg Tang	
2002 Gregory Tang Publishers, Scholastic Inc., Arrays on cards for	

students to use.	

Links to Other Subjects/Areas

Agricultural Science: In farming, one can determine the number of crops in a large field with evenly spaced crops by counting rows and columns.

Building Construction: Tillers/stone layers use multiplication to determine the number of tiles/stones needed to cover a particular area.

Main Content and Skills	Suggestions for Differentiation			
 Content Multiplying using arrays Multiplying 2 digits by 1 digit numbers 	<u>Time /Pace of Instruction</u> Give time for students to understand the principle introduced.	 Output/Assessment Allow students to use counters or other manipulative to show arrays and determine the products. Ask students to find pictures of practical real world situations in which arrays 		
<u>Skills</u>Multiplying,Problem Solving	Present work as students master each skill so that they are not frustrated. Begin with easier renaming such as 30 - 5; 52 - 3; that can be checked by counting backwards, before giving harder ones such as 60 -15; 52 -23.	<i>Level of Support</i> Allow students who need it more time to use actual counters to model the array and give the product, and the multiplication sentence. <i>Input (Instructional delivery)</i> Use role play with the physical lining up of students in different numbers of rows and		
		columns, and give the product. This can be used to show different arrays before the use of pictorial and abstract representations such as multiplication sentences		

UNIT 2 GRADE 7 TERM 2

UNIT TITLE: DIVIDE BY WHOLE NUMBERS

ATTAINMENT TARGET 1B: Use the basic operations, number relationships, patterns, number facts, calculators and appropriate software to compute and estimate in order to solve real world problems.

ATTAINMENT TARGET 4: Employ algebraic reasoning through the use of expressions, equations, and formulae to interpret, model and solve problems involving unknown quantities.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will:ShowInterpret division asDiscusssharing a set of objectsequallyequally among a givensharednumber or groups, orstudeninto groups of a given15 =amount.DivisioInterpret division assharedrepeated subtractionpersonof equal groups, tellorangehow many groupswere taken out, howmany in each group,for any in theoriginal group, Arethere any left?	students a container with 15 objects. s how you might share these objects <u>y</u> among 5 students. How many of the d objects will each person get ? Let nts figure out how to do the sharing. 	Divide by repeated subtraction Memorise and recall division facts	Accurately model division using concrete objects by sharing among groups equally Use concrete objects to model repeated subtraction in division problems Write true number sentences involving division that correspond with pictures given Correctly identify problem situations that involve division Write correct number sentences for division problems

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Use interpretations of division to name the number of objects in each of the resulting groups, and write a division sentence to explain the situation. Use the terms dividend, divisor and quotient and remainder to describe numbers in a division sentence.	Division can be also seen as repeated subtraction of equal amounts. How many times can John get equal groups of three objects from 15 objects? $15 - 3 = 12$; $12 - 3 = 9$; $9 - 3 = 6$; $6 - 3 = 3$; $3 - 3 = 0$; John subtracted 3 from 15, 5 times and nothing was left. Write the division number sentence as $15 \div 3 = 5$. Give students guided practice with each interpretation of division above, writing the division sentence each time using flash cards or other means. Introduce the words dividend, divisor and remainder. Using the definitions given, have students identify which numbers in the division		Correctly identify the dividend, divisor, quotient and remainder in division number sentences Correctly identify dividend, divisor, quotient and remainder in division problems Accurately recite division facts for products up to 81 with divisors of 6, 7, 8 and 9.
Memorize and recall division facts for 6, 7, 8, 9 as divisors (products to 81) Using the inverse rule of division and multiplication to link division facts to known multiplication facts.	 sentence fits the description. Use concrete objects to model multiplication situations and write corresponding multiplication sentences. Have students then model a corresponding division situation and write division sentences to match. Guide students through questioning, to see that division is the reverse of multiplication and vice versa. Have students practice the multiplication/division pairs on the board, as they use the multiplication facts just learned to form the pairs of the new division facts. 		

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Make up division number stories from pictures and division number sentences and find answers.	Show students a picture of a group of items, and allow students to work in pairs to write out division problems based on the picture. Have each pair of students write out their division problems and the solution on the board.		
Create multiplication stories from pictures and multiplication sentences. Identify addition and multiplication situations.	Give students various situations and have them model them using concrete or pictorial representations. Give students the multiplication sentence or a picture and ask them to make up or create the multiplication word story that fits the situation.		Create reasonable and relevant division word problems based on pictures shown Create reasonable and relevant division word problems based on division facts given

- ✓ Interpret division in different ways
- ✓ Use division terms
- ✓ Memorize and recall division facts with 6, 7, 8, 9 as divisors to product 81
- ✓ Use division in problem solving

Points to Note	Extended Learning	
• This section consolidated division as sharing and completes the division facts with divisor 6, 7, 8 or 9.	• Extend division skills to divide 2 digit numbers with remainders.	
	 Use division on the array to find number of rows or number of columns given enough information. 	
Materials and Resources	Key Vocabulary	
Counters, pictures of division situations, division facts flashcards	Divisor, dividend, quotient, division	
Links to Other Subjects/Areas		
Digital citizenship: Understand how to use board and computer division games safely and with ethical behaviour		
Science: Incorporate and match the use of division in the study of science		
Reading: Read and understand mathematical concepts and words related to division, sharing		
Physical Education: Use division as sharing when picking teams etc.		

	Main Content and Skills	Suggestions for	Differentiation
•	<u>ontent</u> Division facts with divisors 6, 7, 8, 9 Interpret division in	Time /Pace of Instruction Pace students by presenting a different format of division in different lessons and not all in the same lesson.	 Output/Assessment Vary the accuracy target for students who seem to have problems memorizing these division facts, but encourage them to use
• Sk	different ways Division Terms	<u>Quantity of work</u> Vary the quantity of work, giving some students worksheets with facts using one divisor at a time,	 different memorization techniques – adding on the divisor, using doubles etc. (see the unit on division in Grade 7 term 1).
•	Divide by subtracting Divide by sharing Memorize and Recall	before giving mixed practice.	• Allow students to use scallolding of counters to help memorize or explain the division facts.
	Memorize and Recall division facts		<u>Level of Support</u> Flash cards can be made with pictures of the division and not just the abstract division statement. Groups of students can use division flash cards and counters to give each other practice or play games. Discourage reliance on looking up the times table at the back of the exercise books.
			Input (Instructional delivery) Present patterns in the division of each divisor, e.g. determine the pattern in the 9 times table.

UNIT 3 GRADE 7 TERM 2

SECTION A UNIT TITLE: INTRODUCING FRACTIONS

ATTAINMENT TARGET 1A: Know the value of numerals, associate them with their names numbers, ordinals and use concrete objects to model patterns expressions and numbers

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Model factional parts of a whole object to tenths Differentiate between a) objects in parts or wholes, b) objects in equal parts /not in equal parts. Write and name fractions to tenths using symbols and words e.g. 2/4 or two fourths.	Give actual whole concrete objects (with lines for cutting) and ask students to break them cut them into smaller parts of equal size. Ask students to fold a sheet of paper in two parts open it up and colour one of the two parts. Say this is one half. Can you find one half among the fraction pieces? (Hold it up) Repeat the paper folding by folding in half again to get fourths (or quarters) – four equal parts. Note that each part is one fourth. Can you find fourths among the fraction pieces? (Hold it up) Relate half and fourths to real life situations half of a piece of cheese, sharing one object into two equal parts; then in four equal parts.	Identify a fraction Write symbols for fractions	Correctly model fractional parts of whole objects up to tenths Accurately write names of fractional parts using symbols and words Correctly label numerator and denominator of fractions Accurately order unit fractions Accurately identify problem situations that involve fractions Correctly name and write fractions from problem situations presented Accurately solve problems involving fractions

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Name and identify the a) numerator, b) denominator in a fraction symbol. Compare fraction pieces of the same sized whole and under-stand that the smaller fraction has more pieces e.g. one piece of tenths is smaller (in size) than one piece of fourths. Solve problems involving the identification of fractions of a whole	Introduce the word fraction: meaning that when there are equal parts, each part or groups of parts are called a fraction. Give pictures or wholes divided into unequal or equal amounts and ask students to identify which ones show fractions. Demonstrate how to write a fraction that corresponds to picture or actual objects. This is a fraction (2)/4 it means 'two fourths'. The number of equal parts shaded (2) is on top, and the total number of equal parts in the whole (4) is at the bottom, and there is a line between them. Introduce the names numerator and denominator and show these numbers in the symbol for a fraction.		
fractions of a whole. e.g. a cake was cut into 5 equal parts, what fraction is one slice of the cake.			

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Create multiplication stories from pictures and multiplication sentences. Identify addition and multiplication situations.	 Give students guided practice in naming parts of a whole or shaded or unshaded parts of pictures showing equal parts of a whole. a) What part of the diagram is shaded? How many parts are there in all? Write the fraction. b) On the diagram below, shade in ³/₁₀ Further practice can be given in worded problems, helping students to draw a diagram from information given in the problem. e.g. a) A cake is shared equally among 5 friends. What fraction will each friend get? b) A pie is cut in 6 equal slices, John got two slices. What fraction of the pie did John get? 		
	' '		

- ✓ Use fractional number to identify one or more equal parts of a whole object
- ✓ Write and name fractions to tenths using symbols and words e.g. $\frac{2}{4}$ or two fourths or two quarters

	Points to Note		Extended Learning
•	This unit introduces a set of numbers that is different from the whole and counting numbers that were being used in the programme so far. Allow students to know the differences between whole and fractional numbers – what the numerals look like, what they mean. Refrain from using fruits to show fractions, if using food, use pizza, cake or chocolate bars; these can be easily divided as they are flat even shapes.	•	Link the number of similar fraction pieces that can be put together to make one whole with the number of pieces into which the whole was cut. Explore the idea of a fraction of a set of objects and use fraction symbols to write the equal parts. e.g. How many cars are one fourth of a group of 12 cars? It introduces a set of numbers that is different from the whole and counting numbers that were being used in the programme so far. Allow students to know the differences between whole and fractional numbers – what the numerals look like, what they mean.
м	aterials and Resources	Ke	ey Vocabulary
Fr ho w	action piece sets up to tenths, paper strips, squares, charts with ow to write a fraction – numerator, denominator, work sheets ith parts to be shaded, fractions to be identified	Fra	actions, numerator, denominator, equal parts, quarters, fourths

Links to Other Subjects/Areas

Extended thinking and problem solving: Use fractions when solving problems in different situations

Digital citizenship: Understand how to use computer games safely and with ethical behaviour

Science:

Reading: Read and understand mathematical concepts and words related to fractions

Physical Education: Most games are played in sections for example the first half and the second half (football). Some are played in quarters (netball and basketball)

Main Content and Skills	Suggestions for	Differentiation
Content	Time /Pace of Instruction	Output/Assessment
 Fractional parts to tenths of wholes <u>Skills</u> Writing fractions Identifying a fraction 	Allow sufficient time for students to use paper folding, and concrete manipulatives to understand the idea of a fraction and identify fractional parts. Quantity of work Allow students to work with different fractional parts in groups up to tenths. Give these parts in different lessons or exercises e.g. a) 2, 4, 8; b) 3, 6, 9; c) 5, 10 d) 7	 Ask students questions that use a lot of scaffolding – paper folding, or other concrete aids to assist with identifying fractions of a whole orally (say the fraction), then written (write the fraction). Other students may be able to use pictorial representations – such as bars with parts shaded, pictures of fraction pieces to identify given fractions, write fractions symbol and to show a given fraction.
		Level of SupportUse concrete manipulative and pictures or bars to understand fractional parts. Allow students to work in groups to identify orally, and write fractional parts of whole.Input (Instructional delivery)Allow students to use a variety of representations, paper folding, concrete manipulatives to understand fractional parts of a whole.

UNIT 3 GRADE 7 TERM 2

SECTION B UNIT TITLE: ADD AND SUBTRACT MONEY

ATTAINMENT TARGET 1B: Use the basic operations, number relationships, patterns, number facts, calculators and appropriate software to compute and estimate in order to solve real world problems.

ATTAINMENT TARGET 4: Employ algebraic reasoning through the use of expressions, equations, and formulae to interpret, model and solve problems involving unknown quantities.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Add whole number amounts of money to make \$99 with/ without regrouping Subtract whole number amounts of money from up to \$99 with/without regrouping. Exchange coins and groups of coins with equivalent value e.g. \$10 coin and \$20 coin in \$1 coins. \$50 note in \$10, \$1	Show how to transfer the skills in addition and subtraction with whole number to whole number amounts of money. Demonstrate that the same rules and skills of adding by counting one, or by adding using place value apply when adding money. Allow students to work in groups with play \$20, \$10 coins and the \$50 note to show equivalent values in other coins. Use money in purchasing situations – e.g. Joe bought one popcorn for \$30 and a cookie for \$50, how much did Joe spend in all? Pam bought a pencil for \$50 and paid with three \$20 coins, how much change will she get?	Adding Subtracting Recognizing money	Correctly add whole number amounts of money to a sum no greater than \$99, without regrouping Use regrouping to correctly add whole number amounts of money up to a sum of \$99 Accurately subtract whole number amounts of money from totals no greater than \$99 without regrouping Use regrouping to accurately subtract whole number amounts from a total no greater than \$99 Identify correctly appropriate operation to be used in problems involving money

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Solve problems using addition skills to tell the total cost of items purchased Solve problems using subtraction skills to tell the amount of change in a purchasing situation.			Write correct number sentences to represent information given in problems involving money Use addition to solve problems involving money accurately Use subtraction to correctly solve problems involving money
Check answer to subtraction by counting on from the total cost as a cashier would in a purchasing situation.			

Learning Outcomes	
 Students will be able to: ✓ Add and subtract amounts of money ✓ Add and subtract to solve problems within purchasing site 	tuations.
Points to Note	Extended Learning
Review and expand adding and subtracting whole numbers to adding and subtracting whole number amounts of money in	• Introduce the idea of a shopping list with more than one item to be purchased. Have different groups work out the total cost

Materials and Resources	Key Vocabulary	
Set up a class shop with items (small box of toothpaste, bottle of water, packs of biscuits) and a display board with the prices of items in whole numbers of dollars close to the real prices but within the computation skills of numbers to \$99, provide play money - \$10, \$20, \$50 \$1, \$5	Money, dollars, cents, add, subtract, shop, shopping	
Links to Other Subjects/Areas		
Extended thinking and problem solving: Using money in problem solving		
Digital citizenship:		
Science:		
Reading: Stories / List with prices of goods in dollars only		
Physical Education:		
Consumer Mathematics: Using money including making change in a purchasing situation.		

Main Content and Skills	Suggestions for Differentiation		
 <u>Content</u> Add & Subtract money Solve problems in a shopping situation <u>Skills</u> Addition Subtraction 	Time /Pace of Instruction Students are to apply skills in addition and subtraction of whole numbers to amounts of money. This should be an easy transfer for many students who have practical experience with money.	Output/Assessment Vary the tasks by using different levels of addition and subtraction skills including with or without regrouping Level of Support Class shop can serve skill levels of different students Input (Instructional delivery) Review addition and subtraction skills with whole number amounts and show how to transfer these to amounts of money.	

UNIT 4 GRADE 7 TERM 2

SECTION A UNIT TITLE: TIME ON THE CLOCK AND CALENDAR

ATTAINMENT TARGET 2: Use the correct units, tools and attributes to estimate, compare and carry out the processes of measurement to given degree of accuracy

Objectives	Teaching /Learning Activities	Key Skills	Assessment	
Students will:	Show students how to tell the time beginning	Estimating time	Correctly model multiplication	
Tell /show time in a)	with the hour – point out the hour hand and	Tell time weine e ele ele	using objects or pictures	
hour and minutes b)	the minute hand on the clock.	Tell time using a clock	Write correct number contences	
a.m. and p.m. on a 12-			to match nictorial or concrete	
hour analogue clock	Help students to practise telling or showing		representation of multiplication	
(read the clock)	time in hours e.g. What time is shown on the			
Associate time with	clock? Draw in the hands to show?		Correctly identify equivalent	
events throughout the	Introduce the unit – minutes, count the minutes		multiplication facts	
school day e.g.	in 5's as the minute hand moves from 12 back		Make accurate observations about	
timetable	to 12 on the clock. Ask: How many minutes are		patterns in multiplication tables	
Know the units of time	in 1 hour?		Accurately regits multiplication	
- hour, minutes, and	Help students to practise telling or showing		facts	
their relationship 60	time in hours and minutes e.g. a) What time is			
minutes = 1 hour.	shown on the clock? b) Draw in the hands to		Correctly model given	
Estimate amounts of	show a) 5:30 b) 10 minutes past/to ?		multiplication scenarios	
time spent on			Correctly identify situations that	
different activities in 1,	$11 \frac{12}{10} \frac{1}{2}$ $12 \frac{11}{10} \frac{12}{2}$		involve the use of multiplication	
5, 15 minute intervals.				
	a)			
	, s, s,			

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Write time using formats such as 5:15 a.m.; 'fifteen minutes past five O' Clock in the morning' Read and interpret time on the Calendar using units – week, day, month, year and the relationships Identify and associate given dates on a calendar with events – e.g. anniversary of birth days (day and month), school holidays etc.	 Introduce a.m., p.m. as the clock only shows 12 hrs and there are 24 hours in one day. So there are two times that the clock shows as 2:00 one in the morning, one in the afternoon. In pairs, document the duration for various activities such as lunch, break, devotion or a class session and tell how many minutes/hours each will take for a week/month. Give students various situations and have them model them using concrete or pictorial representations. Give students the multiplication sentence or a picture and ask them to make up or create the multiplication word story that fits the situation. 	Tell time using a calendar	Observe as students use the calendar for the 2 weeks of the unit. The calendar is also a data organising tool and information can be determined from reading the calendar such as: What day of the week is the 15th of this month? Peter's little brother was born two weeks ago, what date was he born? Build a timeline of historic events in the history of your parish

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Understand that a			
date has a day of the			
week, a month and a			
year and write dates in			
different formats e.g.			
5th January 2013;			
05/01/2013			
(dd/mm/yyyy)			
Associate dates with historic Jamaican events (link with Social			
Studies or Civics)			
Solve problems using the current year's calendar to find day of the week, e.g. What day of the week is a given event? What date is the last Thursday of January 20 ?			

Students will be able to:

 \checkmark Understand how to tell time using the clock and the calendar

Points to Note	Extended Learning		
 During this section of the unit set up a station with a large 12 hr. clock that students can use for different activities A digital clock uses a numeric display to indicate the time. While an analogue (analog) clock shows the time using hands that spin around a dial and point to the time. A digital clock is therefore much easier to use to tell the time. 	 Tell time using the second hand or use a timer in seconds. Tell time using the 24 hour clock as in the army or airlines 		
Materials and Resources	Key Vocabulary		
Working analogue or analog clock, if possible, worksheets with blank clock faces (Note however that on an actual clock the hour hand moves as the minute hand completes partial turns), class calendar – current year	Time, clock, calendar		
Links to Other Subjects/Areas			
Science: Time events that happen in Science			
Reading: Read and understand mathematical concepts and words related to time on the clock and calendar			
Physical Education: Time for races use minutes and seconds (seconds are introduced in the extended learning).			
Social Studies/Geography: Understand time – day, night and year in terms of the rotation of the rotation of the earth and the movement of the earth around the sun.			

Main Content and Skills	Suggestions for Differentiation		
 Content Tell time using the clock Tell time using a calendar Skills Telling time Reading the calendar 	Time /Pace of Instruction Give students a lot of practice in telling time on the 12 hour clock (analogue or analogue clock) Quantity of work Assign work beginning with time on the hour, then half hour and then in minutes depending on the student's skill	 Output/Assessment Use time pieces (clocks, watches) and pictures when assessing the skills of telling time using the analogue clock Students can be given a calendar and asked questions orally and written using data on the calendar <u>Level of Support</u> Assign students in teams to read the clock on different days <u>Input (Instructional delivery)</u> Use a clock and give students who need the practise the task of reading the time at different intervals during the day creating a list of times and events. Some students may have a difficulty using pictures of clock faces as the hour hand moves as the minute hand completes partial turns on an actual clock. 	

UNIT 4 GRADE 7 TERM 2

SECTION B UNIT TITLE: MULTIPLY BY 1 TO 5 AND 0

ATTAINMENT TARGET 5: Collect, organize, interpret and represent data and make inference by applying knowledge of statistics and probability.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will:	Ask each student to write the month of their	Use and interpret	Use tally marks correctly to record
Collect data relevant	birth on a piece of paper (equal sizes about 2	tally marks	data
to students such as birth month, weight, height and most popular cars Use tally marks to record frequency	cm x 4 cm). Show how to construct a bar chart by putting the axes, (months – horizontally, and number of persons – vertically), and pasting each piece of paper to form columns, at the name of the birth month.	Create frequency tables Create bar charts Read and interpret	Read data and interpret tally marks correctly Accurately collect relevant data Correctly construct frequency
Create frequency table with tally marks Understand the process of building a bar chart of the data collected – axis, scale, heights of bars etc. Read literal data on a bar chart e.g. How many persons were born in January?	Answer questions using the bar chart such as: a) How many persons were born in January? b) In which month were the most persons born? Students could i) expand the data by asking family members, other classes ii) construct a frequency table with the data on the birth month and iii) use the table to construct the bar chart.		Accurately represent data on frequency table Correctly answer direct questions about data represented on bar charts Make accurate inferences about information represented on a bar chat

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Read data on a bar			
chart that is			
comparative or			
interpretive e.g. In			
which month were			
most persons born?			

Extended Learning
 Use bar charts in other subjects and to record other data Project (1.5 weeks): Ask students to collect data on the most popular brand of cars, and present data on a bar chart. Quiz them orally on information in the bar chart. (Note: Teachers may need to move these lessons earlier in the unit to give enough time for the project.) Have students discuss situations in which this information

Materials and Resources	Key Vocabulary		
Flip chart paper, same sized cards (approximately 3 cm by 6 cm)	Bar chart, axis, horizontal, vertical		
Links to Other Subjects/Areas			
Digital citizenship: Discuss how apps/ websites capture and report on the visitors/views/users of websites, social media pages and online shopping platforms			
Science: Read bar charts with scientific data			
Physical Education: Use tally marks to record scores when playing games			
Social Studies: Read and interpret bar charts on utility bills that show utility usage trends			

Main Content and Skills	Suggestions for Differentiation		
 Content Collect data Create a bar chart Interpret a literal and comparative data on a bar chart 	Time /Pace of Instruction Give practical examples of use of bar charts – simple data Quantity of work Allow some students to use simple charts with 3 or 4 bars	 Output/Assessment Give some students a bar chart and ask students a variety of literal and comparative questions Other students may be able to build a bar chart in teams or groups 	
 Skills Reading a bar chart Building a bar chart 		<u>Level of Support</u> Grid paper may help some students keep the bars straight / even	



APSE III –Gr. 7 TERM 3	Theme: What is Number?	Theme: Together and Apart	Theme: Space and Measures	Theme: Equal Groups
 Benchmarks: Understand whole number as amount of objects in a group Understand fractional number as showing parts of a whole. Use base 10 place value system to write numbers Compute and solve problems with whole, fractional numbers Compare, and measure mass, volume Observe and name basic shapes in the environment using their properties Recognize and use Jamaican money 	AT#1A: Know the value of numerals, associate them with their names, numbers, ordinals and use concrete objects to model patterns expressions and numbers.	AT#1B : Use the basic number operations, relationships, patterns, facts, calculators and software to compute and estimate in order to solve real world problems.	AT#3: Explore paths, geometric shapes and spacewithin the environment AT#2: Use the correct units, tools and attributes to estimate, compare and measure.	AT#1B: Know the value of numerals, their names, numbers, ordinals and use concrete objects to model AT#4: Use the basic number operations, relationships, patterns, facts, to compute and solve real world problems
	Unit 1: Whole numbers and money to 999 (hundreds) (3 weeks)	Unit 2A: Add subtract whole numbers –hundreds: Unit 2B. Multiply and divide tens and ones (3 weeks)	Unit 3A: Mass and Volume Unit 3B: Quadrilaterals and symmetry in the environment (2 weeks)	Unit 4: Fractions: Add, Subtract, Compare on equal denominators (3 weeks)
	Content outline: Count by hundreds to tell how many objects; Understand that 1 group of hundred is same as 10 groups of ten objects;	Content outline : Add, subtract hundreds using place value with regrouping; Multiplication and division facts with up to 9's;	Content outline: Understand ideas of mass by using experiences with actual objects, and labels Concepts of heavier, lighter; unit – kilogram; instrument - balance, or scale	Content outline: Review concepts of fractions to tenths; Fractions of a set of objects.

Mathematics Scope and Sequence for APSE III Grade 7 (Year 1) – Term 3

APSE III –Gr. 7 TERM 3	Theme: What is Number?	Theme: Together and Apart	Theme: Comparisons in Space Measures, and Number	Theme: Equal Groups
	Content Outline (cont'd): Match numerals to 999 with number names and amount of objects;	Content Outline (cont'd):Multiply 2 digit wholenumbers by 1 and 2 digitswhole numbers with	Content Outline (cont'd): Understand ideas of volume / capacity by using containers of different sizes and varying amounts of liquids. Concepts of more or less, full empty; unit - litre; measuring cup; Sort and name quadrilaterals by properties such as: number of sides and corners. Line of symmetry by folding.	Content Outline (cont'd): Add and subtract fractions with equal denominator using fraction pieces or
	Write standard and extended numerals using hundreds, tens and ones;	regrouping; Link multiplication with arrays;		paper folding. 1 as a fraction. Subtract from one whole
	Compare, order sets of numbers using a number line. Money – recognize \$100 note, build \$100 with coins and notes \$50, \$20, \$10, \$1, Write number names and link to cost of goods.	Divide 2 digit whole numbers by 1- digit whole number using place value and concrete /pictorial representation. Solve a mix of problems that involve addition; subtraction, multiplication and/or division Use Polya's four steps or other concrete models in		Compare fractions telling larger, smaller of a group of fractions – equal denominator; Consolidate and review number and computation skills, Remainder in a division as a fraction of the divisor
	Skills: Count, group, write numerals, number words	Skills: add by putting together, counting on; subtract by taking away, and/or crossing out.	Skills : compare, measure with the litre, kilogram; sort and name quadrilaterals, find symmetry.	Skills : write fractions, add and subtract fractions – equal denominators; compare fractions

APSEIII –Gr. 7 TERM 3	Theme: What is Number?	Theme: Together and Apart	Theme: Comparisons in Space Measures, and Number	Theme: Equal Groups
	Vocabulary (written): Voca hundred. How many? plus,	Vocabulary (written): add, plus, sum; take away,	Vocabulary (written): litre, kilo-gram;	Vocabulary (written): fraction
		Multiply, divide, array	Vocabulary (oral): quadrilateral, square, rectangle, parallelogram; symmetry	Vocabulary (Oral): numerator, denominator,
UNIT 1 GRADE 7 TERM 3

UNIT TITLE: WHOLE NUMBERS AND MONEY TO 999

<u>ATTAINMENT TARGET 1A</u>: Know the value of numerals, associate them with their names, numbers, ordinals and use concrete objects to model patterns, expressions and numbers.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Count by hundreds to tell how many objects are in a group of up to 900 objects Write numerals and matching word names	Give experiences of counting larger amounts by grouping in tens, hundreds. Challenge students to show (prove) that 10 groups with ten objects each is the same amount as 1 group of 100 objects. Students work in pairs or groups to estimate and then count the number of peas, beans in a	Group Write numerals – standard, expanded Write number words Associate groups of objects with a	Count and group and objects accurately. Use base 10 manipulatives to accurately model 3-digit numbers. Correctly write in standard form, numbers written in expanded
up to 999 to tell number of objects. Write amounts using place value – hundreds, tens and ones.	jar (teacher puts in different amounts e.g. about 250 objects in each jar). Set up one jar for each group with small stones, peas etc. Have each person in the group predict the number of objects they think is in the jar. Have students count by first grouping in tens to get a total amount. Whose estimate was closest?	objects with a number Order numbers Compare numbers	notation. Write 3-dgit numbers in expanded form correctly. Correctly identify the greater of two 3-digit numbers
Understand that a) one group of hundred is the same as ten groups of ten objects; b) one hundred is one more than 99.	Show students how to write different amounts using hundred, tens and ones e.g. 132 is 1 group of a hundred, 3 groups of tens, and 2 ones. 132 = 100 + 30 + 2 or 132= 1 x 100 + 3 x 10 + 2 x 1		Correctly arrange a group of 3- digit numbers in ascending/descending order. Correctly place missing 3-digit numbers on a number line.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Use expanded	Show how to count in 100's to 900 on sections		
notation and standard	of the number line filling in missing numbers		
format to show	e.g.		
amounts up to 999. E.g. 176 = 1 x 100 + 7 x 10 + 6 x 1 (176 = 100 + 70 + 6)	0 100 300		
, Write numbers on a number line in 100's, filling in missing numbers	Use the number line section or other means to compare two or more numbers telling the greater. Compare hundreds place, compare tens place, compare ones place.		
Use the number line to compare two or three numbers telling the larger, smaller.			

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Recognize notes in	Present the \$100 note and ask students to give	Match notes and	Correctly identify target Jamaican
\$500, \$1000 and the	note to give the amounts in multiple notes e.g.	money	notes
amounts in up to 9	3 x \$100 =?		Correctly state the amount of money represented by group of
\$100 Hotes.	In groups have students tell how many \$20,		
Give the amount of	\$10, \$1 are in one \$100; three \$100; seven \$100 etc. (give the groups one or two amounts)		
that would be	Procent a channing situation and ask students		
equivalent to the \$100 note.	to determine different combinations of notes		
Determine an amount	and coins to match exactly a given cost of an		
of notes and coins that			
exactly match a given cost of an item.	\$130		
	\$150		

- ✓ Read and write whole numbers to hundreds
- ✓ Compare and order whole numbers up to hundreds
- ✓ Identify notes and coins in the Jamaican money and match combinations of these with the price of objects.

	Points to Note	Extended Learning
٠	In this unit number skills are expanded to writing 3 digit	Students who can manage this unit could move on to one place of
•	numerals, using similar techniques to writing 2 digit numerals. In this section of the unit, Jamaican money is introduced and linked to whole numbers to 999.	thousands

Materials and Resources		Key Vocabulary	,
Number line template; place value chart in hundreds, tens, ones; digit cards: 0 to 9; play money \$1000, \$500, \$100, \$20, \$50, \$10, \$1		Hundreds, place form, expanded	value, money, coins, numeral, number, standard form
Links to Other Subjects/Areas			
Digital citizenship: Understand h	now to use computer number gam	es safely and with	ethical behaviour
Science:			
Reading:			
Consumer Arithmetic/ Buying and selling: Use money skills to match cost of purchases.		ses.	
Main Content and Skills	Suggestions for Differentiation		
			Differentiation
<u>Content</u>	Time /Pace of Instruction		Output/Assessment
Content Whole numbers to	<u><i>Time /Pace of Instruction</i></u> Move at a steady pace, allowing s	students to get	 <u>Output/Assessment</u> Allow the use of manipulatives – individual
Content Whole numbers to hundreds Notes and coins in the	<u><i>Time /Pace of Instruction</i></u> Move at a steady pace, allowing s an understanding of amounts up Students who have not vet maste	students to get to 999. ered tens and	 <u>Output/Assessment</u> Allow the use of manipulatives – individual place value charts and digit cards
 <u>Content</u> Whole numbers to hundreds Notes and coins in the Jamaican money and 	<u>Time /Pace of Instruction</u> Move at a steady pace, allowing s an understanding of amounts up Students who have not yet maste ones need to review this before r	students to get to 999. ered tens and noving to	 <u>Output/Assessment</u> Allow the use of manipulatives – individual place value charts and digit cards <u>Level of Support</u>
 <u>Content</u> Whole numbers to hundreds Notes and coins in the Jamaican money and combinations of these to 	Time /Pace of Instruction Move at a steady pace, allowing s an understanding of amounts up Students who have not yet master ones need to review this before r hundreds	students to get to 999. ered tens and noving to	 <u>Output/Assessment</u> Allow the use of manipulatives – individual place value charts and digit cards <u>Level of Support</u> Allow students to work in groups and vary the
 <u>Content</u> Whole numbers to hundreds Notes and coins in the Jamaican money and combinations of these to match with the price of 	Time /Pace of Instruction Move at a steady pace, allowing s an understanding of amounts up Students who have not yet maste ones need to review this before r hundreds	students to get to 999. ered tens and noving to	Output/Assessment • Allow the use of manipulatives – individual place value charts and digit cards <u>Level of Support</u> Allow students to work in groups and vary the amounts of objects to be counted if necessary.
 <u>Content</u> Whole numbers to hundreds Notes and coins in the Jamaican money and combinations of these to match with the price of objects. 	Time /Pace of Instruction Move at a steady pace, allowing s an understanding of amounts up Students who have not yet maste ones need to review this before r hundreds	students to get to 999. ered tens and noving to	 <u>Output/Assessment</u> Allow the use of manipulatives – individual place value charts and digit cards <u>Level of Support</u> Allow students to work in groups and vary the amounts of objects to be counted if necessary. <u>Input (Instructional delivery)</u>
 Content Whole numbers to hundreds Notes and coins in the Jamaican money and combinations of these to match with the price of objects. Skills 	<u>Time /Pace of Instruction</u> Move at a steady pace, allowing s an understanding of amounts up Students who have not yet maste ones need to review this before r hundreds	students to get to 999. ered tens and noving to	Output/Assessment • Allow the use of manipulatives – individual place value charts and digit cards <u>Level of Support</u> Allow students to work in groups and vary the amounts of objects to be counted if necessary. <u>Input (Instructional delivery)</u> Work with concrete, pictorial and then abstract
 Content Whole numbers to hundreds Notes and coins in the Jamaican money and combinations of these to match with the price of objects. Skills Read and write numbers 	Time /Pace of Instruction Move at a steady pace, allowing s an understanding of amounts up Students who have not yet master ones need to review this before r hundreds	students to get to 999. ered tens and noving to	 <u>Output/Assessment</u> Allow the use of manipulatives – individual place value charts and digit cards <u>Level of Support</u> Allow students to work in groups and vary the amounts of objects to be counted if necessary. <u>Input (Instructional delivery)</u> Work with concrete, pictorial and then abstract representations.
 Content Whole numbers to hundreds Notes and coins in the Jamaican money and combinations of these to match with the price of objects. Skills Read and write numbers Compare and order 	<u>Time /Pace of Instruction</u> Move at a steady pace, allowing s an understanding of amounts up Students who have not yet maste ones need to review this before r hundreds	students to get to 999. ered tens and noving to	 <u>Output/Assessment</u> Allow the use of manipulatives – individual place value charts and digit cards <u>Level of Support</u> Allow students to work in groups and vary the amounts of objects to be counted if necessary. <u>Input (Instructional delivery)</u> Work with concrete, pictorial and then abstract representations.
 Content Whole numbers to hundreds Notes and coins in the Jamaican money and combinations of these to match with the price of objects. Skills Read and write numbers Compare and order numbers Deservice level is even in the set or the set	<u>Time /Pace of Instruction</u> Move at a steady pace, allowing s an understanding of amounts up Students who have not yet maste ones need to review this before r hundreds	students to get to 999. ered tens and noving to	 <u>Output/Assessment</u> Allow the use of manipulatives – individual place value charts and digit cards <u>Level of Support</u> Allow students to work in groups and vary the amounts of objects to be counted if necessary. <u>Input (Instructional delivery)</u> Work with concrete, pictorial and then abstract representations.

UNIT 2 GRADE 7 TERM 3

SECTION A UNIT TITLE: ADD, SUBTRACT WITH UP TO 3 DIGIT WHOLE NUMBERS

ATTAINMENT TARGET 1B: Use the basic operations, number relationships, patterns, number facts, calculators and appropriate software to compute and estimate in order to solve real world problems.

ATTAINMENT TARGET 4: Employ algebraic reasoning through the use of expressions, equations, and formulae to interpret, model and solve problems involving unknown quantities.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Objectives Students will: Add two or more 3- digit numbers using place value without regrouping any total. Add two or more 3 digit numbers with regrouping totals of a) ones to tens; b) tens to hundreds c) both ones and tens Add a mix of two or more 3, 2, or 1-digit numbers with and without regrouping.	Teaching /Learning ActivitiesReview how to add by joining groups and counting in ones or 'counting on' and point out that these strategies work for small numbers even with 175 + 5, but for larger numbers such as: $341 + 175$ we need a different strategy .that of using place value.The place value strategy was shown with 2 digit numbers in Term 2. Demonstrate this strategy with and without regrouping while using pictorial place value mats, concrete bundles of tens etc. e.g. to add: 341 and 175 first write both numbers with expanded numerals – $321 = 300 + 40 + 1$ $175 = 100 + 70 + 5$	Key Skills Add whole numbers Regroup when adding	Assessment Correctly model multiplication using objects or pictures Write correct number sentences to match pictorial or concrete representation of multiplication Correctly identify equivalent multiplication facts Make accurate observations about patterns in multiplication tables Accurate recite multiplication facts Correctly model given multiplication scenarios
			involve the use of multiplication

Objectives	Teaching /Learning Activities	Key Skills	Assessment
	Then we can add ones to ones, tens to tens, hundreds to hundreds to get 321 = 300 + 40 + 1 175 = 100 + 70 + 5 = 400 + 110 + 6 516 = 500 + 10 + 6 When 40 is added to 70 it gives 110 (11 groups of ten) which can be regrouped to give 1 group of 100 + 1 group of 10. Allow students to practise using the expanded notation along with concrete or pictorial representations, then just the standard numerals e.g. $3^{1} 4 1$ + 1 7 5		
	5 1 6 Discuss unconventional ways of adding. Eg. 56 + 29 = 60 + 25 = 85 56 + 29 = 55 + 30 = 85		

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Subtract from a 3 digit number a smaller number without regrouping. Subtract from a 3 digit number (including multiples of 100) a 3, 2, or 1 digit number in which a) tens, b) hundred c) both tens and hundreds are regrouped.	The place value strategy was shown with 2 digit numbers in Term 2. Show students how to subtract: e.g. 175 from 340, while using concrete bundles of tens, pictorial place value mats, then the abstract symbols. See below. Subtraction with regrouping both tens and hundreds i. write both numerals in expanded form. 340 = 3 hundreds + 4 tens + 0 ones - 175 = - (1 hundred + 7 tens + 5 ones) ii. <u>Let's subtract ones</u> a) Do we have enough loose ones in 340 to take 5? b) No! c) regroup taking one ten from the 4 tens leaving 3 tens. d) exchange the one ten to give ten single ones; e) then subtract 5 from 10 ones to give 5. This is how it is written: 340 = 3 hundreds + 4 ³ tens + ¹⁰ 0 ones - 175 = - (1 hundred + 7 tens + 5 ones) + 5 ones	Subtract whole numbers Regroup in subtraction	

Objectives	Teaching /Learning Activities	Key Skills	Assessment
	iii. Lets' subtract tens. We now have 30 (3 tens) to take 70 (7 tens) a) Do we have enough tens shown in the larger number? b) No! c) regroup taking one hundred from 3 leaving 2 hundreds d) exchange the 1 hundred and regroup this as 10 tens e) add 10 tens to 3 tens to get 13 tens f) take 7 tens from 13 tens to give 6 tens $340 = 3^2$ hundreds + 4^{13} tens + 10 0 ones - 175 = - (1 hundred + 7 tens + 5 ones) + 6 ten + 5 ones iv. Let's subtract hundreds - one hundred from 2 hundreds gives 1 hundred. The answer is: 1 hundred + 6 tens + 5 ones or 165. Allow students to practise using the expanded notation along with concrete or pictorial representations, then just the standard numerals. In standard numerals the subtraction would be: $3^2 4^{13} 10$ -17 5 1 6 5		
Use addition to check answers to subtraction situations.	Demonstrate how to check your work! If the subtraction is correct 175 +165 would give you 340.	Check answers to subtraction by adding	Use addition correctly to verify answers from subtraction

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Use addition, subtraction, skills and strategies to solve problems by using a systematic approach, and concrete or pictorial models	Introduce a systematic way to approach a word or other problem situation Understand: What information is given? What am I asked to find? What do I know about the situation? Is it part-part whole or a comparison? Plan: What will you do to find the answer e.g. draw a picture, write a number sentence, model with concrete objects, add, subtract? Answer: Do what was indicated in step 2, and find an answer. Check	Solve problems using the UPAC steps	Correctly identify the appropriate operation to be used in problem solving situations Accurately solve problems involving addition and subtraction

- ✓ Add three digit numbers without/ with regrouping once or twice
- ✓ Subtract from a three digit number another three or two digit number without/with regrouping once or twice.
- ✓ Solve problems using addition or subtraction of up to 3 digit numbers

	Points to Note	Extended Learning
•	Use the pictorial or concrete bundles of ten, hundreds, or the place value mats to demonstrate each step in the process of the addition and subtraction while writing the abstract symbols.	

Materials and Resources	Key Vocabulary	
Place value mats or Dienes blocks	add, addition, subtract, subtraction	
Links to Other Subjects/Areas Digital citizenship: Understand how to use board and computer addition games safely and with ethical behaviour		
 Science: Use addition and subtraction in the study of science. Reading: Read and understand mathematical concepts and words related to addition, counting, subtract. Physical Education: Use addition and subtraction while participating in physical education minor or major games. 		

Main Content and Skills	Suggestions for Differentiation		
 <u>Content</u> Add three digit numbers without/ with regrouping once or twice Subtract from a three digit number another three or two digit number without/with regrouping once or twice. Solve problems using addition or subtraction of 	<u>Time /Pace of Instruction</u> Reduce the size of the numbers for some students (if needed) using only two digit numbers.	 <u>Output/Assessment</u> Allow students to use manipulatives or other devices to assist the demonstration of their competence in this area. <u>Level of Support</u> Have students work in groups to demonstrate the addition and subtraction using manipulatives before writing the abstract numerals. <u>Input (Instructional delivery)</u> 	
 addition of subtraction of up to 3 digit numbers. Skills Add with regrouping Subtract with regrouping Solve problems using UPAC system 		Use manipulatives to demonstrate the regrouping skills.	

UNIT 4 GRADE 7 TERM 1

UNIT TITLE: MULTIPLICATION AND DIVISION WITH UP TO 3 DIGIT WHOLE NUMBERS

ATTAINMENT TARGET 1B: Use the basic operations, number relationships, patterns, number facts, calculators and appropriate software to compute and estimate in order to solve real world problems involving fractions, percentages and decimals.

ATTAINMENT TARGET 4: Employ algebraic reasoning through the use of expressions, equations, and formulae to interpret, model and solve problems involving unknown quantities.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Recall memorized multiplication facts and division facts with up to 9's. Multiply a 1 or 2 digit whole number by 10 orally and fluently know the 10 times table. Know and use the rule: each digit needs to be multiplied (distributive rule of multiplication over addition)	Use a class quiz to check students' ability to recall multiplication and division facts (up to 9 times table). Use the place value chart and patterns to show how multiplication by ten changes ones to tens, e.g. 2 ones x 10 = 2 tens; and tens to hundreds e.g. 2 tens x 10 = 2 hundreds; 5 tens x 10 = 50 tens or 5 hundreds Challenge students in groups to figure out how to multiply a) 34×2 b) 226×3 using expanded notation. The answers can be checked by adding.	Multiply 2 or digit whole numbers Regroup once or twice when multiplying whole numbers	Correctly recite multiplication and division facts up to the 10's. Accurately multiply a 1-digit or 2- digit number by 10 orally Accurately multiply a 3-digit number by a 1-digit number without regrouping. Accurately multiply a 3-digit number by a 1-digit with regrouping. Use addition correctly to check answers to multiplication

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Multiply 3 digit numbers by a 1-digit number a) without b) with regrouping ones. Add numbers to check answers to multiplication. Divide 2-digit numbers by a 1-digit number to get a) a 1-digit quotient b) a 2-digit quotient. Check the answer to a division by multiplying. Identify the divisor, dividend, quotient, remainder in a division sentence or situation.	Use the division facts memorized to reinforce division of 2 digit to get a 1 digit answer without a remainder – e.g. $36 \div 6 =$ Introduce the idea of a remainder by discussing the answer to $40 \div 6$; since $36 \div 6 = 6$, and $42 \div 6 = 7$ the answer to $40 \div 6$ lies between 6 and 7, as there is not enough to form another group of 6's. Lets' divide. What is the answer to $48 \div 2$, $69 \div 3$? What do you notice about the numbers 48 and 2; 69 and 3? a) Remind students that division is sharingso $48 \div 2$ means: How many groups of 2's are in 48 , a) model the division with place value strips and expanded notation write 48 as 4 tens + 8 ones; How many 2's are in 4 tens 2 tens, how many 2's are in 8 4? The answer is 2 tens and 4 ones. $48 \div 2 = 24$	Divide 2 digit whole numbers Check answers to division by multiplying	Divide a 2-digit number by a 1- digit factor accurately without regrouping Divide a 2-digit number by a 1-dgit factor accurately using regrouping Accurately divide a 2-digit number by a 1-digit number without regrouping, with a remainder. Accurately divide a 2-digit number by a 1-digit number with regrouping and a remainder Use multiplication correctly to check answers to division.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Use, multiplication and division skills and strategies to solve problems by using a systematic approach, and concrete or pictorial models.	Introduce the division of 81 by 3 in a similar fashion but note that there are 20 groups of 3's in 80 with 2 tens remaining. Model with long division, and place value strips. 7 20 3)81 - 60 - 20 x 3 21 - 21 - 7 x 3 0 Answer 81 ÷ 3 = 27 Introduce a systematic way UPAC to approach a word or other problem situation Understand: What information is given? What am I asked to find? What do I know about the situation? Is this addition, comparison, fractions? Plan: What will you do to find the answer e.g. draw a picture, write a number sentence, model with concrete objects, add, subtract Answer: Do what was indicated in step 2, and find an answer. Check	Solve problems using the UPAC approach	Correctly identify the appropriate operation to be used in problem solving situations Use selected strategy to correctly solve problems

- $\checkmark~$ Recall and use multiplication and division facts
- ✓ Multiply a 1, 2 digit whole number by a 1 digit whole number, and by 10
- ✓ Multiply a 3 digit whole number by a 1 digit whole number
- ✓ Divide a 2 digit whole number by a 1 digit whole number
- ✓ Use the UPAC approach to solving problems

Points to Note	Extended Learning		
 Present different groups of 2 digit whole numbers as follows: a) divide to get a 1 digit answer with and without a remainder e.g. 36 ÷ 6; 50 ÷ 9 b) divide to get a 2 digit answer sometimes renaming e.g. i) 64 + 2 (In 64 each digit can be divided evenly by 2); ii) 81 +3 will also give a two digit answer but each digit is not divisible by 3. 			
Materials and Resources	Key Vocabulary		
Place value mats to demonstrate the division	Divide, division, remainder, quotient, divisor.		
Links to Other Subjects/Areas			
Digital citizenship:			
Science: Use multiplication and division skills in the study of science.			
Reading: Read and understand mathematical concepts and words related to multiplication and division			
Physical Education:			

	Main Content and Skills	Suggestions for Differentiation		
•	Multiplication and division facts Multiply a 1, 2 digit whole number by a 1 digit whole number, and by 10 Multiply a 3 digit whole number by a 1 digit whole number Divide a 2 digit whole number by a 1 digit whole number	Time /Pace of InstructionIncrease or decrease the time for learning theseskills for some students.Quantity of workIncrease the amount of exercises for studentswho need more practice.	Output/AssessmentAllow students to use place value mats or other manipulatives to demonstrate competence.Level of SupportAllow students to work in peer groups with multiplication and division flash cards to practice multiplication and division facts and skills.Input (Instructional delivery) Demonstrate the skills with manipulatives.	
<u>Sk</u> • •	<i>ills</i> Multiply Divide Solve problems			

UNIT 3 GRADE 7 TERM 3

SECTION A UNIT TITLE: MASS AND VOLUME

ATTAINMENT TARGET 2: Use the correct units, tools and attributes to estimate, compare and carry out the processes of measurement to given degree of accuracy.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Use word 'heavy' 'light' to compare attributes (mass) of objects. Identify the lighter, heavier of two objects on a balance or pictures of a balance with the objects. Identify goods in the market or supermarket that are sold by heaviness (weight). Associate heaviness with the weight of an object on a scale or a balance.	 Provide a collection of objects for students to explore the idea of 'heaviness'. Place objects on a balance two at a time and note which one is lighter, heavier or if they are the same. Draw the position of the arms of the balance in each instance. Create /prepare a picture of goods in a market and help students identify goods that are sold by the mass (weight). e.g. oranges have mass but are usually sold by the dozen, or bag. Introduce the metric International Standard for measuring mass – one kilogram by asking students to match objects on the balance against a kilogram mass. 	Use a balance Estimate a mass of 1 kilogram Recognize a scale	Correctly identify the lighter/heavier of two objects on a balance beam. Correctly state items/products that are sold by their mass Correctly identify instruments used to measure mass Correctly identify objects that are greater than 1kg, less than 1kg and about equal to 1 kg

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Identify objects in everyday life which have a mass of about 1 kilogram. Identify objects in everyday life that are measured in kilograms/ or using a scale. Understand 'volume' and 'capacity' as attributes of objects and name objects that have volume or capacity Understand that a given volume of liquid does not change when poured from one container to another. Understand the litre as a metric international standard unit of measuring volume or capacity of objects.	Provide experiences with volume and capacity by setting up stations with different sizes and shapes of containers – bottles, water and/or sand. Students say which container holds more by throwing sand or water from one container to the other. Identify liquids that are about 1 litre – look at empty containers or labels. Introduce the metric International Standard Unit – Litre and symbol L by use a measuring cup in litres to show how much is a litre. Demonstrate how to measure amounts of volume up to 5 L by using a measuring jug marked off in litres.	Identify objects with volume or capacity Estimate 1 litre Use a measuring jug marked in whole number of litres	Give reasonable explanations of the terms volume and capacity orally or in writing (using objects or pictures where necessary) Correctly identify volumes of liquid that are greater than, less than and about equal to 1L Use graduate measuring cups/cylinders/beakers correctly to measure the volume of liquids Accurately record measurements of volume using L

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Have a visual			
representation of an			
amount that is a			
litre/is not a litre.			
Use a litre measuring			
jug to measure and			
record volume of			
various objects			
recording the amounts			
using the word Litre or			
symbol L.			
Identify quantities in			
everyday life which are			
usually measured in			
litres.			

- ✓ Identify the lighter or heavier of two objects when put/shown on a balance
- ✓ Identify goods sold by their heaviness or measured on a scale
- ✓ Estimate objects that have a mass of about 1 kilogram
- ✓ Understand mass, volume, capacity as attributes of an object
- ✓ Estimate volume of liquid or containers with capacity of 1 litre
- ✓ Use a measuring jug marked in litres

Points to Note	Extended Learning	
 Volume is not just liquids as volume of sand, or the volume of material in a stone or solid object can be measured 	 Use a scale marked in kilograms to measure mass of objects Explore how the volume of objects is found by submerging them in water. 	
Materials and Resources	Key Vocabulary	
Objects with mass, 1 kilogram mass, balance, picture of goods in a market, empty containers to demonstrate capacity or volume, measuring jug marked off in 1 litres	Mass, balance, kilogram, capacity, volume, litre, measuring jug	
Links to Other Subjects/Areas		
Digital citizenship: Use math apps and websites to explore balance beam activities (http://www.mathplayground.com/balance_scales.html)		
Science: Use measurement skills for measuring mass, volume, capacity in the study of science, e.g. mass of and object		
Home Management: Use measures of mass, volume, capacity in recipes		

UNIT 3 GRADE 7 TERM 3

SECTION B UNIT TITLE: QUADRILATERALS AND SYMMETRY IN THE ENVIRONMENT

<u>ATTAINMENT TARGET 3</u>: Explore paths, geometric shapes and space and make generalization about geometric relationships within the environment.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Recall and give	Review ideas of points, lines, polygons, names of polygons	Recognize different	Review Basic geometry concepts – Points, lines, polygons
examples of points, lines, polygons in the environment. Understand	Give examples or worksheet with different quadrilaterals for students to cut out and sort using similar characteristics – opposite sides equal, sides parallel, type and size of each	quadrilaterals Recognize objects or patterns that have line symmetry	Ask students: How are the square and rectangle alike? How are they different?
quadrilaterals as polygons with four straight sides	corner. Introduce the names and properties for different quadrilaterals. Give a description and		Students will match names of quadrilaterals to diagrams or actual shapes
Identify quadrilaterals in the environment. Use the properties –	ask students to hold up the cut out and name them orally. e.g. I have four square corners, two pairs of opposite sides that are equal in length;		Give the property of a quadrilateral and ask student to identify the quadrilateral. I have
equality of length of opposite, and adjacent sides; parallel sides;	am I? (rectangle) Students in groups will build a table with the		Ask students to identify from a group of pictures or shapes those that have line symmetry.
type and size of corners to distinguish between types of quadrilaterals.	names and properties of each quadrilateral. Use pictures of a butterfly or other object that has symmetry when folded along a centre line to introduce the idea of symmetry.		

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Name different types of quadrilaterals:	Give students the hand out with symmetric and non-symmetric shapes and objects for students to tell which one has symmetry along a line.		
rhombus,	Give students incomplete patterns to complete		
trapezium.	simple cut outs where the paper is folded and a		
Determine line of symmetry in a pattern			
or objects in the environment			
Make symmetric shapes and patterns by folding, cutting and blobbing.			

- ✓ Recall and use ideas of points, lines, polygons
- ✓ Understand similarities and differences in the properties of different quadrilaterals to sort and name them.
- ✓ Recognize symmetry in a line in objects and shapes in the environment
- ✓ Create objects, or patterns with symmetry in a line.

Points to Note	Extended Learning
• It is sufficient at this stage for some students to recognize the similarities and differences between the quadrilaterals, even if they cannot name all of them.	 Use the quadrilaterals to make tessellations – repeating patterns that fit each other without gaps. Note the quadrilaterals that will not fit easily without gaps.
Materials and Resources	Key Vocabulary
Worksheets with different quadrilaterals – rectangle, square, kite, rhombus, parallelogram, trapezium, handouts with symmetric, non-symmetric patterns, sheets of paper for students to continue a pattern or draw their own symmetric pattern.	Quadrilaterals, rectangle, square, kite, symmetry
Links to Other Subjects/Areas	
Extended thinking and problem solving: Understand similarities ar	nd differences in quadrilaterals in the environment
Digital citizenship:	
Science:	
Reading:	

Main Content and Skills	Suggestions for Differentiation		
 Content Points, lines, polygons Similarities and differences in the properties of different quadrilaterals Name different quadrilaterals Symmetry in a line in objects and shapes in the environment Skills Recall geometric concepts Identify similarities and differences Name different quadrilaterals Create objects, or patterns with symmetry in a line. 	Time /Pace of Instruction Pace the instruction. Students do not have to know the names (written) of all the different types of quadrilaterals, the most common ones are the square, rectangle – the kite might be an interesting one for students. Be guided by their reading level. Quantity of work It is sufficient at this stage for some students to recognize the similarities and differences between the quadrilaterals, even if they cannot name all of them.	 <u>Output/Assessment</u> Allow some students to trace the shapes of the different quadrilaterals, or use the cut outs to answer questions about similarities and differences of the four-sided shapes. Observations could be made as students work with the idea of symmetry. <u>Level of Support</u> Give peer or teacher assistance in groups. <u>Input (Instructional delivery)</u> Treat this section of the unit in a practical way and not just a list of names. Students need to know practical differences. 	

UNIT 4 GRADE 7 TERM 3

UNIT TITLE: ADD, SUBTRACT AND COMPARE FRACTIONS

ATTAINMENT TARGET 1A: Know the value of numerals, associate them with their names, numbers, ordinals and use concrete objects to model patterns expressions and numbers.

ATTAINMENT TARGET 1B: Use the basic operations, number relationships, patterns, number facts, calculators and appropriate software to compute and estimate in order to solve real world problems involving fractions, percentages and decimals.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Review concepts of writing fractions to tenths. Write fractions of a set of objects Use concrete manipulatives; geometric shapes;	Give students a set of fraction discs to use in pairs. Have students name different coloured fraction pieces, reviewing the concept of fractions as equal parts of a whole object and how to write a fraction. Students put together different pieces of the same whole and say how many pieces make up the whole e.g. How many $\frac{1}{2}$ pieces fit together	Write fractions Add fractions on equal denominators Subtract fractions on equal denominators Compare fractions on equal denominators Add, subtract,	Correctly represent fractions of a set of objects Correctly state fractions represented in pictorial form Use fraction tiles/pieces to add two proper fractions with the same denominator with sum no greater than 1.
paper folding or other means to model addition of fractions on the same denominator. Understand that 1 can be written in fraction format with different denominators.	to make the whole? Students practise writing 1 as a fraction with any given denominator up to 10, drawing pictures or folding paper to show this.	multiply, divide whole numbers	Accurately add two proper fractions with the same denominator with a sum no greater than 1 without the use of concrete manipulatives

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Objectives Add two proper fractions on the same denominator up to a sum of 1. Write mathematical sentences showing the addition of proper fractions on the same denominator. Use concrete manipulatives geometric shapes; paper folding or other	Teaching /Learning ActivitiesHave students put more than one fractionpieces with the same denominator togetherand give the total.e.g. $\frac{1}{4} + \frac{2}{4} = \frac{3}{4}$ Note that the denominatorremains the same as it describes the fractionfamily of fourths.Show how to add two or more fraction piecesby shading parts of the whole e.g. $\frac{2}{5}$ $\frac{1}{5}$	Key Skills	Assessment Correctly model subtraction of proper fractions with like denominators. Use manipulatives to correctly model subtraction of proper fractions from 1. Accurately subtract a proper fraction from another proper fraction with like denominators without the use of manipulatives Accurately subtract a proper fraction from 1 without the use of
paper folding or other means to model subtraction of fractions on the same denominator. Subtract a proper fraction from 1 or a larger proper fraction both on same denominator.	$\overline{5}$ $\overline{5}$ How much of the bar is shaded? 2 parts are shaded grey and 1 part is shaded orange. $\frac{2}{5} + \frac{1}{5} = \frac{3}{5}$ Have students pick up 3 pieces of the fractions in the same denominator group then give away one piece, and write the results e.g. $\frac{3}{8} - \frac{1}{8} = \frac{2}{8}$ Note that the denominator remains the same as it describes the fraction family of eighths.		fraction from 1 without the use of manipulatives Correctly order a set of fractions with the same denominator.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
 Write mathematical sentences showing the subtraction of proper fractions on the same denominator. Compare fractions telling larger, smaller of a group of fractions – same denominator; Consolidate and review number and number operations (computation skills). Write the remainder in a division as a fraction of the divisor. 	Show how to subtract one proper fraction from another e.g. $\frac{4}{5}$ Four parts of the bar were shaded? If one part is shaded red, how many parts are shaded grey? $\frac{4}{5} - \frac{1}{5} = \frac{3}{5}$ Show how to subtract from 1 whole first writing the whole as a fraction. The bar shows 1 whole, if 4 parts are shaded what part is not shaded? Or taken out? $\frac{5}{5} - \frac{4}{5} = \frac{1}{5}$ Write the whole as a fraction on denominator 5 (number of parts in the whole) then subtract the number of parts shaded. (Subtraction is also used to tell the amount left when one piece is taken away.)		

Objectives	Teaching /Learning Activities	Key Skills	Assessment
	Model fractions on the same denominator to tell who has the greater part? Gen got $\frac{4}{5}$ of the cake and Peggy got $\frac{1}{5}$ who got the bigger part?		
	through games, quizzes, worksheets. It is important that students memorize the addition, subtraction, multiplication, division facts and procedures.		
	While dividing with a remainder, allow students to write the answer as a mixed fraction using the quotient with the remainder as a fraction of the divisor (divisor is the denominator, with the remainder as the numerator) e.g. Divisor $7 \leftarrow$ quotient $6)\overline{47} \leftarrow$ dividend $7\frac{5}{6}$ -42 $5 \leftarrow$ remainder		

- ✓ Write a fraction of a set of objects
- ✓ Write 1 as a fraction
- ✓ Add, subtract, compare two proper fractions on equal denominator
- ✓ Write mathematical sentences of addition and subtraction of fractions
- ✓ Subtract a proper fraction from 1.
- ✓ Review computational skills with whole numbers

Points to Note	Extended Learning
 When adding, subtracting or comparing fractions on equal denominators, remind students that only the numerators are used as the denominator names the total parts of the fraction. Some students have the incorrect tendency to add or subtract both the numerator and the denominator. This concept seems easy. Ensure that students have a thorough understanding as these skills form the basis of adding and subtracting with other fractions. As students do not know how to change a fraction to simplest form. Mark the answer correct in the format that it is given. 	 Subtract from more than one whole number e.g. 3 - ⁷/₁₀ = Add to get an improper fraction (more than one whole number) e.g. ⁷/₉ + ⁴/₉
Materials and Resources	Key Vocabulary
Fraction pieces, paper to fold, crayons to shade	Equal denominator, add, subtract, numerator, fraction

Links to Other Subjects/Areas

Digital citizenship: Understand how to use computer number games safely and with ethical behaviour

Reading: Read and understand mathematical concepts and words related to fractions etc.

Physical Education:

<u>Co</u>	<u>ntent</u>	Time /Pace of Instruction	Output/Assessment
•	Fraction of a set of objects	Introduce the skills at a steady pace, giving	• Students can use manipulatives to assist the
•	1 as a fraction	students sufficient practice with the	computation
•	Add, subtract, compare	manipulatives before writing the mathematical	
	two proper fractions on	sentences	Level of Support
	equal denominator		Provide peer group and teacher support for
•	Mathematical sentences of	Quantity of work	students who may be struggling. Each group/
	addition and subtraction of	Give sufficient work so that students become	individual should have a set of fraction pieces.
	fractions	competent with the concepts and skills	Input (Instructional dolivory)
•	Subtract a proper fraction		Input (Instructional derivery)
	from 1.		introduce these ideas with manipulatives
•	Review computational skills		
	with whole numbers		
<u>Sk</u>	<u>ills</u>		
٠	Writing fractions		
•	Add fractions – equal		
	denominators		
٠	Subtract fractions – equal		
	denominators		
•	Compare fractions – equal		
	denominators		



ATTAINMENT TARGETS /STRANDS

National Curriculum Framework

	ATTAINMENT TARGETS	STRANDS
AT1A:	Know the value of numerals, associate them with their names, numbers, ordinals and use concrete objects to model patterns expressions and numbers.	Number: Number Representation
AT1B:	Use the basic operations, number relationships, patterns, number facts, calculators and appropriate software to compute and estimate in order to solve real world problems involving fractions, percentages and decimals.	Number: Number Operations and Application
AT2:	Use the correct units, tools and attributes to estimate, compare and carry out the processes of measurement to given degree of accuracy.	Measurement
AT3:	Explore paths, geometric shapes and space and make generalization about geometric relationships within the environment	Geometry
AT4:	Employ algebraic reasoning through the use of expressions, equations, and formulae to interpret, model and solve problems involving unknown quantities.	Algebra
AT5:	Collect, organize, interpret and represent data and make inference by applying knowledge of statistics and probability.	Data Handling and Probability

MATHEMATICS **GRADE 8 TERM 1** Lundon Burghowshi

սահասհասհասհաս

NSC

Mathematics Scope and Sequence for APSE III

Grade 8 (Year 2) – Term 1

APSE III –Gr. 8 TERM 1	Theme: What is Number?	Theme: Together and Apart	Theme: Comparisons in Space Measures, and Number	Theme: Equal Groups
 Benchmarks: Understand whole number as amount of objects in a group Understand fractional number as showing parts of a whole or a 	AT#1A: Know the value of numerals, associate them with their names, numbers, ordinals, and use concrete objects to model patterns, expressions and numbers.	 AT#1B: Use the basic number operations, relationships, patterns, calculators and software to compute, estimate and solve real world problems. AT#4: Employ algebraic reasoning to interpret, model and solve problems involving unknown quantities. 	 AT#3: Explore paths, geometric shapes and space and make generalization about geometric relationships within the environment. AT#2: Use the correct units, tools and attributes to estimate, compare and measure to given degrees of accuracy. 	 AT#1B: Know the value of numerals, associate them with their names, numbers, ordinals, and use concrete objects AT#4: Use the basic number operations, relationships, patterns to compute, estimate and solve real world problems.
 Use base 10 place value system to write numbers Compute and solve problems 	Unit 1 : Tenths to ten thousands	Unit 2A: Addition and subtraction; Unit 2B: Multiplication; Unit 2C: Division	Unit 3A: Measuring and ordering distances; Unit 3B: Paths, lines and shapes; Unit 3C: Elapsed time	Unit 4A: Fractions of wholes and groups; Unit 4B: Simple probability
with whole,	(3 weeks)	(3 weeks)	(2 weeks)	(3 weeks)
 numbers Compare, and measure distances, and elapsed time 	Content outline : Count by ten thousands; Associate thousands with large amounts; understand that ten groups of hundreds is the same as one group of a	Content outline : Add and subtract up to ten thousands using place value with regrouping; multiply up to 4 digit numbers by up to 2-digit numbers regrouping in any	Content outline : Estimate and measure distances in m and cm; distance on road, and maps in km; use a ruler /measuring tape to tell distances including the Unit	Content outline: Review concepts of fractions to tenths of whole or groups; fractions of a set of objects linking this to multiplication of fractions and division of

APSE III –Gr. 8 TERM 1	Unit 1 : Tenths to ten thousands	Unit 2A: Addition and subtraction; Unit 2B: Multiplication; Unit 2C: Division	 3A: Measuring and ordering distances; Unit 3B: Paths, lines and shapes; Unit 3C: Elapsed time 	Unit 4A: Fractions of wholes and groups; Unit 4B: Simple probability
 Observe and name polygons in the environment using their properties 	thousand objects; Standard and expanded numerals and word names using place value to 99,999. Order and compare whole numbers using symbols <, >, =; round to nearest ten, hundreds; Write fractional numbers - proper, improper, mixed as a decimal to tenths.	position: use estimation and memorized division facts to divide 4 digit whole numbers by 1 or 2-digit whole numbers, writing quotients as a mixed fraction. Solve problems finding addends, sums, difference, products, factors, quotients using concrete, pictorial or algebraic models.	perimeter of objects and shapes. Compare and order distances. Use prefix <i>Kilo</i> to aid in relationships of units. Problem solving with elapsed time between two events: Lines, line segments, rays, types of lines, angles, right angle. Explore use of degrees to measure angles.	whole numbers; generate equivalent fractions on related denominators; add and subtract proper, improper, mixed numbers with equal denominators using fraction pieces or paper folding. Subtract a fraction from 1 or more than one whole. Describe the probability of a given event occurring.
	Skills: Counting, grouping, writing numerals, number word 'thousand,' tenths.	Skills : Add by counting on; putting together; subtract by taking away, and/or crossing out. Multiply, divide	Skills : Compare, measure and compute with time and distance. Identifying polygons.	Skills : Add and subtract and multiply fractions – proper, improper, mixed with equal denominators Calculate probability.
	Vocabulary (written): number names <i>zero to nine;</i> <i>ten, eleven to nineteen,</i> <i>twenty, thirty, forty, fifty</i> <i>How many?</i>	Vocabulary (written): add, plus, sum; take away, subtract		Vocabulary (written): numerator, denominator, improper, mixed, fraction, chance, likelihood, unlikely, certain, uncertain, possible, impossible, probability

UNIT 1 GRADE 8 TERM 1 (3 WEEKS)

UNIT 1TITLE: TENTHS TO TEN THOUSANDS

ATTAINMENT TARGET 1A: Know the value of numerals; associate them with their names numbers, ordinals and use concrete objects to model patterns, expressions and numbers.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will:	Allow students to experience large amounts by	Use base ten place	Make reasonable estimates of
Associate number in	having pictures such as truckloads of oranges,	value system to show	large numbers of objects.
thousands (1000 to 99,999) with the	persons at a national sporting event, etc.	large numbers.	Draw a reasonable straight line
number of members in	Count in thousands, five numbers including the	in standard format	(IIOTIZOTILAI OF VERLICAI) USING a
a large set of objects,	use of a number line e.g. If each unit distance	in Stanuaru Tormat.	ruler.
e.g. truckload of oranges.	numbers.	Count in thousands.	Partition a straight line at regular intervals.
Count by the year de		Count in five	
for any converse up to	2000 🗍 3000 🗌 🗍 🗍	hundreds.	Correctly place numbers on a
101 any sequence up to	← →	Drow o nymehor line	number line in ascending order by
without a number line	Establish on a place value chart the positions in	Draw a number line.	1s, 10s, 100s or 1000s.
without a number line.	thousands (ten and one) Point out or model for	Spatial Awareness	Correctly draw place value
Understand that ten	students how to read the number as- thirty four		table/chart from tenths to ten
groups of hundreds is	thousand, five hundred and seventy eight.		thousands
same as one group of a	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		thousands.
thousand objects;	Thousands		Place number on place value chart
Kaassa kassa ta taaltaata	Ten One Hundreds Tens Ones		with all digits in their correct
Know now to indicate	3 4 5 7 8		places.
thousands (one, ten)	Point out that 3 is in the ten thousand place		
on the place value	and means (3 y ten) or thirty thousands		Accurately write in expanded
chart.			place value chart.
Objectives	Teaching /Learning Activities	Key Skills	Assessment
--	--	---	---
Write numerals in standard, expanded and word names format using base 10 place value. Identify the place (position) value and the total value of a digit in a standard numeral showing whole numbers to ten thousand.			Correctly match number names to numerals Write the names of numerals in words accurately.
Order and compare numbers to thousands using symbols <, >, = Round a 4 or 5 digit number to the nearest thousand, ten thousand	Use the number line to help in rounding numbers as it gives a visual of the nearest number, as follows: e.g. to round 57,675 to the nearest thousand, pay most attention to the thousands and hundreds places. Count in thousands on the number line.	Ordering numbers Comparing numbers Rounding numbers	Correctly name the symbols '<', '>', (within context) and '=. Use the symbols '<', '>', and '=.correctly in number sentences

Objectives	1	Teachi	ng /Lea	arnii	ng Activitie	25	Key Skills	Assessment
ObjectivesUnderstand the difference between whole and fractional numbers.Identify proper, improper fractions and mixed numbersWrite whole and mixed numbers as improper fraction and	Discussion between whole nur Give a gro fractions a them After stud introduce different t	eachin m quest whole mbers oup of 4 and dis lents h the na types o	tion- W and fra also fra proper scuss th ave dis ames, a of fracti	/hat /hat actio ac	is the differ nal number nal number mproper' ar fferences b sed the differ eatures of t	rence rs? Are all rs? ad 'mixed' etween erences the	Key SkillsRecognize differenttypes of fractionalnumbersConvert fractions ondenominator 10 to adecimalUse base 10 placevalue system to showtenths	Assessment Correctly identify from a list, i. Proper fractions ii. Improper fractions iii. Mixed numbers Correctly give two (2) examples of i. Proper fractions ii. Improper fractions iii. Mixed numbers Accurately convert an improper fraction to a mixed number
vice versa. Understand the use of the base ten place value system (decimal point, numbers to the right of the decimal point) to show fractional numbers. Convert proper fractions and mixed numbers on denominator 10 to a decimal – tenths	Proper fr Improper Mixed nu Present st mixed nu students r to write th Draw a pla revise the places. Show the	raction fractio mber cudent: mbers read th nem in ace val relatio	3/4 on 17/ 5 3/7 s with p with de e fract expan- ue cha onship lace on	/3 prop enor ions ded rt or betv	er fractions ninators of and guide form. n the board ween adjace	s and 10. Have students and ent e chart to		 Accurately convert a mixed number to an improper fraction Correctly write as a decimal: A proper fraction with a denominator of 10 as a decimal. An improper fraction with a denominator of 10 A mixed number with a denominator of 10 Write decimal numbers in expanded form accurately
	the right of Whole	Tens	One's p	iace	Fractional Tenths 4 5			

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Convert a decimal in tenths to a mixed number or proper fraction	Point out the use of the decimal point to separate whole and fractional parts of the number. Guide students in writing their fractions on the new place value chart.		

- ✓ Write and interpret standard numerals that show thousands in the base 10 place value system.
- ✓ Write and interpret standard numerals that show fractional numbers in the base 10 place value system.
- ✓ Understand the differences and similarities between fractional, whole and mixed numbers.

	Points to Note		Extended Learning
•	This section extends the place value to two places of	•	Explore the need for using small numbers.
	thousands. Note that in the numeral 30,678 although the	•	Have students explore hundredths on the place value chart
	number is read 30 thousand, six hundred and seventy-eight,		
	the 3 is in the ten thousands place.		
•	When rounding pay most attention to the place value of the		
	digit to which you are rounding. In this case we are rounding in		
	thousands, and need to count in thousands; if we were in ten		
	thousand we would need to count in ten thousand.		
•	Proper fractions show amounts between 0 and 1; the		
	numerator is less than the denominator.		
•	Improper fractions show amounts of 1 or more; the numerator		
	is equal to or more than the denominator.		
•	Mixed numbers show both a whole number and a fraction.		

Materials and Resources	Key Vocabulary		
Place value chart showing whole numbers to ten thousands, place value chart showing one place of decimals - tenths	Thousands, tenths, place value, decimal point, decimals, the prefix "th"		
Links to Other Subjects			
Digital citizenship: Understand how to use computer number games safely and with ethical behaviour			
Science: The need to use small amounts			
Reading: Distinguishing between tens and tenth, hundred and hundredth and thousand and thousandth.			
Physical Education: Identify situations when a tenth of a second or minute is valuable e.g. in running a race			
Discussion: What is meant by a split second?			

UNIT 2 GRADE 8 TERM 1 (3 WEEKS)

SECTION A UNIT TITLE: ADDITION AND SUBTRACTION

<u>ATTAINMENT TARGET 1B</u>: Use the basic number operations, relationships, patterns, calculators and software to compute, estimate.... and solve real world problems.

ATTAINMENT TARGET 4: Employ algebraic reasoning through the use of expressions, equations, and formulae to interpret, model and solve problems involving unknown quantities.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Add numbers up to ten thousands using place value with regrouping in any position (s) Solve routine word problems finding sums and using number sentences with	Give exercises to review and extend addition and subtraction skills with 3 digit numbers to 4, and 5 digit numbers. Use memorized addition facts and place value positions when adding large numbers. Review the procedure for adding / subtracting using place value e.g. adding tens to tens, hundreds to hundreds etc.	Add with regrouping in any position Find unknown sums using addition Write addition number sentences with unknown amounts	Accurately add numbers up to ten thousands without regrouping Accurately add up to ten thousands that requires regrouping in position Correctly identify word addition as the appropriate operation required to solve a word problem
unknowns Subtract from up to ten thousands using place value with regrouping in any position (s) and memorized subtraction facts	Review the procedure for when and how to regroup when adding and/or subtracting The expanded notation can be used for students who need the additional support.	Subtract with regrouping in any position Find unknown addends (differences) using subtraction Write subtraction sentences with unknown amounts	Accurately solve routine word problems using addition Subtract from a whole number, up to ten thousand accurately without regrouping Accurately subtract from a whole number up to ten thousand with regrouping

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Solve routine word problems finding unknown addends, differences in number sentences.	Have one student stand on a bathroom scale holding a stack of books and record the measurement. Have the student put down the books then measure the student's mass without the books. Discuss with students how they could determine the mass of the stack of books Show the class pictures of balance beams that are balanced and some that are not and review the concept of balance. Present the following picture to the class.		Correctly identify routine problems that require subtraction Use subtraction to accurately solve routine word problems Correctly solve for unknowns, given images of balance beams
	Ask students to determine the number of balls required to balance one can.		

- ✓ Add whole numbers up to ten thousands regrouping in any position.
- ✓ Subtract whole numbers from up to ten thousands regrouping in any position.
- ✓ Solve problems that require finding sums or addends (part-part-whole situations).

	Points to Note	Extended Learning
•	Finding sums or addends result from different problem situations. Give students practice with each problem situation. Addition situations involve finding the sum (whole), whether we put objects together or we take away a known amount and know how many are left. e.g. $17 + 5 = ? ? - 17 = 5$ both use addition to solve the problem. Subtraction situations in the part- part- whole situation involve finding one part, given the whole and the other part. 17 - 5 = ? 30 - ? = 6 both use subtraction to solve the problem Understanding equality/balance is an important pre-algebraic skill. Give students opportunity to discuss when a beam is balanced or unbalanced and to explain what could be done to make it balance.	 Work with 2 step problem situations, in which more than one part make up the whole, or where there is addition and subtraction in the same problem situation. Ask students to make decisions in the problem situation. E.g. John and Peter want to buy and share a raisin bread and cheese. If the bread and cheese cost \$175, Peter has \$60 and John has \$95, do they have enough to buy the bread and cheese? If not, how much more do they need? Explain your answer.
Materials and Resources		Key Vocabulary
Cards with addition or subtraction problems for students to solve (one problem per card), blank cards for students to write their own problems, chart with Polya's Four Problem Solving Steps (understand, plan, carry out the plan, check)		add, addition, plus, join, sum, addend, subtract, subtraction, part, whole, regrouping, unknown

Digital citizenship: Understand how to use board and computer addition games safely and with ethical behaviour

Science: The concept of balance is used extensively in science. Some clinics still use scales that balance your mass by sliding weights along a beam.

Reading: Read and understand mathematical concepts and words related to addition, subtraction

Physical Education: Use addition while exercising or participating in physical education minor or major games.

UNIT 2 GRADE 8 TERM 1 (3 WEEKS)

SECTION B UNIT TITLE: MULTIPLICATION

ATTAINMENT TARGET 1B: Use the basic number operations, relationships, patterns, calculators and software to compute, estimate and solve real world problems.

ATTAINMENT TARGET 4: Employ algebraic reasoning through the use of expressions, equations, and formulae to interpret, model and solve problems involving unknown quantities.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Multiply 1, 2, 3, 4 digit whole numbers by 10. Multiply a 2, 3, 4- digit whole number by a 2 digit multiple of ten e.g. 20. Multiply 3 and 4 digit numbers by 2 digit numbers with regrouping in any position. Solve problems using multiplication to find the whole (products) in situations in which known equal parts (factors) are given.	Use the pattern on the place value chart and show how multiplication by 10 moves each digit position 1 place to the left. For example to multiply 345 x 10, multiply each digit by 10 So, 3 hundreds +4 tens +5 ones x 10 3 thousands +4 hundreds +5 tens +0 ones 5 ones x 10 = 50 ones (or 5 tens, 0 ones); 4 tens x 10 = 40 tens (or 4 hundreds, 0 tens); 3 hundred x 10 = 30 hundreds (or 3 thousands, 0 hundreds) On the chart the results show that each digit moves one place to the left: and zero fills the empty ones place.	Multiply by 10 (orally) Multiply by 2 digit multiples of 10 Multiply by 2 digit numbers Use multiplication to find the whole amount in a problem solving situation	Correctly state pattern of "zero at the end" when a whole number is multiplied by 10 Accurately multiply a whole number less than 10, 000 by 10. Accurately multiply a whole number less than 10, 000 by a multiple of 10 less than 100. Accurately multiply a whole number less than 10,000 by a 2 digit number without regrouping Accurately multiply a whole number less than 10,000 by a 2- digit number with regrouping. Correctly identify problem situations that utilize multiplication.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Use algebraic reasoning to solve multiplication problems.	To multiply by 2 digits we need to remember how to multiply by ones and tens. Again place value with expanded notation can help. e.g. 37 x 20 is 3 tens + 7 ones <u>x 2 tens</u> step 1: 2 tens x 7 ones 14 tens or 140 Step 2: 2 tens x 3 tens <u>6 hundreds or 600</u> 740		Make reasonable attempts to proportion shares according to situation given (e.g. the larger amount given in accordance with problem situation). Use manipulatives to model problem situations involving multiplication correctly.
	Or $3^{1} 7$ x 20 740 (say 0 x 7 = 0; 2 tens x 7 ones = 14 tens - 4 tens carry 1 hundred; 2 tens x 3 tens = 6 hundred plus 1 hundred = 7 hundred) Or $30 + 7$ x 20 $30 \times 20 + 20 \times 7$ 600 + 140 600 + 100 + 40 740 Give students practise in multiplying by multiples of tens e.g. 20, 30, 40 etc. before moving on to other twodigit numbers as in #5. Show the steps in multiplying a 2 or 3 digit number by a 2 digit number. e.g. 567 x 35 has		Accurately model and solve word problems involving multiplication.
	567 (567 x 5) + (567 x 30) <u>X 35</u> 2835 567 x 5 + <u>17010 567 x 30</u> 19845		

Objectives	Teaching /Learning Activities	Key Skills	Assessment
	In groups, give worded problems that have a mix of skills and allow students to use Polya's planning steps, decide the strategy that is to be used, and solve the problem. Problem solving techniques involve drawing a picture and/or writing a number sentence.		
	Multiplication problems could include arrays, or finding the whole when there are multiple groups of equal number of objects. e.g. There are 10 sticks of gum in each carton. a. if a box has 50 cartons of gum, how many sticks of gum does the box have? b. A box has 67 cartons and 5 loose sticks of gum, How many sticks of gum are in the carton? Present student with pictures of balance beams such as the one below and have them determine the number of balls required to balance if one box was removed?		
	Have students use manipulatives or pictures to model and solve problems such as: Sarah and May have 35 coins altogether. If May has twice Sarah's amount plus five more, how many coins does each girl have?		

Students will be able to:

- ✓ Multiply up to a 4-digit whole number by 10 written or orally
- ✓ Multiply up to a 4-digit whole number by a 2-digit whole number

Points to Note	Extended Learning
 Multiplication by 10, and other powers of 10 is a key skill that students should be able to do fluently and orally. This unit begins with multiplication by 10. Despite popular belief that the decimal point moves it's the size of the digits that get larger in a multiplication by 10. Multiplication is the computational strategy used to find unknown whole amounts in problem situations when the number of equal parts is given, and the amount in each equal part is also given. Linkage should be made to algebraic reasoning. 	 Extend Multiplication skills to multiply by 100 (another power of 10), and multiples of 100. Compute to make decisions or find solutions in worded problem situations. E.g. John has a total of \$100. If he only has one type of coin e.g. ten dollars, one cent etc. How many coins does he have?
Materials and Resources	Key Vocabulary
	multiply, arrays, product, factor, part, whole
Links to Other Subjects/Areas	

Digital citizenship: Understand how to use board and computer multiplication games safely and with ethical behaviour

Science: Incorporate and match the use of multiplication in the study of science.

Reading: Read and understand mathematical concepts and words related to multiplication, factor, product.

Physical Education: Use multiplication when participating in physical education minor or major games.

Agriculture: Farmers use multiplication to approximate the amount of crop (corn/sugarcane) in a field

UNIT 2 GRADE 8 TERM 1 (3 WEEKS)

SECTION C UNIT TITLE: DIVISION

ATTAINMENT TARGET 1B: Use the basic number operations, relationships, patterns, calculators and software to compute, estimate.... and solve real world problems.

ATTAINMENT TARGET 4: Employ algebraic reasoning through the use of expressions, equations, and formulae to interpret, model and solve problems involving unknown quantities.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Tell or identify by using divisibility rules, whole numbers that can be divided exactly by 2, 3, 5, or 10. Divide 3 digit whole numbers by a 1 digit number with or without regrouping to get a 3 digit quotient e.g. 652 ÷ 3; 327 ÷ 3; 800 ÷ 4	Ask: How can you tell by looking at a number that it can be divided exactly (no remainder) by 2? Give each group one set of times tables e.g. two times table to look at the pattern and develop a rule. Do similar for 3, 5, and 10. Each group presents their rules and students check numbers.	Use divisibility rules Divide by a 1 digit number with regrouping Estimate products using rounded numbers Write answers to division as a mixed number Solve problems finding unknown factors	Correctly identify, from a list of numbers, numbers which are divisible by 2. List examples of numbers divisible by 2 Correctly identify, from a list of numbers, numbers which are divisible by 3. List examples of numbers divisible by 3 Correctly identify, from a list of numbers, numbers which are divisible by 5. Correctly generate a list of multiples of 5

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Divide a 3 digit whole number by a 1 digit number with or without regrouping and remainders to get a 2 digit quotient e.g 127 ÷ 4 Divide 4 digit whole numbers by a 1 digit number with or without regrouping or remainders to get: a. a 4 digit quotient b. a 3 digit quotient Write quotients with a remainder as a mixed fraction of the divisor. Divide a 3 digit whole number by a 2-digit whole number without or with regrouping and remainders to get a. a 2 digit number b. 1 digit number	 Allow students to use manipulatives to show division by 1 digit giving a visual interpretation of the procedure. e.g 224 ÷ 3: 2 2 4 a. Can we get 1 hundred 3's from 2 hundred? No! 3) 224 do not write anything in the hundreds place of the quotient (answer). b. Regroup the 2 hundreds as 20 tens, (physically change out the flats to ten strips) add 2 tens to get 22 tens; How many 3's are in 22 tens?7 tens + 1 ten; 7 write 7 in the tens place. 3) 224 c. Regroup the 1 ten to 10 ones (physically change 1 ten strips to 10 squares) then add the 4 ones to get 14 ones. How many threes are in 14 ones? 4 (4 x 3 = 12) with remainder 2. 		Correctly identify, from a list of numbers, numbers which are divisible by 10. Correctly generate a list of multiples of 10. Use manipulatives to correctly model division statements Accurately divide a 3 digit whole number by a 1 digit numbers without regrouping Regroup to accurately divide a 3 digit whole number by a 1 digit number without 0 in the quotient. Accurately divide a 3 digit whole number by a single digit number by regrouping to get a quotient that includes 0. Accurately divide a 4 digit whole number by a 1 digit numbers without regrouping Regroup to accurately divide a 4 digit whole number by a 1 digit number without 0 in the quotient.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Divide a 4 digit whole	7.4 write 4 in the ones place in the answer $2\sqrt{2.2.4}$		Accurately divide a 4 digit whole
whole number with or	-210		hy regrouping to get a quotient
without regrouping	14		that includes 0
and remainders to get	-12		
a. a 3 digit quotient	2 Remainder (not enough to make		Express the remainder after
b. a 2 digit quotient	another group of 3). The answer as a mixed		division as a fraction
Use rounded whole	number is $74\frac{2}{3}$.		Write a quotient with a remainder as a mixed number.
the quotient (answer)	Division by 2 digits to get a 1 or 2-digit		
in division when the	quotient; e.g. divide 345 by 47		Accurately divide a 4 digit whole
divisor has 2 digits.	a. <u>Check</u> is 345 ten times of more than 47 f Not $(47 \times 10 = 470)$ So we will get a 1 digit		without regrouping
Solve problems including sharing or the inverse of multiplication to find factors in a related multiplication and division number	 number as the quotient. b. <u>Round</u> the divisor 47 (what you are dividing by) to the nearest ten giving 50 c. <u>Estimate</u>. How many 50's are in 345? From the multiplication facts we know that: 50 x 6 = 300; and that 50 x 7 = 350, Which number 300 or 350 is closer to 345? 		Regroup to accurately divide a 4 digit whole number by a 2 digit number without 0 in the quotient. Accurately divide a 4 digit whole number by a 2 digit number by
sentence	 d. Let's use 6. (we can adjust the estimate) 6 (write 6 in the ones place) 		includes 0.
Use algebraic	47) 345		Identify situations in which
reasoning to solve	$-282 6 \times 47$		division is appropriate.
division problems	63 (63 is more than 47 so we could		Use division to correctly solve
	adjust the estimate of 6 to take out 1 more		nrohlems
	group of 47)		

Objectives	Teaching /Learning Activities	Key Skills	Assessment
	e. Adjust the estimate (if necessary) 7 (write 7 in the ones place) 47) 345 -329 7 x 47 16 The quotient (answer) is $7\frac{16}{47}$ (Explain to students the use of a fraction of the divisor). Modelling with place value mats as shown in the previous section helps students see that the answer is 7, not 70 or 700. In groups, give worded problems that have a mix of multiplication and division skills and allow students to use Ploya's planning steps- understand, plan - decide the strategy that is to be used, carry out the strategy, and check. Division problems include finding the factors in a sharing situation or multiplication situation with unknown factors. E.g., if a box has in 630 sticks of gum in 35 cartons, how many sticks of		

- ✓ Divide a 3- digit and a 4- digit number by a 1- digit number.
- ✓ Divide a 3- digit and a 4- digit number by a 2- digit number.
- ✓ Write answers to division as a mixed fraction.
- ✓ Solve problem situations or make decisions that involve finding an unknown factor.

	Points to Note		Extended Learning
 Divisibility rul numbers are, To get a 3- dig number the d divisor, E.g. if 	es help students to decide what the factors of and how to divide in different situations. git quotient when dividing a 3- digit by a 1- digit lividend has to be more than 100 times the the divisor is 3, the numbers have to be 300 or	•	Write quotients (answers) as a decimal by placing a decimal point and continuing the division.
 more. Take the skills The placemer important. E.g correct answe Division by 2- multiplication number of gro the dividend. Incorporate p learning techn 	s in division step by step. In t of the numbers (digits) in the quotient is very g. in the example given writing 740 is not the er but is a common error that students make. digits uses many skills: rounding, estimation, a, subtraction. The goal is to tell the largest pups of the divisor that can be subtracted from problem solving strategies and guided discovery niques		
Materials and Resources		Ke	ey Vocabulary
Division charts with an explanation of how to divide, Place value mats, Diene's blocks, in hundreds, tens and ones.		Di	ivide, dividend, divisor, quotient, factor, remainder.

Digital citizenship: Understand how to use board and computer division games safely and with ethical behaviour

Science: Incorporate and match the use of division in the study of science.

Reading: Read and understand mathematical concepts and words related to division – divisor, dividend, quotient

Physical Education: Use division as sharing into groups.

UNIT 3 GRADE 8 TERM 1 (2 WEEKS)

SECTION A UNIT TITLE: MEASURING AND ORDERING DISTANCES

ATTAINMENT TARGET 3: Explore paths, geometric shapes and space and make generalization about geometric relationships within the environment.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Objectives Students will: Estimate, measure and record distances a) in both metres (m) and centimetre (cm), b) to the nearest metre. Use a ruler or tape measure to measure distances in metres and centimetres, centimetres only. Associate distances on the road with the kilometre (km). Estimate and record distances in a) kilometres b) to the nearest kilometre.	Teaching /Learning ActivitiesReview the use of the metre rule and examinethe metre rule marked off in smaller units –centimetre.Measure distances in metres and centimetres (asmaller unit gives more accuracy) e.g. height ofthe doorway is 2 m 30 cm.Introduce the idea of measuring distanceswithin the country – and the use of thekilometre and the symbol km.Use a road map/distance charts to get ideas ofhow far or near locations/towns in Jamaica areto each other.Have students do the project to be familiar withdistances in kilometres.Use the prefixes to help remember therelationships of units in the SI metric system.	Key Skills Estimate distances in m, cm , and km Measure distances using standard units Read road signs, simple maps Compare distances	Assessment Select an appropriate instrument for measuring a given distance. Use appropriate instruments to accurately measure a given distance. Select appropriate units for measuring certain distances. Give reasonable estimates for given distances. Correctly order distances all listed in the same unit (cm, m or km).
	1000 times a metre.		

ATTAINMENT TARGET 2: Use the correct units, tools and attributes to estimate, compare and measure to given degrees of accuracy.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Differentiate the use of the metre, centimetre, and kilometre in a given measurement situation.			
Compare and order distances all in metres, kilometres.			
Understand that measures can only be compared when they are in the same units.			
Know that a) 100 cm = 1 m b) 1000 m = 1 km			
Use the prefixes a) centi b) kilo to help remember the relationship of distance units			

- ✓ Estimate, measure and record distances using the appropriate SI unit , metre, centimetre, kilometre
- ✓ Compare and order distances given in the same units.
- ✓ Understand the relationship between the cm and the m; and the m and the km.

Points to Note	Extended Learning
 Begin the project early so that students have one week to complete the activity. When ordering or comparing distances they must all be in the same units. 	 Use known relationships to convert distances shown in metres to centimetres (needs multiplication by 100) shown in kilometres to metres, (needs multiplication by1000) Project: Road Trip: Have students plan a road trip. Instruct them to pick a destination and see how many km and how to travel to that destination via different routes. Create a map in pictures showing places of interest that would be on the way to the destination. Have them include pictures of road signs with the distance to different locations shown.
Materials and Resources	Key Vocabulary
Measuring tools – tape measure, ruler, metre stick, road maps of distances between towns in Jamaica, distance chart or table for major towns and cities in Jamaica (a diary may have this)	metre, centimetre, kilometre, distance

Digital citizenship: Use online Map apps to measure explore the distance between various locations.

Science: Use measurement skills for measuring distances in the study of science, e.g. height of plants, length of leaves etc.

Reading: Read and understand mathematical concepts and words related to comparisons and measures --- taller, shorter, etc.

Physical Education. Explore the dimensions for various courts (Football, Basketball, Netball and Track & Field).

UNIT 3 GRADE 8 TERM 1 (2 WEEKS)

SECTION B UNIT TITLE: PATHS, LINES AND SHAPES

ATTAINMENT TARGET 3: Explore paths, geometric shapes and space and make generalization about geometric relationships within the environment.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Objectives Students will: Identify draw and/or describe a) a line, b) line segment, c) a ray Identify and model lines, line segment that are horizontal, vertical, oblique (slant). Identify and model lines, line segments that a) intersect b) do not seem to intersect. Recognize, draw and describe an a) angle, b) a right angle (square corner).	Teaching /Learning ActivitiesReview line, line segment and introduce the ray as having one end point. E.g. ●Introduce angles by looking for points in the environment where two straight lines meet or cross each otherDemonstrate turns with a simple device with two arms that can move. (See materials)Use the term angle to describe the space between two rays that represents the amount of turn that moves one ray to the other. E.g.Vertexay ray rayAllow students to explore different amounts of turns using the angle device against different	Key Skills Identify angles in the environment Measure angles	Assessment Mark all the angles in the diagram or pictures shown. a. b. c. Between the hands of a clock How many degrees of turn are there between the hands of a clock showing: a. three O'clock b. six O'clock c. 12 O'clock C. 12 O'clock How many degrees are in a. a full turn b. half turn? Show a full turn using the hands of a model clock.
Understand degrees as the measure of the size of an angle	angles in the environment (door and floor etc.), or students can model the turns with their bodies.		

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Know that a right angle (square corner) measures 90° (90 degrees).	Introduce the idea of measuring angles in degrees (°), and demonstrate 90° linking this to a quarter turn; 180° linking this to a half turn and 360° linking this to a full turn.		
Know that a half-turn is 180° (180 degrees)			
Know that a full turn is 360° (360 degrees)			

- ✓ Define an angle as the turn between two rays.
- \checkmark Identify angles in the environment and in geometric shapes
- ✓ Understand that the amount of turn can be measured in degrees

	Points to Note	Extended Learning
•	Angles are formed when two rays meet or two lines intersect. Angles are the turn created between two rays The amount of turn in the angle can be measured in degrees	 Introduce the use of a protractor to measure in degrees the amount of turn

Materials and Resources	Key Vocabulary		
Make moveable angle displays by joining two strips of stiff cardboard using a split pin, so that the arms can move.	Angle, ray, line, line segment, degrees, full turn, half turn, right angle		
Join with a split pin so that the arms can move.			
Links to Other Subjects/Areas			
Extended thinking and problem solving: Use geometric features w	nen solving problems in different situations		
Digital citizenship:			
Science: Use shape and size to classify, and group in the study of science.			
Reading: Read and understand mathematical concepts and words related to geometric features.			
Physical Education: Use shape, size and space while exercising or participating in physical education minor or major games or dance.			

UNIT 3 GRADE 8 TERM 1 (2 WEEKS)

SECTION C UNIT TITLE: ELAPSED TIME

ATTAINMENT TARGET 2: Use the correct units, tools and attributes to estimate, compare and carry out the processes of measurement to given degree of accuracy.

ATTAINMENT TARGET 2: Use the basic number operations, relationships, patterns, calculators and software to compute, estimate.... and solve real world problems.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Recall how to tell time in minutes on an analog or digital clock 12 hour clock Use am and pm to differentiate time with the 12 hour clock. Find the difference (elapsed time) between times using the 12 hour clock Given one time and the amount of elapsed time find the other time.	Review the measures of time, hours, minutes, and the use of a.m. p.m.to differentiate time on the 12 hour clock Pose a problem with elapsed time and ask students to use the model of the clock to count off the time and work out the problem .e.g., John left home at 7:30 a.m. and arrived at the bank at 9:00 a.m. How much time did he take to go the bank? Give students different situations with two events a) both a.m; b) both p.m; and c) one time a.m. and the other p.m. Change the situations and give the beginning time or the arrival time, the elapsed time and ask students to work out the arrival time or the beginning time	Tell time with the 12- hour clock Compute with measures of time	 Draw models of clocks to find the answer in the following: A bus left Kingston at 5:30 a.m. If the bus arrived in Montego Bay at 9:15 a.m, How much time did the journey take? Show both beginning and arrival times in the following situations: a. Petal left home at 7:45 a.m. and arrived at school 1hour 15 minutes later. What time did she arrive at school? b. Homer arrived at a party at 9:30 p.m. If he took two hours 20 minutes to travel, what time did he leave home?

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Find solutions in problem situations by using the elapsed time between two events	Gradually get students to draw diagrams of the clock or just add /subtract the times to find the differences, arrival /departure times.		The Johnson family began a road trip at 11:15 a.m and arrived at the first stop in Ocho Rios at 1:30 p.m. How much time did this part of the trip take?

- ✓ Find differences between two times given on the 12-hour clock
- ✓ Solve problems finding arrival, departure or elapsed time given any of the other two times.

Points to Note	Extended Learning
• Elapsed time often gives students difficulty especially when one event occurs in the a.m. and the other in the p.m. Using models of or actual timepieces to actually count off the hours and minutes will help students to visualize the situation.	 Allow students to use travel schedules (bus, airlines, TV etc.) and other real world events to work out the time between different places or events.
Materials and Resources	Key Vocabulary
Models of clocks (or watches) with moveable hands sufficient to be distributed two per group of students, drawings of clocks	Time, elapsed time, anti-meridian (a.m.), post meridian (p.m.),

Extended thinking and problem solving:

Digital citizenship: Understand how to use computer safely and with ethical behaviour

Science: Use elapsed time in the study of science.

Reading: Read and understand relationships of time in stories.

Physical Education: Find times of matches, duration, start, finish times in sports etc.

UNIT 4 GRADE 8 TERM 1 (3 WEEKS)

SECTION A UNIT TITLE: FRACTIONS OF WHOLES AND GROUPS

ATTAINMENT TARGET 1B: Use the basic operations, number relationships, patterns, number facts, calculators and appropriate software to compute and estimate in order to solve real world problems.

ATTAINMENT TARGET 4: Know the value of numerals, associate them with their names numbers, ordinals and use concrete objects to model patterns, expressions and numbers.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
 Students will: a. Write a fraction to show equal parts to tenths b. Write a fractions to show a whole number e.g. 5/1, 10/2 Write a fraction to describe the amount of given objects among a larger set of objects. 	Review writing fractions of a whole object with denominators up to 10. Introduce the idea of fractions of a set of objects by showing practical objects with two different colours or shapes. E.g., there are some blue and orange balls in a box as shown. What fraction of the balls is blue? Ask students to say how they might work this out to answer the question. Using what we already know about fractions we can say. a. How many blue balls? 1 b. How many balls in all? 5 c. The fraction of blue balls is 1/5.	Represent a fraction of a set of objects	 Write correct images of equal parts of an object. Model fractions of an object. Write a whole number as a fraction Correctly express one set of objects as a fraction of a larger set of objects.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Objectives Use multiplication and division to find a given fraction of a set of objects. e.g.; 1/5 × 15; 3/4 of 24	 Teaching /Learning Activities Pose a question or show a set of objects and ask students to find a given fraction of the objects. Later introduce the multiplication and division algorithm. e.g. algorithm. e.g. a. What fraction of the cars have children in them? b. How many cars are in one half of this set of objects? Using sharing Draw lines to create 2 groups with the same number of cars in each group. Using the algorithm a of 6 = ? If there are two groups, how many cars in each group? 6 divided by 2 = 3 in each part. The answer is 3. c. How many cars are in two thirds of the set of objects? Using the visual Using the visual 	Key Skills	Accurately find a fraction of a set of objects using manipulatives or pictures. Correctly use multiplication and division to find a fraction of a set of objects
	To get 2 objects in each one third, therefore 4 objects are in 2 thirds. Using the algorithm What is $\frac{2}{3}$ x 62. Dividing 6 into 2 equal parts		
	gives 2 cars in each third; and 4 cars in 2 thirds		

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Generate equivalent fractions on related denominators (multiples of 2, 3, 4, 5, 6) up to a max denominator of 20 Use the 'multiplication by 1' technique to generate fractions equivalent to another fraction on a related denominator. Identify the simplest form of a set of equivalent fractions.	Introduce the concept equivalent fractions - as fractions that name the same amount of the whole, with concrete experiences. a. This can be shown with paper folding to show halves. $\boxed{\frac{1}{2}}$ b. a second fold will show fourths $\boxed{\frac{1}{4}}$ c. How many parts will a third fold show? Other concrete experiences can have students finding fraction pieces that match exactly and writing the equivalent fractions, e.g. place the 1-sixth pieces on top of a one-third piece to show that 2-sixths, match exactly 1-third. Write $\frac{1}{3} = \frac{2}{6}$ Move to the abstract practice with converting to an equivalent fraction. $\frac{2}{4} \times - = \frac{4}{8}$ What fraction will multiply fourths to give eighths? 4 x? = 8; 2 x? = 4? Answer $\frac{2}{2}$ Point out that $\frac{2}{2}$ is the same as 1. (multiplying by 1 gives the same number) Use the rule above (multiplying by 1 as a fraction) to convert fractions to an equivalent fractions to an equivalent fractions to an equivalent fractions to an equivalent fraction on a related denominator.	Generate equivalent fractions	Correctly identify equivalent fractions represented in pictorial form Correctly determine whether or not a pair of fractions are equivalent Use multiplication to accurately generate equivalent fractions Correctly identify common factors of the numerator and denominator of given fractions. Correctly generate equivalent fractions using division State accurately whether a fraction is written in its lowest form or not. Use division to accurately write fractions in their simplest form

Recognise improper and mixed numbers, and a whole number in fractional format.Review proper, improper and mixed numbers, and how to convert between improper and mixed numbers using concrete and pictorial representations.Recognize and name different types of fractionsName whole numbers as fractionsExtend the addition of proper fractions on equal denominators to adding improper, and mixed numbers, converting to whole numbers if needed.Recognize and name different types of fractionsOnvert a. an improper fraction to a mixed numberExtend the subtraction of proper fractions on equal denominators to improper and mixed numbers.Add different types of fractions on equal denominatorsAdd proper, improper fraction.Extend the subtraction of proper fraction on equal denominators to improper and mixed numbers.Subtract with different types of fractions on equal denominatorsAdd proper, improper, mixed numbers with equal denominators.Subtract a proper, or mixed number from 1 or more than 1 whole.Improper fraction or mixed number on equal denominatorsImproper fraction or mixed number on equal denominatorsSubtract a proper fraction or mixed number on equal denominatorsImproper fraction or mixed number on equal denominatorsImproper fraction or mixed numberSubtract a proper fraction or mixed number on equal denominatorsImproper fraction or mixed number on equal denominatorsImproper fraction or mixed number on equal denominatorsImproper fraction or mixed number on equal denominatorsImproper fraction or mixed numberImproper <br< td=""><td>Correctly identify an improper fractions, mixed numbers and whole numbers written in fractional form Accurately name whole numbers as fractions Convert an improper fraction to a mixed number Convert a mixed number to an improper fraction Add two proper fractions with the same denominator accurately Accurately add three proper fractions with the same denominator Accurately add two improper fractions with like denominators Accurately add 3 improper fractions with like denominators</td></br<>	Correctly identify an improper fractions, mixed numbers and whole numbers written in fractional form Accurately name whole numbers as fractions Convert an improper fraction to a mixed number Convert a mixed number to an improper fraction Add two proper fractions with the same denominator accurately Accurately add three proper fractions with the same denominator Accurately add two improper fractions with like denominators Accurately add 3 improper fractions with like denominators

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Round a			Add two or more mixed
a. proper or			numbers with the same
b. mixed number to			denominator accurately
the nearest whole			
number			Add any combination of a
			proper fraction, improper
			fraction and mixed number
			accurately
			Subtract a proper fraction from
			a whole number accurately
			Accurately subtract a proper
			fraction from another proper
			fraction with the same
			denominator
			Subtract an improper fraction
			from a whole number accurately
			Accurately subtract an improper
			fraction from another improper
			fraction with the same
			denominator
			Accurately subtract a mixed
			number from a whole number

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Solve word problems that use adding, subtracting, or multiplying with fractional numbers. Use rounded numbers to check answers to addition and subtraction problems.	 Present the solution of problems with fractions by drawing a diagram as one strategy to solve the problem. a. Each child got 4 toys when a box of 20 toy cars was shared equally. What fraction of the toy cars did each child get? b. A pizza was cut in 8 equal slices. If John ate 2 slices and Peta ate 3 slices what fraction of the pizza was eaten? 	Solve problems with fractions	Identify from a given proper fractions, those that are closest to 0, ½, and 1 Round mixed numbers to the nearest whole numbers Add and subtract various fractions appropriately to accurately solve word problems.

- ✓ Use a fraction to show parts of a set of objects
- ✓ Generate a fraction equivalent to another fraction on a denominator that is a multiple of the first fraction

Points to Note	Extended Learning
 Writing a fraction of a set of objects extends the concept of fractions as equal parts of a single object. This section also introduces the idea that multiplying (x) by a fraction is the same as dividing by the denominator of the fraction. 	 Discuss whether or not fractions such as ³/₆ and ⁴/₈ (across different families) are equivalent. Use the multiplication chart to show equivalent fractions.
Materials and Resources	Key Vocabulary
Square paper sheets, grid paper, set of fraction pieces, equivalent fraction wall or chart, this can be one chart or be in families or with a mix of fractions families, multiplication chart showing numbers multiplied by each other chart in family – 2's $\frac{\frac{1}{2}}{\frac{1}{2}}$	Fractions, equivalent fractions, mixed numbers, proper fraction, improper fraction

Digital citizenship:

Reading: Read and understand mathematical concepts and words related to multiplication etc.

Physical Education: Use number – multiplication skills while exercising or participating in physical education minor or major games or dance
UNIT 4 GRADE 8 TERM 1 (3 WEEKS)

SECTION B UNIT TITLE: SIMPLE PROBABILITY

<u>ATTAINMENT TARGET 5</u>: Collect, organize, interpret and represent data and make inference by applying knowledge of statistics and probability

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Use the terms likely, unlikely, most likely, least likely, highly likely, even chance, highly unlikely, certain and impossible to describe the likelihood of an event occurring Calculate the probability of an event occurring.	Reproduce the following probability line on the board. Impossible Equal Chance Certain Have students pull and read aloud descriptions of an event from a bag. Ask students to place their events in the appropriate place on the probability line. Have students discuss their placement. Have students also place the following on the probability line: 100%, 0%, 50%, 50-50.	Calculating probability Identifying possible outcomes	Correctly list activities that are certain, uncertain, possible, impossible State appropriate real life activities involving chance Accurately calculate the probability of an event happening in a given scenario

Objectives	Teaching /Learning Activities	Key Skills	Assessment
	Place the following spinners on the chalkboard.		
	Ask students to state on which colour the spinner is most likely to land. Have students state a numerical value that would represent the chance of the spinner landing on each colour.		
	Explore different experiments such as pulling cards, throwing dice, pulling an item from a bag etc and calculate the probability of a given outcome.		

- \checkmark Use appropriate terminology to describe the likelihood of an event occurring
- ✓ Calculate the probability of an event occurring
- ✓ Conduct simple experiments to explore probability

Points to Note	Extended Learning		
 Students understanding about probability/likelihood/chance will develop from experience. They may initially confuse chance with luck for example or, believe that a 6 is "harder to roll" than a 4. Facilitate discussions about the likelihood of events and allow students to justify their positions without trying to force a definition. Over time, students will begin to develop their own understanding. It is important that students understand that the chance of an event occurring is unaffected by previous trials in a simple experiment. For example, each time you flip a coin the chance of getting a head is 0.5, regardless of whether or not you flipped six heads in a row previously. 	 Develop a list of goofy personal insurance plans such: Bitten by Shark Insurance, Struck by lightning Insurance, Falling through a manhole Insurance, Death by Spider Insurance, Getting Splashed by a car Insurance Discuss with students, which, if any, they would invest in. Have students research online the probability of some of the more unlikely events occurring 		
Materials and Resources	Key Vocabulary		
Spinners, cards, dice	Chance, likelihood, unlikely, certain, uncertain, possible, impossible, probability		
Links to Other Subjects/Areas			
Digital citizenship: Use phone and computer apps for rolling dice or spinners. (https://www.nctm.org/Classroom			

Digital citizenship: Use phone and computer apps for rolling dice or spinners. (https://www.nctm.org/Classroom Resources/Illuminations/Interactives/Adjustable-Spinner/)

Science: Read patient information leaflets for prescription drugs. Different possible side effects are listed and classified as rare/ extremely rare/ common etc., based on the likelihood of someone experiencing them.

Physical Education: In sports, some events are more likely to happen than others; athletes and coaches may use this knowledge to their advantage. (Fouls at key points, penalty shots)

NSC MATHEMATICS GRADE 8 TERM 2

13

-/8

213

12

Mathematics Scope and Sequence for APSE III

Grade 8 (Year 2) – Term 2

APSE III –Gr. 8 TERM 2	Theme: What is Number?	Theme: Together and apart	Theme: Comparisons in Space Measures, and Number	Theme: Equal Groups
 Benchmarks: Understand fractional number as showing parts of a whole. 	AT#1B: Use basic number operations, relationships, patterns, facts, calculators and appropriate software	AT#1A: Know the value of numerals, associate them with their names, numbers and amounts.	AT#1A: Know the value of numerals, associate them with their names, numbers and amounts	AT#1B : Use the correct units, tools and attributes to estimate, compare and measure.
 Use base 10 place value system to write numbers Compute and solve problems with whole 	in order to solve real world problems	AT4: Employ algebraic reasoning through the use of expressions, equations, and formulae to interpret, model and solve problems involving unknown quantities.	AT#5: Collect, organize, represent and interpret data.	AT#4: Explore paths, shapes and space and make generalizations about spatial relationships within the environment
 numbers Construct bar chart and interpret data by making 	Unit 1 : Fractions - compute and compare, solve problems	Unit 2: Decimals to hundredths Unit 2B: Add, subtract, solve problems with decimals	Unit 3A: Sets and Venn Diagrams Unit 3B : Pictographs	Unit 4A : Measuring Volume and Capacity Unit 4B: Perimeter
comparisons	(3 weeks)	(3 weeks)	(2 weeks)	(3 weeks)

•	Measure liquids in litres Amounts of money as a decimal Compute and solve problems including with money	Content outline: Show fractions to hundredths using grid paper, and symbols; Convert fractions on factors of 100 to an equivalent fraction with denominator 100;	Content outline : Place value of decimals to 2 places including money as decimal of a \$; centimetres as a decimal of a metre;	Content outline : Sets: List members using symbols; the empty set; Odd, even, prime, multiples, factors, composite numbers;	Content outline: Measure in litres and millilitres using a measuring cup, teaspoon; relationship of units;
	APSE III –Gr. 8 TERM 2	Theme: What is Number?	Theme: Together and apart	Theme: Comparisons in Space Measures, and Number	Theme: Equal Groups
		Content outline: Use equivalent fractions to add and/or subtract two fractions – proper, improper mixed, and to compare two fractions on unequal but related denominators. Use fractions (proper etc.) in problem solving, e.g. make up number stories from pictures and number	Content outline: Convert fractions on denominator hundred or factor of hundred to a decimal. Add or subtract with two or three decimals to hundredths Solve 2-step problems using price list or other lists, and money and measures as a decimal	Content outline: Venn diagram for two sets with members in common; Solve problems using data and a Venn Diagram with two overlapping sets. Record data collected using tally and frequency charts and pictographs	Content outline: liquid measures in food preparation, recipes Read and interpret data in recipes, lists of ingredients including the litre measures; Use lists, menus to solve problems. Measure and/or compute perimeter of objects, geometric shapes.

Skills: Convert to equivalent fractions, add / subtract fractions on unequal but related denominators	Skills : Fractions as decimals, money as decimals solve problems with money	Skills : Draw a Venn Diagram, Interpret and use data in a Venn Diagram, Read and write tally marks, Draw and interpreting tally and frequency charts and pictographs, Use data keys,	Skills : Measure small amounts of liquids; compute perimeter with measures of sides.
Vocabulary (written): equivalent fractions, mixed fractions	Vocabulary (written): hundredths	Vocabulary (written): odd, even, prime, composite; sets, members, tally marks, frequency, data, pictograph, key	Vocabulary (written): Litre, millilitre, teaspoon, liquid, chart perimeter

UNIT 1 GRADE 8 TERM 2 (3 WEEKS)

UNIT 1TITLE: FRACTIONS: COMPUTE, COMPARE, SOLVE PROBLEMS

ATTAINMENT TARGET 1B: Use the basic operations, number relationships, patterns, number facts, calculators and appropriate software to compute and estimate in order to solve real world problems.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Use fractions to name up to one hundred equal parts. Write a fraction on denominator 100 that is equivalent to another fraction on a denominator that is a factor of 100 (e.g. 5, 2, 25, 20 etc.) Identify the simplest form of a set of equivalent fractions Add two or more proper fractions on related (multiples) unequal denominators.	Students work in groups using grid paper to introduce fractions on denominator 100. Shade in different amounts and tell or write the fraction. Shade in a) $\frac{10}{100}$, and find other ways of writing the same amount b) $\frac{25}{100}$ and find two other ways of writing the same amount. Convert fractions using the multiplication by 1 rule. E.g. $\frac{3}{5}x - = \frac{1}{100}$ Hint 5 x ? = 100. Show this equivalence on the grid paper or in a diagram. To add or subtract fractions student learned a basic rule: The denominators have to be equal. Demonstrate with fractions on equal denominators. Discuss what to do when the denominators are unequal but related. We need to get them on equal denominators. What technique can help? Equivalent fractions!	how and write fractions Write equivalent fractions Add proper fractions – unequal denominators Subtract proper fractions – unequal denominators	Correctly name fractional parts up to hundredths Correctly identify equivalent fractions for fractions with a denominator of 100. Use multiplication or division to accurately generate equivalent fractions for fractions with a denominator of 100 Correctly identify fractions in their simplest form Use division to accurately write fractions in their simplest form. Add two proper fractions where one denominator is a multiple of the other.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Subtract from a proper fraction another fraction with unequal but related denominators.	To add or subtract when denominators are unequal but related follow <u>three basic steps</u> . E.g., What is: $\frac{1}{5} + \frac{3}{10} = -?$ (5 multiplies to give 10) a. Change one or both fractions so that the denominators are equal. In this instance the denominators are 5, and 10, 5 x 2 = 10, so 10 can be used for the equal denominator. b. Change each fraction to an equivalent fraction on the chosen denominator in this case 10. i. One of the fractions is already on denominator 10. ii. Change the fraction on denominator 5 to denominator 10. Change $\frac{1}{5}$ to an equivalent fraction on denominator 10. $\frac{1}{5} x \frac{2}{2} = \frac{2}{10}$ c. Add the fractions writing $\frac{2}{10}$ instead of $\frac{1}{5}$ so $\frac{2}{10} + \frac{3}{10} = \frac{5}{10}$		Add two or more proper fractions where all denominators are factors of one of the denominators. Subtract a proper fraction from another where one denominator is a multiple of the other.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Compare two fractions on unequal denominators and use symbol <, >, = to show this comparison. Place in order of size a set of fractions (different but related denominators)	Present class with a model of a pizza (or draw on the chalk board). Ask students to discuss how much each child would get if it would be shared between 2 students. Use cut-out cartridge paper to model on share and label with the corresponding fraction Discuss what happens as more students are invited to share the pizza. Model each share and label with the corresponding fractions. (Repeat for at least three different fractions) Guide students, through discussion to observe that as the denominator becomes larger, each share (the fraction) becomes smaller. Ask students to discuss what would happen if they had more than 1 pizza (numerators greater than 1). Guide them to see that if the numerators are the same, then a larger denominator denotes a smaller fraction. Once fractions have the same numerator or denominator, we are able to compare and order them, have students use equivalent fractions to change numerators or denominators of fractions so that they may be compared.	Compare fractions Order fractions	Correctly identify the larger/smaller of two fractions with equal numerators but unequal denominators. Use equivalent fractions to write fractions with unequal denominators as fractions with equal denominators. Correctly identify the larger/smaller of two fractions with unequal denominators and numerators. Use the symbols < , > and = appropriately in the comparison of two fractions Place in ascending/descending order a set of fractions with equal numerators Place in ascending/descending order a set of fractions with unequal numerators and denominators

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Add two or more proper, improper, or mixed numbers on related unequal denominators. Subtract from a larger whole number a) a mixed number, b) an improper fraction. Subtract from an improper or mixed number another fraction with unequal but related denominators.	When adding mixed numbers the additional steps need to be taken to recognize the whole numbers part of the problem. E.g., $2\frac{7}{8} + 1\frac{1}{4}$ The process is to: Add the whole numbers, add the fractions and then add the answers together. E.g. $2 + 1 = 3$ add the whole numbers $\frac{7}{8} + \frac{1}{4} = \frac{7}{8} + \frac{2}{8} = \frac{9}{8}$ add the fractions The answer is $3\frac{9}{8}$. add whole numbers and fractions However $\frac{9}{8} = 1\frac{1}{8}$ so the final answer in simplest form is $3 + 1\frac{1}{8}$ or $4\frac{1}{8}$ When subtracting, a whole number may need to be changed to show a fraction, if the fractional parts are not sufficient for the subtraction. a. Begin with subtracting from a whole number. Models and pictorials can be used to show the situation. e.g. $4 - \frac{5}{9} = 3 + (1 - \frac{5}{9})$ (write 4 as $3 + 1$) 1 can be written as $\frac{9}{9}$; so $\frac{9}{9} - \frac{5}{9} = \frac{4}{9}$ or $3\frac{9}{9} - \frac{5}{9}$ The answer is $3\frac{4}{9}$.	Add mixed fractions unequal denominators Subtract mixed fractions unequal denominators	Accurately add two or more proper fractions with related unequal denominators Accurately add two or more improper fractions with related unequal denominators Accurately add two or more mixed numbers with related unequal denominators Accurately add any combination of two or more proper fractions, improper fractions or mixed numbers with related unequal denominators. Subtract, accurately, an improper fraction from a larger whole number Accurately subtract a mixed number from a larger whole number Accurately subtract an improper fraction from an other with related unequal denominator

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Use fractional	b. Then present subtracting from a mixed number. E.g., $5\frac{7}{10} - \frac{4}{5}$ i. change to equal denominators on 10 $5\frac{7}{10} - \frac{8}{10}$ ii. eight-tenth is more than seven tenth, change one of the 5 whole numbers to a fraction on denominator 10 to complete this subtraction. = $4 + (1\frac{7}{10} - \frac{8}{10}) = 4 + (\frac{10}{10} + \frac{7}{10} - \frac{8}{10}) = 4\frac{9}{10}$ Point out the use of the decimal point to	Problem solving	Accurately subtract a mixed number from another with related unequal denominator Subtract accurately, an improper fraction or mixed number from another fraction with related unequal denominator
numbers in problem solving – make up number stories from pictures and number sentences and find answers.	Separate whole and fractional parts of the number. Guide students in writing their fractions on the new place value chart.		sentences involving fractional numbers from pictures. Create appropriate word problems involving fractional numbers from number sentences Correctly identify relevant information in problem solving situations involving fractions Use appropriate operations in problem solving situations involving fractions. Accurately solve problems involving fractional numbers

- ✓ Convert a fraction to an equivalent fraction on unequal but related denominator
- ✓ Add proper, improper fractions, mixed numbers, with unequal denominators
- ✓ Subtract from a whole, proper or mixed number another fraction with unequal denominator
- ✓ Compare order fractions any type, unequal
- ✓ Problem solve with fractions

Points to Note	Extended Learning			
 If denominators are unequal fractions need to be converted to equal denominators before adding or subtracting When adding or subtracting fractions the answer could be correct but not in simplest form. Simplest form is the usual requirement for the answer but students are just learning the process, give an additional point when marking to encourage students to change to simplest form. 	 Problem solving using fraction bars to aid computations. 			
Materials and Resources	Key Vocabulary			
Grid paper, fraction sets	Fraction equivalent fraction, proper, improper fraction, mixed numbers			
Links to Other Subjects	·			
Digital citizenship: Understand how to use computer number games safely and with ethical behaviour				
Science: Use fractions				
Reading: Read recipe cards and learn to calculate the amount needed for a particular portion				
Physical Education:				

Main Content and Skills	Suggestions for Differentiation		
 Content Convert to equivalent fractions from related but unequal denominators Add, subtract with proper, improper, mixed numbers on unequal but related denominators Compare, order fractions on unequal but related denominators. Skills Convert to equivalent fractions Add, subtract fractions with unequal but related denominators Compare, order fractions with unequal but related denominators Compare, order fractions with unequal but related denominators Compare, order fractions with unequal but related denominators 	 Time /Pace of Instruction Take the skills slowly. Converting to an equivalent fraction is the key skill in this unit. The size of denominator is not critical, but students need to move to denominator 100 in order to work with decimals in the unit that follows. Quantity of work Vary amount of work done by using smaller numbers in the denominators. 	Output/AssessmentProvide guided and independent tasks with gridpaper or fraction bars as scaffolding for somestudentsLevel of SupportUse grid paper / fraction bars. Have studentswork in groups on different skills.Input (Instructional delivery)Remind students of the process of changingunequal but related denominators to equaldenominators.	

UNIT 2 GRADE 8 TERM 2 (3 WEEKS)

SECTION A TITLE: DECIMALS TO HUNDREDTHS

ATTAINMENT TARGET 1A: Know the value of numerals, associate them with their names numbers, ordinals and use concrete objects to model patterns expressions and numbers.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will:	Review the position value of tenths and how to	Write decimal	Correctly identify the hundredth
Understand the	write 279/10 as a decimal. 27.9 is the same as	numbers to	position on the place value chart.
position value two	279/10	hundredths	
places to the right of			State correctly place value
the decimal point as	Extend the place value chart one place to the	Convert fractions to	positions tenths and hundredths.
showing the amount	right to show hundredths.	decimals	Correctly use place value chart to
of 1/100, hundredths.	Whole Fractions		show amounts given in words
	H Tens Ones Tenths Hundredths		
Identify the place	3 4 5 · 9 8		Correctly convert fractions with a
value (position)	Liele students to understand that		denominator of 100 to a decimal
and/or the total value	Help students to understand that:		Correctly write a fraction with a
of the digit in the	a. 345.98 is the same as 34598/100		correctly write a fraction with a
standard numeral	b. Challenge students to use expanded		action initiator that is a factor of 100
snowing nundreaths.	they figure out how to write the desimals		denominator of 100
Convert fractions on	Correct if pocossan		
denominator a) 100	Correct in necessary.		Correctly convert a fraction with a
or b) a factor of 100	200 + 40 + 5 + 9 + 8		denominator that is a factor of 100
(e.g. 5) to a decimal.	$300 + 40 + 5 + \frac{1}{10} + \frac{1}{100}$		to a decimal
			Change a decimal in tenths to a
			proper fraction or mixed number.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Change a decimal in tenths or hundredths to a proper fraction or mixed number fraction.			Change a decimal in hundredths to a proper fraction or mixed number
Write amounts of money (dollars and cents) as a decimal of a \$. Write amounts of distance measures in metres and centimetres or centimetres as a decimal of a metre.	Extend students' knowledge of 2 places of decimal by writing amounts of money (100 cents = 1 dollar); and distance measures in metres and centimetres as decimals (100 cm = 1 m) Ask questions such as: a. What fraction of a dollar is 50 cents? b. What fraction of a metre is 25 centimetres?		Read correctly, cents expressed as decimal amounts of dollars. Correctly write cents as decimal amounts of dollars Correctly read decimal amounts of meters as centimetres Write correctly, measures in centimetres as decimal amounts of metres Write correctly measures in metres and centimetres as decimal amounts of metres Correctly write measures written as decimal amounts of metres as centimetres

- ✓ Understand and write rational numbers as fractions or decimals to two decimal places
- ✓ Write amounts of money and measures (metres and centimetres) as decimals to 2 places

Points to Note	Extended Learning		
 This unit continues the extension of place value systems to show fractions as decimals to 2 places. Principles of the place value system are supported as each place to the left is 10 times. 	• Understand that fractions and decimals show rational numbers that are different from the whole numbers that we were using at the beginning of the programme.		
Materials and Resources	Key Vocabulary		
Place value chart showing decimals to two places. Use background Decimals, hundredth, decimal place shades on the chart to show the position values.			
Links to Other Subjects			
Digital citizenship: Use decimals			
Science: Use numbers in science			
Reading: Read and understand mathematical concepts and words related to decimal fractions			
Physical Education: Discuss how fraction is used in major games			

Main Content and Skills	Suggestions for Differentiation		
Content	Time /Pace of Instruction	Output/Assessment	
 Understand and write rational numbers as fractions or decimals to two decimal places Write amounts of money and measures (metres and centimetres) as decimals to 2 places 	Review decimal to tenths for students who need it then move on to hundredths. <u>Quantity of work</u> Give students sufficient practice in writing decimals.	Use scaffolding in the form of individual place value charts to help students as they work to determine and write fractions as decimals to hundredths. <u>Level of Support</u> Students can work in groups with peer or rotated teacher support.	
 Skills Write decimals to two places Write amounts of money as a decimal of a dollar Write distance measures in metres as decimals to 2 places 		Input (Instructional delivery) Provide Individual Place Value Charts and grid paper as needed to help students who need it.	

UNIT 2 GRADE 8 TERM 2 (3 WEEKS)

SECTION A TITLE: ADD, SUBTRACT, SOLVE PROBLEMS WITH DECIMALS

ATTAINMENT TARGET 1B: Use the basic operations, number relationships, patterns, number facts, calculators and appropriate software to compute and estimate in order to solve real world problems.

ATTAINMENT TARGET 4: Employ algebraic reasoning through the use of expressions, equations, and formulae to interpret, model and solve problems involving unknown quantities.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Add two or three numbers written as decimals to tenths, with regrouping tenths to ones; Add two or three numbers written as decimals up to, hundredths with regrouping hundredths to tenths; tenths to ones. Know how to and align a mix of decimals tenths, hundredths correctly for addition and subtraction.	Review the technique of using expanded notation and place value to add whole numbers. Extend to decimals (adding tenths to tenths and hundredths to hundredths) e.g. $37.2 + 5.9$ is 317.2 + 5.9 43.1 Help students by giving them practice in how to line up (align) the digits in order to add tens to tens; ones to ones; tenths to tenths etc., paying attention to the placement of the decimal point. Subtraction with decimals is also similar to that with whole numbers in using expanded notation and place value. Take the skills one step at a time. See obj. 4, 5, 6	Add decimals Subtract decimals Solve 2 step problems	Accurately add two or three numbers written as decimals to tenths without regrouping. Regroup appropriately to add two or three numbers written as decimals to tenths accurately Accurately add two or three numbers written as decimals to hundredths without regrouping. Regroup appropriately to add two or three numbers written as decimals to hundredths accurately Correctly add a mix of decimals written to tenths and hundredths without regrouping.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Subtract from a whole number a fractional number as a decimal in			Correctly add a mix of decimals written to tenths and hundredths, regrouping where needed.
tenths, e.g. 3 – 2.5 Subtract from a decimal in tenths, another decimal in tenths without or with regrouping ones to tenths. e.g. 5.7 – 0.9			Accurately subtract a decimal to tenths from another decimal to tenths without regrouping. Accurately subtract a decimal to tenths from another decimal to tenths regrouping as required. Accurately subtract a decimal to tenths from a whole number
			Accurately subtract a decimal to hundredths from another decimal to hundredths without regrouping.
			Accurately subtract a decimal to hundredths from another decimal to hundredths regrouping as needed.
			Subtract a decimal to hundredths from a decimal to tenths accurately
			Accurately subtract a decimal to hundredths from a whole number.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Subtract from a	Give students word problems in which two		Correctly identify appropriate
decimal in hundredths	operations have to be done, e.g. add and then		operations in problem solving
another decimal in	subtract. What is the change from \$500 when		involving decimals including
hundredths regrouping	Peg buys a cap for \$150.50 and a book for		money.
as necessary including	\$200.40		
tenths to hundredths			Accurately solve 2-step problems
e.g. 0.75 – 0.26	Have students work in groups from a menu or a		involving decimals including
Solve 2-step problems	with different amounts, or make up problems		distances
(add & subtract) using	for other students to solve		ustances
decimals including use			Correctly interpret information
of money as a decimal	Make up problems adding and subtracting		with decimals presented in a list
of a \$ in purchasing	using different distances e.g. pieces of wood,		to be used in problem solving
situations.	lists with distances between places, or distance		
	tables.		Correctly solve problems involving
Use a list when solving			decimals in lists including those
problems; price list for			involving money and distances.
money problems,			
amounts of motros			
amounts of metres.			
Solve problems adding			
distance measures in			
decimal amount of			
metres			

- ✓ Add two or more decimal numbers to 2 places
- ✓ Subtract a decimal number from a decimal number or a whole number.
- ✓ Solve two step problems

Points to Note	Extended Learning		
 Techniques for adding and subtracting whole numbers are applied to decimals Adding tenths to tenths Regrouping 	 Solve problems adding and subtracting with amounts of measures and money to 2 decimal places. Use a calculator to check answers 		
Materials and Resources	Key Vocabulary		
Place Value Charts to hundredths, calculator, price lists, lists of distances – pieces of wood, distance between places, ones, tens	Decimals, tenths, hundredths		
Links to Other Subjects			
Digital citizenship: Understand how to use board and computer addition and subtraction games safely and with ethical behaviour			
Science: Use skills with numbers in decimal format			
Physical Education: Add or subtract measures or money for buying apparatus			

Main Content and Skills	Suggestions for Differentiation			
Content	Time /Pace of Instruction	Output/Assessment		
 Write decimal numbers to hundredths 	Review place value with tenths and extend to hundredths	Students can use a calculator to assist practice and check answers.		
 Add, subtract and solve problems with decimals to two places Skills Use decimal numbers Add, subtract decimal numbers Solve 2 step problems 	Review adding tenths and then move on to adding hundredths. However some students may need more practice adding and subtracting tenths, while others can move on to adding and subtracting hundredths, and a mix of tenths and hundredths. Quantity of work Allow students, if they need it to spend more time using tenths before moving on to hundredths.	<u>Level of Support</u> Individual place value charts or worked examples may assist some students <u>Input (Instructional delivery)</u> Show students how to do the addition and subtraction using the calculator		

UNIT 3 GRADE 8 TERM 2 (3 WEEKS)

SECTION A TITLE: SETS AND VENN DIAGRAMS

ATTAINMENT TARGET 1A: Know the value of numerals, associate them with their names numbers, ordinals and use concrete objects to model patterns expressions and numbers.

ATTAINMENT TARGET 1B: Use the basic operations, number relationships, patterns, number facts, calculators and appropriate software to compute and estimate in order to solve real world problems.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Describe and/or list the members of a given set of numbers such as odd, even etc. or objects. Use the notations ε 'is a member of' and { } to list members of a given set. Identify and /or describe a set that would have no members - the empty set.	 Begin by building sets with string and actual objects. a. Objects with at least one similar characteristic are enclosed inside the string. b. Describe the members of the set by identifying the similar characteristic. Then c. Use set notation to describe the set, by identifying the members. Use more abstract set definitions such as: all the even numbers between 0 and 13. 	Use set notations Use and interpret Venn Diagram Solve problems using data and Venn Diagrams	 Give an appropriate description for a set of numbers or objects. Correctly list the members of a described set. List the members of a set using { }. Use ∈/∉ to indicate what items are/are not elements of a given set. State whether or not a described set is an empty set. Describe a set that would be an empty set. Identify numbers or objects that belong to more than one of given sets.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Understand that an	Present students with string and objects and		Give examples of two sets that
object or number may	two sets defined in such a way that one or more		have common elements.
be a member of more	objects have both defined characteristics. In an		Correctly list the factors of
than one set (group).	abstract sense this could be multiple of 2 to 12		composite numbers
Write a composite	and multiples of 3 to 13, decide where 6, and 12		composite numbers.
number as a product	would go on the diagram.		Correctly list the prime factors of
of factors, b) prime			given composite numbers
factors.	Multiples Multiples		Write a composite number as a
Write cots of multiples	of 2 of 3		product of factors
of a given numbers			
and identify common			Write a composite number as a
factors.	Students can discuss the following problem and		product its prime factors.
	use Venn Diagrams to present the data and find		Identify common factors of two or
Identify, name and	missing amounts.		more numbers.
give examples of			Correctly cort numbers into groups
odd, b) even, c) prime.	In a class of 25 male students, 15 students in all		of odd and even numbers
d) composite, e)	play football, 12 play cricket. Eight (8) boys play		or oud and even numbers
factors of a given	only football and 5 boys do not play any		List, correctly, numbers that are
number, f) multiples of	outdoor games. How many students play both		odd and those that are even,
a given number.	tootball and cricket?		Correctly sort numbers into groups
Lise a Venn Diagram to			of prime and composite numbers.
present and interpret			
data about			Correctly list examples of Prime
overlapping sets.			numbers
			Give examples of composite
			numbers

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Solve problems using data presented using a			Correctly identify multiples of a given number
number of objects.			List accurately, multiples of a given number.
			Correctly state elements belonging to two sets shown on a Venn Diagram.
			Correctly place elements on a Venn Diagram with overlapping sets
			Identify relevant data presented on a Venn Diagram needed to solve problems
			Accurately solve problems using data presented on a Venn Diagram.

- ✓ Use sets notations to show relationships among 2 sets
- ✓ Use Venn Diagram to show two overlapping sets
- ✓ Solve problems using data in a Venn Diagram of 2 overlapping sets

Points to Note	Extended Learning	
• Venn Diagrams are a visual method of showing relationships and can be used to solve problems. This unit shows Venn Diagram with overlapping two sets.	 Draw Venn Diagrams to show other relationships of sets two sets that have no members in common two sets where one is a subset of the other 	
Materials and Resources	Key Vocabulary	
Strings, coloured pencils/crayons	Sets, number, composite, factor Venn Diagram,	
Links to Other Subjects		
Digital citizenship:		
Science: Use Venn Diagram to help with classification		
Reading: Research the history of Venn Diagram and write a summary of findings.		

Main Content and Skills	Suggestions for Differentiation		
 Content Use sets notations to show relationships among 2 sets Use Venn Diagram to show two overlapping sets Solve problems using data in a Venn Diagram of 2 overlapping sets Skills Draw Venn Diagram to show given data 	Time /Pace of Instruction Venn Diagrams as used here should be presented visually with coloured chalk, strings showing the different sets. Quantity of work Allow each student to work at his/her own pace.	<u>Output/Assessment</u> Allow students to respond to tasks in different ways – orally, by drawing etc. <u>Level of Support</u> Provide support to groups of students who need it. <u>Input (Instructional delivery)</u>	

UNIT 3 GRADE 8 TERM 2 (2 WEEKS)

SECTION B TITLE: PICTOGRAPHS

ATTAINMENT TARGET 5: Collect, organize, interpret and represent data and make inference by applying knowledge of statistics and probability.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will:	Ask students what word they think is used the	Read and write tally	Accurate complete frequency
Collect data and	most in a popular song. Take the top four or five	marks,	table where tally marks are given
record using tally marks Construct frequency tables with and without tally marks Read and interpret data represented on pictographs Construct pictograph from information given in a frequency table	suggestions from students and list on the board. Play the song/music video for students and ask them to keep track of how often each of the listed words appears. Discuss with students how they kept track of the frequency of each word. Guide students to see that the use of tally marks is a more efficient strategy than some may have chosen Give students a picture list of various items (birds, or vehicles etc.) and have them use tally marks to record the frequency of each item in a frequency table.	Draw and interpreting tally and frequency charts and pictographs, Use data keys	Correctly use tally marks to depict information given in a list Correctly state the frequency of items on a pictograph Make accurate inferences from pictographs (e.g. How much more than, how much less than, Which item should be selected for a specific purpose) Accurately construct pictograph to depict information given in a frequency table.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
	Ask students to discuss what fast food they would want for a class "treat-day". Create a chart with the top four (4) or five (5) suggestions as shown below		
	Preferred Fast Food For Class Treat Fast Food Frequency Restaurant Pizza Hut Popeye's KFC Burger King Island Grill Have students indicate their choice for class "treat-day" food by placing a smiley face in the corresponding row		
	Discuss final pictograph with class, Ask questions such as: "Which fast food restaurant is most popular?" "How many more students preferred to ?" "Which fast food restaurant is the least popular?"		

Objectives	Teaching /Learning Activities	Key Skills	Assessment
	Arrange a class talent show; choose students for contestants and a panel of judges. Give the panel of judges a set of stars as shown below.		
	Instruct judges to shade in one section of a star to represent each point awarded to a contestant. Create a chart with each contestants' name on the board and have the judges place the stars awarded to each contestant in the corresponding row.		
	Discuss the completed pictograph. Draw attention to the fact that one star represents more than one vote. Introduce the term key to students.		

- \checkmark Read and make inferences about data presented on a pictograph
- ✓ Construct pictographs based on data presented in a frequency table

Points to Note	Extended Learning
• While technology can be used to generate graphs, by engaging students in the process of constructing graphs, they are able to make connections with how data is represented and in turn are better able to decipher information presented on graphs.	 Have students run a mini research. Guide students to determine the area to focus on (e.g. Reasons students are late, new item for the cafeteria menu, new club to launch at school). Have students collect information and construct frequency tables and pictograph. Have students present their findings with conclusions and recommendations to the class.
Materials and Resources	Key Vocabulary
Strings, coloured pencils/crayons, smiley face cut-outs, star cut- outs	Tally marks, frequency, data, pictograph, key
Links to Other Subjects	
Links to Other Subjects Digital citizenship: Use computer programs and apps to construct g	raphs

UNIT 4 GRADE 8 TERM 2 (2 WEEKS)

SECTION A TITLE: MEASURING VOLUME AND CAPACITY

ATTAINMENT TARGET 2: Use the correct units, tools and attributes to estimate, compare and carry out the processes of measurement to given degree of accuracy.

ATTAINMENT TARGET 3: Explore paths, geometric shapes and space and make generalization about geometric relationships within the environment

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will:Students will:Associate the measureIof small amounts ofIliquids with the SI unitmillilitre.IKnow that a teaspoonIis about 5 mL and useIthis to estimate smallIamounts of liquid inImillilitres.IUse a measuring cupImarked off in amountsIof litres and millilitresI(e.g. 100 mL) tomeasure amounts ofliquids.I	 Show examples of small amounts of liquid and how they are measured drops etc. Give students measuring tasks to find the measure of small and larger amounts using the teaspoon and the measuring jugs. Ask students to make their favourite drinks, or find a recipe and identify the measures, and units used. Have students work in groups on a given recipe; identifying the ingredients and how they are measured. 	Measuring volume/ capacity	Correctly identify litres and millilitres as units or measuring capacity. Correctly state the capacity of 1 teaspoon as 5ml. Accurately identify instruments for measuring volume/capacity (teaspoon, measuring cups and beakers) Correctly identify amounts of liquid that are greater than, less than and about equal to 1 litre Correctly identify appropriate units and instruments for measuring amounts of liquid quantities.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Record estimates and measures using the symbols L (litro) and			Correctly use the symbols ml and L when recording measurements
mL (millilitres)			Take accurate measurements using graduated instruments such
Know that 1000 mL = 1L			as beakers, measuring cups or measuring cylinders
Identify liquid measuring units and			
instruments and their use in the			
preparation.			
Read and interpret data in recipes, lists of			
the litre measures			
Use ingredient lists in a recipe, or a menu to			
solve problems using liquid measures.			

Students will be able to:

✓ Measure volume in litres and millilitres

Points to Note	Extended Learning		
• In this unit students are extending the measuring skill to using litres and millilitres.	 Students find the capacity of different shaped containers in litres and millilitres 		
Materials and Resources	Key Vocabulary		
Graduated measuring , measuring spoons, recipes, water or other liquid to measure	Recipe, capacity, volume, litre, millilitre		
Links to Other Subjects			
Science: Use measures of volume in the study of science – measuring cylinder to measure liquids.			
Reading: Read and understand volume and capacity measures used in recipes.			
Food and Nutrition: Food preparation and measures of volume			

Main Content and Skills	Suggestions for Differentiation		
Content Measure volume, and capacity in litres and millilitres Skills Measure volume using a measuring jug	Time /Pace of InstructionGive students practice measuring volume and capacity using a measuring jug.Some students may measure only in whole numbers, while others can move on to measure using the in-between markings.Quantity of work Give students sufficient practice	Output/AssessmentAssess measuring skills with the actual use of the measuring jug for some items and just the reading of the units on a picture of a measuring jug.Level of SupportProvide support to groups, who may use a 	
		Input (Instructional delivery) This is an important skill to master so all students should be assisted to master the skill of using a measuring jug.	

UNIT 4 GRADE 8 TERM 2 (3 WEEKS)

SECTION B TITLE: PERIMETER

ATTAINMENT TARGET 2: Use the correct units, tools and attributes to estimate, compare and carry out the processes of measurement to given degree of accuracy.

ATTAINMENT TARGET 1B: Use the basic operations, number relationships, patterns, number facts, calculators and appropriate software to compute and estimate in order to solve real world problems.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Objectives Students will: Identify the perimeter of objects and geometric shapes. Measure and /or compute the perimeter of objects and geometric shapes. Solve problems that require making a decision using the perimeter in a real world situation	Teaching /Learning ActivitiesHave objects for students to measure around e.g. the table, around the room. Discuss what around means in different situations around the edge of the plate.Add measure of lengths of sides of polygons to find the perimeter of the polygon. (numbers in decimals)Present a real world situation involving a decision using the perimeter to each group and ask them to find a solution. They may build a model or make a drawing to help them solve the problem.Kit bought 2.5 metres of ribbon to put twice around the edge of the rectangular wall plaque	Key Skills Measuring Computing with measures Solve problems using the computation of the perimeter	Assessment Demonstrate an association between perimeter and the lengths of sides of polygons. Accurately calculate the perimeter of a polygon given the lengths of each side. Give a reasonable explanation of how to find the perimeter of the top of a table. Give students a practical example of the use of perimeter in a real world situation and have them make a decision.
	that is on your desk. Does Kit have enough ribbon? Show your working.		
Students will be able to:

- ✓ Measure perimeter of objects
- ✓ Compute the perimeter of objects and geometric shapes

Points to Note	Extended Learning
• The circumference of a circle is its perimeter	Compute the measure of the perimeter of compound shapes
Materials and Resources	Key Vocabulary
Measuring tape, ruler	Perimeter
Links to Other Subjects	

Extended thinking and problem solving: Solve problems in real life that use the perimeter of objects

Digital citizenship:

Science: Compute with measures – perimeter of leaves, etc.

Reading: Read articles on the use of perimeter in the environment

Physical Education: Use the idea of the perimeter to mark out fields of play – football, netball etc.

Main Content and Skills	Suggestions for Differentiation			
Content	Time /Pace of Instruction	Output/Assessment		
 Measure perimeter of objects Compute the perimeter of 	Allow students sufficient time. All students should be able to do this task as a practical activity related to their area(s) of interest, and	Assess in a practical real world sense and not just with worksheets of distance measures.		
objects and geometric	games. E.g. How much would you run if you went	Level of Support		
shapes	around the football field a) one time? B) 10	Provide group support as needed		
	times?			
		Input (Instructional delivery)		
Skills	<u>Quantity of work</u>	Provide a variety of experiences so that students		
 Measure perimeter as a distance using a measuring tape or ruler 	Vary the quantity, setting and difficulty of the problems students have to solve.	get a working knowledge of what distance is a perimeter, and so will be able to solve real-world problems.		
 Compute perimeter 				





Mathematics Scope and Sequence for APSE III

Grade 8 (Year 2) – Term 3

APSE III –Gr. 8 TERM 3	Theme: What is Number?	Theme: Together and apart	Theme: Com2parisons in Space Measures, and Number	Theme: Equal Groups
 Benchmarks: Understand whole number as amount of objects in a group 	AT1A: Associate numerals, words, other symbols with amounts of objects and other types of numbers.	AT1B: Use number operations and relationships to compute and solve problems.	AT3: Explore paths, geometric shapes and space andgeometric relationships in the environment.	AT1B: Use number operations and relationships to compute and solve problems
 Understand fractional number as showing parts of a whole. Use base 10 place 	AT5: Collect, organize, interpret and represent data and make inference by applying knowledge of statistics and probability.		AT2: Use the correct units, tools and attributes to estimate, compare and measure .	AT4: Employ algebraic reasoning to interpret, model and solve problems
 value system to write numbers Compute and solve problems with whole, fractional 	Unit 1A: Whole numbers to hundred thousand / Data in Tables Unit 1B: Averages	Unit 2A: Multiply fractions and decimals	Unit 3A: Prefixes in the metric system Unit 3B: Temperature, and Area	Unit 4A: Divide fractions Unit 4B Divide decimals Unit 4C: Use Algebraic thinking
numbers	(3 weeks)	(3 weeks)	(2 weeks)	(3 weeks)

•	Compare, and	Content outline:	Content outline:	Content outline:	Content outline:
	measure mass,	Count by ten, hundred	Multiply fractions (proper,	Appropriate metric units and	Divide a whole number by a
	area	thousand	improper, mixed) by a whole	instruments for mass,	fraction, a fraction (proper,
•	Observe and	Understand the pattern in	number, another fraction;	volume, and distance;	mixed, improper) by a whole
	identify objects	the place value chart for	Simplest form of mixed	Understand use of prefixes	number;
	with line	the thou-sands (one, ten,	numbers;	kilo-, centi- in the metric	Divide a decimal in tenths by
	symmetry.	hundred);		system	a 1 digit whole number, and by 10.

APSE III –Gr. 8 TERM 3	Theme: What is Number?	Theme: Together and apart	Theme: Comparisons in Space Measures, and Number	Theme: Equal Groups
	Content outline: Use standard and expanded numerals (no indices) and words to	Content outline: Review place value of decimals to tenths, hundredths;	Content outline: Associate temperature above zero with degrees Celsius and with events;	Content outline: Consolidate and review number and computation skills with whole, fractional
	Compare, order and /or round numbers on the	Multiply decimals in tenths by 1 digit whole number, 10, or another decimal (tenths);	Concept of 'area' related to regions, flat shapes, including floors, walls, land;	Translate a sentence or phrase to mathematical
	Read tables and bar charts	Solve 1- or 2 step problems using addition; subtraction,	Area of irregular, regions on a grid in cm2.	represent unknown numbers.
	show population.	and multiplication with decimals and fractions.	Units of measure – informal squares, square centimetre	
	Use calculators when computing with large numbers.		(cm2), square metre (m2). Solve problems with area of regular and irregular regions.	
	Compute with up to 6- digit whole numbers		5 5 5	
	Find mean, mode and median of a data set			
	Skills: Read and write numbers compare, order and round large numbers; compute using calculators	Skills : Compute with decimals to hundredths	Skills : comparing, measuring with the kilogram; area	Skills : Divide a fraction or a decimal by a whole number; using algebraic symbols and letters
	Vocabulary: Thousands, average, mean, mode, median, range	Vocabulary (written):	Vocabulary (written): Kilogram, area	Vocabulary (written):

UNIT 1 GRADE 8 TERM 3 (3 WEEKS)

SECTION A TITLE: WHOLE NUMBERS TO HUNDRED THOUSAND

ATTAINMENT TARGET 1A: Know the value of numerals; associate them with their names numbers, ordinals and use concrete objects to model patterns expressions and numbers.

Objectives	Teaching /Learning Activities					es		Key Skills	Assessment
Objectives Students will: Count by tens, hundreds or thousands to tell how many objects are in a group of objects up to hundred thousand. Understand a) the repeat in the pattern in the place value chart for the group of thousands (one, ten, hundred) b) that each place is 10 times the place to its right. Use standard and expanded numerals (no indices) and words	Pattern o Thousands Hundred 8 Show stue chart – as eight hun hundred s written o thousand However hundred t iv) Review order, rou populatio also be us	Ten f thou f thou dents the t dred t seven nce al s. when thous v and unding on dat sed in	ing /L sands One 4 how t housa thirty- . Notic thoug ident and pl exten- g with a by p probl	earning Ad in the plac Hundreds 5 o read the nds are gro four thousa ce also that h all three ifying posit ace. d number s whole nun arish in Jan em solving.	tivitie e valu Tens 0 numb ouped and, fir thous positic cions – skills, c nbers r naica.	er in the compare of the charmed of	t ne d: ore ow the ring, n	Key SkillsWrite standardnumerals for largenumbersUse place value chartto show up tohundred thousandShow numbers withexpanded numeralsRound numbersInterpret data intables that showlarge numbersSolve problems usingdata in tablesCompute with whole	Assessment Count by tens, hundreds and thousands to tell the number of objects in a group no larger than 100,000. Correctly use place value chart to represent large numbers up to 6- digits. Demonstrating understanding of ten-makes-one relationship between consecutive place value positions. Correctly match numerals in standard form to number names Match numerals in expanded form to their expanded form
999,999								numbers	standard form in expanded form.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Round: a. 4-digit numbers to the nearest thousands; b. 5-digit numbers to the nearest thousands or ten thousands; c. 6-digit numbers to the nearest ten thousand, hundred thousand. Relate number to large amounts of objects, people e.g. the population (number of people who live in different parishes in Jamaica. Solving problems using data from tables: a. compare and tell with the greater/lesser b. place in serial order by the size	Use tables with population of parishes to solve problems with number comparisons, order, and rounding with 5 and 6-digit numbers. (These can be obtained from STATIN website or publications, social studies books.) Review and practice computation with 5, and 6- digit numbers, using the calculator to check answers.		Correctly round numbers (up to 6 digits) to the nearest thousands. Round 5 or 6 digit numbers to the nearest ten thousands correctly. Correctly round 6 digit numbers to the nearest hundred thousands Give reasonable examples of large amounts of objects, e,g, population Select relevant data from tables for problem solving Accurately solve problems using data from tables. Compute accurately using whole numbers having up to 6 digits. Use calculators appropriately to check answers to computation with whole numbers having up to 6 digits.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Compute using up to 6-digit whole numbers.			
Use calculator to check answers to computation with up to 6 digits.			

Learning Outcomes				
 Students will be able to: ✓ Understand sequence and patterns in using large whole numbers ✓ Use standard and expanded numerals to show numbers to hundred thousand ✓ Round 4, 5, and 6-digit numbers to nearest thousand, ten thousand, hundred thousand respectively ✓ Use tables with large numbers to solve problems ✓ Practice computation skills with 4, 5, 6 digit whole numbers 				
Points to Note	Extended Learning			
• When reading a six digit number e.g. the number in the place value chart is read: eight hundred thirty four thousand, five hundred and seven Notice that thousand is written once, although there are three places of thousands.	 Students can use Bar Charts with large numbers showing exports, population of countries etc. 			
Materials and Resources	Key Vocabulary			
Place value pocket charts to thousands, digit cards	Hundred thousand, ten thousand, round, population			

Links to Other Subjects

Digital citizenship: Understand how to use computer number games safely and with ethical behaviour

Science: Use large whole numbers

Reading:

Social Studies/Geography: Use large whole numbers such as the population of countries etc.

Main Content and Skills	Suggestions for Differentiation				
 Content Sequence and patterns in using large whole numbers Standard and expanded numerals to show numbers to hundred thousand Round 4, 5, and 6-digit numbers to nearest thousand, ten thousand, hundred thousand respectively Use tables with large numbers to solve problems Computation skills with 4, 5, 6 digit whole numbers 	Time /Pace of Instruction Give students the numbers that they can use comfortably, but many students should be able to use up to hundred thousand as this stage. Quantity of work Be mindful of individual students needs and capability.	Output/AssessmentGive students activities related to the size of numbers with which they are workingLevel of SupportAllow students to work in groups so that they are supported by their peers.Input (Instructional delivery)This unit adds two places to the place value chart, ten thousand and hundred thousand.			
 Skills Read and write large numbers Round numbers Using data in tables Compute with large number 					

UNIT 1 GRADE 8 TERM 3 (3 WEEKS)

SECTION B TITLE: WHAT IS NUMBER

ATTAINMENT TARGET 5: Collect, organize, interpret and represent data and make inference by applying knowledge of statistics and probability.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will:	Tape 5 clear plastic bags on the board (ensure	Levelling	Correctly state whether the mean,
Calculate the mean of	that the tops are not taped shut). Select five	-	mode or median would be the
a given set of data	students. Have each student take counters from	Finding averages	most appropriate in a given
Find the missing data	a container with 30 bottle covers and place into	Organizing data	situation
from a set, given that	they may take as many or as few as they would	0 0	Correctly describe the process for
we know how many	like, simply ensure that all counters are used	Creating frequency	calculating the arithmetic mean of
numbers are in the set	up. Write the number of counters in each bag	data	a set of data
and the mean	below the bag. Now ask the class how many	Solving problems	Find the evithmentic means of a set
Identify the mode of a	counters would be in each bag if each student		through levelling evening out of
given set of data	had taken out the same amount. Allow the class		stacks
	to discuss various methods of finding this.		
Find the range of a set	Have students take stacks of copies of the same		Accurately calculate the mean for
	book from a box/ bookshelf and place in		a set of date
Identify the median of	separate stacks on a table. (Be deliberate in the		Explain clearly what is meant by
a given set of data	number of books available and the number of		the mode of a set of data
Solve problems	students chosen taking care that the mean will		
involving average	be a whole number). Ask students to discuss		Correctly identify the mode of a
	now many books should be in each stack, to ensure that all stacks are equal		set of data

Objectives	Teaching /Learning Activities	Key Skills	Assessment
	Discuss situations in which the mode would be useful such as follows. Your cousin in New York wants to set up a business with you buying and selling shoes and clothes. You are starting small with just one or two of each item and want to sell as much goods as you can quickly so that you can turn over the money and expand. How do you decide what size shoes/jeans/dresses to buy? Have students conduct a small survey and guide them in finding the mode.		Describe clearly, the process for finding the median of a set of data Correctly order data in ascending/descending order Correctly identify the median of a set of data Correctly solve problems involving average

- ✓ Calculate the arithmetic mean of a set of data
- \checkmark Find the mode and median of a given set of data
- ✓ Solve problems involving averages.

Points to Note	Extended Learning		
 The idea of levelling is a key concept in understanding mean and can be used to develop the algorithm. Students may approach levelling activities by taking from the larger stacks/groups and sharing until all stacks are even. To begin, ensure that the mean will be a whole number if objects being shared cannot easily be divided into fractional parts. To develop the algorithm, get students to level off by thinking about how many they have in all and then think about how many each stack/group would have if shared equally. 	 In small groups, have students choose a small business to investigate such as a taxi business, hairdressing salon, market produce stall, etc. Have students investigate various types of averages that are used in the business in different instances (e.g. average income, choice of goods/services offered based on popularity, pricing of services based on time taken etc.). Where possible have students collect relevant data, create table and calculate averages. 		
Materials and Resources	Key Vocabulary		
Counters/bottle covers, stacks of books, connecting cubes, plastic bag	Average, mean, mode, median, range		
Links to Other Subjects Science: Scientists use averages to standardize data, investigate trends and minimize errors that may be seen due to laboratory			

conditions. Social Studies/Civics: Various government and civil organizations collect demographic data about a particular population and use

different averages to analyse data for the purpose of decision making.

Social Studies/Home Economics: When budgeting, entrepreneurs/small business owners need to utilize mean to determine their average income/expenditure as they can sometimes experience large differences in their incomes at specific times/seasons

UNIT 2 GRADE 8 TERM 3 (3 WEEKS)

SECTION A TITLE: MULTIPLY FRACTIONS

ATTAINMENT TARGET 1B: Use the basic operations, number relationships, patterns, number facts, calculators and appropriate software to compute and estimate in order to solve real world problems.

ATTAINMENT TARGET 4: Employ algebraic reasoning through the use of expressions, equations, and formulae to interpret, model and solve problems involving unknown quantities.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Objectives Students will: Multiply a whole number by a proper fraction (review). Multiply a proper fraction by another proper fraction. Multiply an improper or mixed number by a. a proper or improper fraction; b. a mixed number Write fractions in the simplest form	Teaching /Learning Activities Review multiplying a whole number by a proper fraction. E.g. what is 10 x 1/2? Is the same as 1/2 of 10? We have ten objects, how many objects would be 1/2? Give a practical example by drawing this on the chalkboard or using a picture of 10 objects. Ask: Is this the same as dividing 10 into two equal groups? Have students work in groups to figure out different fractions of a different number of whole objects. E.g. a) 15 x 2/5 b) 27 x 1/3	Key Skills Multiply fractions Multiply mixed numbers Solve problems	AssessmentAccurately multiply a whole number by a proper fractionCorrectly model multiplication of proper fractions using paper folding/pictures or fraction piecesCorrectly interpret models to find the solution for multiplication problemsMultiply a proper fraction by another proper fraction accuratelyAccurately multiply an improper fraction by a proper fractionAccurately multiply an improper fraction by another improper
			fraction

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Solve 1- or 2-step problems using multiplication skills with fractions.	Model the multiplication of fractions by using an array. What is $\frac{4}{5} \times \frac{2}{3}$? How can we show this with paper folding or an array? a. draw a model in fifths and mark off 4 parts $\frac{4}{5}$ b. Take two-thirds of the model by folding in three then marking two of the three parts to give: $\frac{4}{5}$ What part of the whole has both shading and criss-cross lines? $\frac{8}{15}$ The multiplication is $\frac{4}{5} \times \frac{2}{3} = \frac{4 \times 2}{5 \times 3} = \frac{8}{15}$		Accurately multiply a mixed number by a proper fraction Accurately multiply a mixed number by an improper fraction Multiply a mixed number by another mixed number accurately Accurately write the product of multiplication of fractions in the simplest form Simplify multiplication of fractions by dividing any pair of numerator and denominator by a suitable number Identify suitable operations in problem situations involving fractions Create appropriate number sentences involving fractions based on problem situations

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Compute using up to	Extend to use improper and mixed numbers.		Accurately solve 1 or 2 step
6-digit whole numbers.	Ask students to draw a model to show:		problems involving multiplication
Use calculator to check	$1\frac{9}{10} \times \frac{1}{3}$ and discuss the answer.		of fractions.
answers to	Method 1: Multiply 1 by one third and multiply		
to 6 digits.	nine tenths by one third and add the results.		
	Method 2: change the mixed number to an		
	improper fraction and multiply both		
	numerators and both denominators. Write the answer in simplest form		
	Give students further practice with the		
	multiplication with fractions (proper, improper)		
	and mixed numbers.		
	Peter has one half of a cake. He gave Pat two-		
	thirds of the piece of cake he has. How much of		
	the entire cake did he give Pat? (Use a piece of		
	paper to show this in a practical way)		

- \checkmark Multiply a whole number by a fraction
- ✓ Multiply a fraction, or mixed number by another fraction or mixed number
- \checkmark Solve problems that involve the multiplication of fractions

Points to Note	Extended Learning
 Multiplication of fractions seems easy for students but they may not understand the concepts in a practical sense, and may not recognize the multiplication in a problem situation. Allow students to cut or fold paper to show the multiplication, especially of a fraction by another fraction. 	• Explore further the idea that multiplication by a fraction gives the same result as dividing by a whole number. E.g. multiplying by one-third, gives the same result as dividing by 3.
Materials and Resources	Key Vocabulary
Paper (one quarter of a sheet, or smaller) for folding, counters or other objects	Multiplication, fraction, proper improper, mixed number
Links to Other Subjects	
Digital citizenship:	
Science:	
Physical Education: Use fractions	

Main Content and Skills	Suggestions for Differentiation		
 Content Multiplication by a fraction Problems involving the multiplication of fractions Skills Multiplication Solve Problems 	Time /Pace of InstructionAllow students to work with objects for the multiplication of a whole number, and with paper folding for the multiplication of two fractions.Give sufficient time for students to become familiar with the concepts and to develop an understanding of the symbols and abstract algorithm.Quantity of work Allow students to work with the amount they can reasonably handle.	Output/AssessmentAllow students to use counters, objects and paper folding while doing some tasks in the assessment. For other tasks students should be able to use the abstract symbols only.Level of SupportAllow students to work in groups on the paper folding, present and explain their work to each other.Input (Instructional delivery)Emphasize the practical aspects.	

UNIT 2 GRADE 8 TERM 3 (3 WEEKS)

SECTION B TITLE: MULTIPLY DECIMALS

ATTAINMENT TARGET 1B: Use the basic operations, number relationships, patterns, number facts, calculators and appropriate software to compute and estimate in order to solve real world problems involving fractions, percentages and decimals.

ATTAINMENT TARGET 4: Employ algebraic reasoning through the use of expressions, equations, and formulae to interpret, model and solve problems involving unknown quantities.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will:	Model a multiplication of a decimal in tenths by	Multiply decimals	Correctly write a decimal numbers
Write decimal	a whole number in different ways: Give		to hundredths using place value
numbers using base	students different examples and ask them to		chart
ten place value to	give the answer using at least two different		
tenths, hundredths	methods: e.g. What is 0.9 x 5?		Accurately convert a decimal to a
(review)	a. As a fraction: $\frac{9}{10} \times \frac{5}{1} = \frac{45}{10}$ or 4.5		fraction with a denominator of 10
Convert a decimal to a	b. Using repeated addition of a decimal or		Accurately convert a decimal
fraction with	a fraction. E.g. 0.9 + 0.9 + 0.9 + 0.9		number to a fraction with a
denominator 10 or 100	+0.9 = 4.5		denominator of 100
(review)	Note that this multiplication $0.9 \times 5 = 4.5$ is very		Accurately multiply a decimal in
Multiply a decimal in	similar to the multiplication of whole numbers,		tenths by a 1- digit whole number
tenths by a 1 digit	as it uses the same facts but we need to pay		by converting to fractions
whole number.	attention to the placement of the decimal		
	point.		Demonstrate an understanding of
	0.9 is ten times less than 9		the placement of the decimal
	<u>X 5</u> (1 decimal place) <u>x 5</u>		point when a decimal is multiplied
	45		by a whole number

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Objectives Understand where to put the decimal point in the product of a fractional decimal number, and whole number Multiply a decimal in tenths by 10 or 100. Multiply decimals in tenths by another decimal in tenths. Solve 1- or 2-step problems using, multiplication skills with decimals.	Teaching /Learning ActivitiesLink the multiplication by 10 or powers of 10 to the place value chart as multiplying by 10 moves the digits one place to the left. e.g. $0.9 \times 10 = 9$ (we can show this with multiplication of a fraction).Give practice in multiplying tenths by a. a whole number b. 10 or c. 100.When multiplying a decimal in tenth by another decimal in tenths show how many the decimal places that will be in the answer. e.g. $2.4 \times 0.6 = \frac{24}{10} \times \frac{6}{10} = \frac{144}{100}$ The answer has two decimal places as we divide 144 by 100 to get 1.44	Key Skills	AssessmentAccurately multiply a decimal number to tenths by 10Accurately multiply a decimal number to tenths by 100Demonstrate an understanding of the placement of decimal point when a decimal to tenths is multiplied by a power of 10Accurately multiply a decimal in tenths by another decimal in tenths using fractionsAccurately multiply a decimal in tenths without the use of fractionsIdentify suitable operations in problem situations involving decimals including money
			Create appropriate number sentences involving decimals, including money, based on problem situations
			Accurately solve 1 or 2 step problems involving multiplication of decimals including money.

- ✓ Write decimal numbers using base ten place value to hundredths (review)
- \checkmark Convert a decimal to a fraction on denominator 10 or 100
- ✓ Multiply a decimal number by a whole number, or another decimal
- ✓ Solve problems that involve multiplying a decimal number

Points to Note	Extended Learning		
• Multiplication by a fraction can be used to establish the rules for finding how many decimal places are in the answer and to check the multiplication of decimals.	 Multiply a decimal in hundredths by a) a 1- digit whole number b) ten c) 100 		
Materials and Resources	Key Vocabulary		
	Decimal, tenths, hundredths multiplication		
Links to Other Subjects			
Digital citizenship: Understand how to use computer number games safely and with ethical behaviour			
Science: Understand and use the multiplication of decimals			
Physical Education: Use decimals and decimal Multiplication especially with measures.			

Main Content and Skills	Suggestions for Differentiation	
Content	Time /Pace of Instruction	Output/Assessment
 Place value of decimal 	Multiplication with decimals is very similar to	Assess orally /mentally students' ability to
numbers (review)	whole numbers and students may find this easier	multiply a decimal by 10, or 100 as students
 Decimals to a fraction on 	than multiplication with fractions. The aspect to	should be able to do this easily. Other skills may

 denominator 10 or 100 Multiply a decimal number by a whole number, or another decimal Solve problems that involve multiplying a decimal number 	watch is to find out the number of decimal places in the answer.	be assessed with pencil and paper. <u>Level of Support</u> Help students to see the link with multiplication of whole numbers.
 Skills Writing decimals Convert a decimal to a fractions Multiply with a decimal Solve problems 		

UNIT 3 GRADE 8 TERM 3 (2 WEEKS)

SECTION A TITLE: PREFIXES IN THE METRIC SYSTEM

ATTAINMENT TARGET 2: Use the correct units, tools and attributes to estimate, compare and carry out the processes of measurement to given degree of accuracy.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Recall ideas of mass, volume, capacity, and distance, their units and the instruments used when measuring. Identify the appropriate unit – kilogram, gram; litre, millilitre; metre, centimetre, kilometre for use in a measurement situation. Understand structure of units in the metric systems with the use of the prefixes a) kilo- b) centi-	Present measurement tasks – and observe students as they select the instrument and units to use to carry out the required measurements. Build a chart with a wheel that the prefix: a) kilo- b) centi- could be moved to be placed beside the main units: gram, litre, metre. Discuss the meaning of the prefix and the effect when this is placed before the main units. The prefix kilo- means a thousand times, and placed before a main unit gives one thousand times the unit e.g. kilo- gram, kilo-litre, kilo-metre. Ask: What does the prefix centi- mean? Where have you seen this prefix before? centi- metre centi- means one hundredth How much of a litre would be a centi- Litre?	Using prefixes in the metric system Chart Building	Correctly select appropriate instruments to carry out required measurements Correctly state the best units to use in a given measurement situation Correctly state the relationship between km(kl/kg), cm(cl/cg), and m(l/g)

- ✓ Review metric units of mass, volume/capacity and distance
- ✓ Identify prefixes (kilo-, centi-) used in the metric system and tell their meaning

Points to Note	Extended Learning		
• Point out that there are many prefixes in the metric system but each prefix is not in popular use with all the main units.	 Find two other prefixes in the metric system and explain what they mean and how they are used 		
Materials and Resources	Key Vocabulary		
Chart with prefixes kilo- and centi-, wheel with prefixes and main units	Prefix, centi-, kilo-, gram, metre, litre		
Links to Other Subjects			
Digital citizenship: Use software and apps to convert between various units in the metric system			
Science: Use prefixes in the metric system. Also link to the periodic table and its symbols			
Language Arts/Reading: Link with the use of prefixes in other words			

UNIT 3 GRADE 8 TERM 3 (2 WEEKS)

SECTION B TITLE: TEMPERATURE AND AREA

ATTAINMENT TARGET 2: Use the correct units, tools and attributes to estimate, compare and carry out the processes of measurement to given degree of accuracy.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Objectives Students will: Understand that temperature shows how hot or cold it is when measured with a thermometer. Measure and record a given outdoor /indoor temperature using degrees Celsius (28 °C). Associate a) 0 °C with the freezing point of water, b) 32 °C with	Teaching /Learning ActivitiesBuild a chart for the week, giving the outside temperatures at different time of the day or listen for the temperature of different places in a weather report.Know that degrees Celsius (°C) is used to measure everyday temperature.Students in groups use pictures to build a chart showing events associated with given temperatures such as freezing (water turns to ice), boiling (water turns to steam); normal body temperature etc.	Key Skills Measure temperature Use a thermometer	AssessmentCorrectly use the words hotter or colder to describe a higher or lower temperatureCorrectly identify the instrument used for measuring temperatureAccurately measure and record temperaturesCorrectly state the freezing and boiling points of water
water.			

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Tell the temperature which is a number of degrees warmer or cooler that a given temperature above zero.	Give students experiences with flat surfaces	Find area using a grid	Correctly identify the definition of
 Find the area of irregular and regular and regular and regular flat surfaces using nonstandard units. Find the area of flat surfaces using nonstandard units. Find the area of flat shapes (actual, pictures, or diagrams) on a) a square grid b) a square centimetre (cm2) grid. Solve problems by finding the area of irregular regions and irre	Give students experiences with hat surfaces, and regions. Cut out different shapes from cardboard; examine pictures of land; touch the walls of the classroom, the tiles on the floor and/or newspaper sheets. Introduce the idea of measuring area by covering completely (no gaps, no overlaps) flat surfaces with smaller objects that have area; e.g. cover the table top with leaves, multiple cut-outs of a given shape, and count how many of the smaller ones cover the larger surface exactly.	Find area using a grid	Correctly identify the definition of area from a list Accurately find the area of polygons by counting units on a grid Give reasonable answers for the area of enclosed shapes (not polygons) by counting units on a grid
regular regions and square centimetre grid.			

Objectives	Teaching /Learning Activities	Key Skills	Assessment
	Introduce a square grid (then the centimetre		Identify correctly, problem
	square grid) and use this to cover an area and tell how many square grids will cover the		situations involving area
	outlined area exactly. (grid could be paper or		Accurately solve problems
	a geoboard)		involving the area of polygons
			using a square centimetre grid
	Is the area of the top of the teachers' desk more than the area of the tops of 2 student's desks?		Find reasonable solutions for problems involving the area of enclosed shapes using a square centimetre grid
Learning Outcomes			•
Students will be able to:			
✓ Understand temperature, and area			
✓ Use a thermometer			
 Associate temperatures in degrees Celsius with everyday events/occurrences 			
✓ Tell a temperature warmer or cooler than a given temperature (both above zero)			
 Use a grid, a centimetre grid to give the area of irregular or regular shapes 			

Points to Note	Extended Learning		
	• The idea of covering a region with different shapes could be used as a pattern or a tessellation. Students could answer questions such as: which shapes make good tessellations (coverage with no gaps)?		
Materials and Resources	Key Vocabulary		
Thermometer, centimetre grid paper, other grid paper, cut outs of different shapes	Temperature, thermometer, warmer, cooler, degrees celsius, area, irregular shape		
Links to Other Subjects			
Digital citizenship: Use Weather Apps and websites to monitor daily temperature			
Science: Use shape and size to classify, and group in the study of science. Link temperature changes to changes in matter in the study of science			
Reading: Read and understand mathematical concepts and words related to temperature and area			

Main Content and Skills	Suggestions for Differentiation		
Content	Time /Pace of Instruction	Output/Assessment	
 Temperature; area 	Students can be given the task of reading the	Observe and mark students as they complete the	
 Use a thermometer 	daily temperature in groups. Groups can rotate	practical assignments and display their charts.	
 Temperatures in degrees 	daily for the week to give the morning and		
Celsius for everyday	afternoon temperatures at different places in the	Level of Support	
events/occurrences	school.	Students work in peer groups.	
 Temperatures warmer or 			
cooler than a given			
temperature (both above			
zero)			
• Telling area by using a grid, a			
centimetre grid			
Skills			
 Measuring temperature 			
 Find area using a grid 			
8 - 8 - 8 - 8 - 8			

UNIT 4 GRADE 8 TERM 3 (2 WEEKS)

SECTION A TITLE: DIVIDE WITH FRACTIONS

ATTAINMENT TARGET 1B: Use the basic number operations, relationships, patterns, facts, calculators to compute and solve real world problems.

ATTAINMENT TARGET 4: Employ algebraic reasoning through the use of expressions, equations, and formulae to interpret, model and solve problems.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Divide a whole number by a fraction. Divide a whole number by another whole number so that the answer is a fraction	 Review the two meanings of division as sharing to find: a) the number of groups b) the number of objects in each group Apply the meaning of division to dividing by a fraction. Problem: <i>Divide three cakes equally so that each person gets one-quarter of a cake. How many persons will get cake?</i> As a semi concrete representation, give groups of students three pieces of paper of the same size and ask them to answer the problem. Let students show their work. They could cut 3 whole objects (same size shapes) into fourths, to find out that there are 12 fourths) 	Divide fractions	Correctly represent division of a whole number by a fraction using pictures, paper folding, fraction tiles or other manipulatives Interpret models correctly to find answer to division of whole numbers by fractions Accurately divide a whole number by a fraction without the use on concrete or pictorial representations Model the division on a whole number by another where the answer is a fraction Accurately divide a whole number by another whole number by another whole number by another whole number so that the answer is a fraction

Objectives	Teaching /Learning Activities	Key Skills	Assessment
	Show students how to write $3 \div \frac{1}{4} = 12$ Show students how to write $3 \div \frac{1}{4} = 12$ So 12 persons will get one-fourth of a cake. We can reword the problem as: <i>How many</i> $\frac{1}{4}$ <i>are in 3 whole objects?</i> Give students more examples, or allow them to work in pairs or groups to actually cut the paper leading to the rule that <i>dividing by a fraction gives the same</i> <i>result as multiplying by the inverted fraction::</i> So $3 \div \frac{1}{4}$ is the same result as $3 \times \frac{4}{1}$ and $5 \div \frac{1}{3}$ $= 5 \times \frac{3}{1}$ and so on.		
	the question as: How many three fourths are in three whole objects? Allow students to cut apart the 12 fourths and arrange them in threes to get 4. There are 4 three fourths in 3 whole objects. $3 \div \frac{3}{4} = 3 \times \frac{4}{2}$		
	Write the 3 as a fraction with denominator 1; so the sentence is: $\frac{3}{1} \times \frac{4}{3} = \frac{12}{3}$ or 4		

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Divide a fraction by a whole number.	Examine and interpret the following problem: $\frac{1}{2} \div 3$ a. If one half of an object is divided into 3 equal partshow much of the whole will be each part? b. Semi concrete representation cut one half of an object in three equal pieces. What fraction of the whole is one of these new pieces? c. As a picture when one half is divided into three equal pieces, one piece is one sixth of the whole. $\frac{1}{2}$ d. In unit 3 students were introduced to the rule: multiplying by a fraction is the same as dividing by the denominator. So applying this rule means that $\frac{1}{2} \div 3 = \frac{1}{2} \times \frac{1}{3}$ (dividing by 3 is the same as multiplying by $\frac{1}{3}$). The reciprocal of 3 is $\frac{1}{3}$		Model, appropriately, the division of a fraction by a whole number. Accurately divide a fraction by a whole number.

- ✓ Divide a whole number by a fraction
- ✓ Divide whole numbers to get a fraction
- ✓ Divide a fraction by a whole number

Points to Note	Extended Learning		
 Students will intuitively understand this skill when it is presented as a problem of sharing into equal parts, and in using semi concrete, paper cutting, and pictorial representations. Present the mathematics sentence and procedure after the manipulation with paper and objects. 	 Students who are able to can move to division of a fraction by another fraction. e.g. ²/₃ ÷ ¹/₂ Read the story 'The Doorbell Rang'. 		
Materials and Resources	Key Vocabulary		
Objects, fraction pieces, paper cut into equal parts	Division, inverting fractions, reciprocal		
Links to Other Subjects			
Digital citizenship: Understand how to use computer number games safely and with ethical behaviour			
Science:			
Reading: Read and understand mathematical concepts and words related to multiplication etc.			
Physical Education: Understand sharing and grouping			

Main Content and Skills	Suggestions for Differentiation		
 Content Whole number divided by a fraction Whole number divided by a whole number to get a fraction Fractions divided by a whole number Skills Divide with fractions 	Time /Pace of Instruction Allow students to pace themselves through this unit. Give time to work through the problems in a practical sense.	Output/AssessmentAssess students with a mix of performance itemsin which they show the process of the division isdemonstrated and others in which just themathematical expression is given.Level of SupportHelp students to display their work after solvingthe problems, e.g. show a) the pieces of paperthat were used, b) the mathematical sentenceand c) the answer.Input (Instructional delivery)Begin with a practical problem to solve and notwith the mathematical sentence to bemanipulated. The mathematical sentence ispresented after the activity has been completed.	

UNIT 4 GRADE 8 TERM 3 (2 WEEKS)

SECTION B TITLE: DIVIDE WITH DECIMALS

ATTAINMENT TARGET 1B: Use the basic number operations, relationships, patterns, facts, calculators to compute and solve real world problems.

ATTAINMENT TARGET 4: Employ algebraic reasoning through the use of expressions, equations, and formulae to interpret, model and solve problems.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Divide a whole number by another whole number to get a decimal in tenths or hundredths Divide a decimal number in tenths by a 1-digit whole number Divide a decimal number in tenths by 10. Solve problems that require the division with fractions and decimals.	Show how to continue the division of whole numbers to get quotients in decimal to 1 or 2 places. 2.62 e.g. $21 \div 8 = 8)21$ -16 50 Remainder 5 ones; put zero in the tenths place -48 20 Remainder 2 tenths: put zero in the hundredths place -16 4 2×8 The division can be continued until the remainder is zero. However some decimals numbers can continue to several places of decimal.	Divide whole number to get a decimal. Divide with decimals Solve problems using numbers as decimals	Correctly position decimal point and zero in tenths position of whole number dividend when dividing a whole number by another whole number Correctly position decimal point in quotient when dividing a whole number by another whole number Accurately divide a whole number by another whole number to get a decimal in tenths Accurately divide a whole number by another whole number to get a decimal in hundredths

Objectives	Teaching /Learning Activities	Key Skills	Assessment
	Give students practice dividing whole numbers to get 1 or 2 places of decimals even if there is still a remainder the division can stop at whatever decimal place is desired. e.g. 41 ÷ 2; 16 ÷ 5 Model the division of a decimal by a whole number a. using fractions b. multiplication facts with whole numbers c. division of whole numbers e.g. Divide 3.5 by 5 Model: Convert 3.5 to a fraction and divide $3.5 = 3\frac{5}{10}$ or $3\frac{1}{2}$ as a mixed fraction; as an improper fraction it would be: $\frac{7}{2}$ $3.5 \div 5$ can be written as $\frac{7}{2} \times \frac{1}{5} = \frac{7}{10}$ $\frac{7}{10}$ as a decimal is 0.7 $3.5 \div 5 = 0.7$		Accurately divide a decimal number in tenths by a 1-digit whole number without regrouping Accurately divide a decimal number in tenths by a 1-digit whole number regrouping once where necessary Accurately divide a decimal number in tenths by 10 Correctly identify problem situations that involve division with fractions and decimals Create appropriate number sentences based on problem situations involving division with fractions and decimals including money Accurately solve problems that require the division of fractions and decimals
- ✓ Divide whole numbers to get a decimal quotient
- ✓ Divide a decimal by a whole number
- ✓ Divide to 1 or 2 decimal places
- ✓ Solve problems with the division of a decimal with a whole number

Points to Note	Extended Learning
 Students need time with this concept and skill. Link to the division of whole numbers if possible. Students can check the answers by multiplying or using a calculator. When working with decimals, note that not all decimal divisions will have an exact quotient as for several numbers the decimal place could be carried out to several decimal places. 	 Look at the patterns in the decimal places when dividing with decimals. e.g. a) 1 ÷ 4 = 0.25; b) 3 ÷ 8 = 0.375 c) 16 ÷ 6 = 2.66666666 (to as many decimals places as you want) Rounding decimals can be done to give the answer to as many decimal places as you want. The skill that completes the division of decimals is that of dividing a decimal by another decimal
Materials and Resources	Key Vocabulary
Chart with worked example of how to divide to get a decimal quotient	Decimal, quotient, remainder
Links to Other Subjects	
Digital Citizenship: Understand how to use computer number game	es safely and with ethical behaviour
Science: Use division with decimals in computations.	
Consumer Arithmetic/Home Management: Use the division with d	ecimals with money, measures or other situations.

Main Content and Skills	Suggestions for Differentiation		
 Content Divide whole numbers to get a decimal quotient Divide a decimal by a whole number Divide to 1 or 2 decimal places Solve problems with the division of a decimal with a whole number 	 <u>Time /Pace of Instruction</u> Pace the instruction to give students as much practice as they need <u>Quantity of work</u> Keep the numbers small so that students learn the skill of dividing with decimals. 	Output/AssessmentAllow some students to use calculators when answering the question. However, students need to give the answers to the required number of decimal places.Level of Support Allow students to use calculator and to work in groups to get peer support.	
SkillsDividing whole and decimal numbers			

UNIT 4 GRADE 8 TERM 3 (2 WEEKS)

SECTION C TITLE: ALGEBRAIC EXPRESSIONS

ATTAINMENT TARGET 4: Employ algebraic reasoning through the use of expressions, equations, and formulae to interpret, model and solve problems involving unknown quantities.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Write an algebraic expression to represent given word phrases.	Have students use counters and model simple addition problems. Write corresponding addition statements. Place an unknown amount of counters in an envelope/box/opaque bag and use it along with counters to model an addition situation. Discuss with students how they would describe the modelled situation. (Allow students to use informal language)	Write a mathematical phrase of sentence	Identify appropriate operation to be used in given situation/phrase Write a correct algebraic expression to represent a given situation/phrase
	 Help students to create an algebraic expression to describe the modelled situation using symbols/letters to represent the unknown. Give students different amounts of counters and boxes/envelopes and have them model addition situations and write the corresponding algebraic expressions. Guide students to write expressions from given statements. e.g. twice a number p = 2p 		

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Write an equation to represent given sentences.	Translate to symbols: b) What number multiplies 25 to give 100? This involves a complete sentence using a number that at the moment is unknown. This unknown number can be shown with a ?, a \Box , or a letter of the alphabet such as n, p, X. The answer is: 25 x ? = 100 or 25 x \Box = 100 Allow students to use different symbols to show the unknown number. Translate to symbols: John is one half the age of his brother. What is John's age? There are two unknowns John's age, and his brother's age. We can pick any symbol to show John's age, but we will need a different symbol to show his brother's age. Since any symbol can be used, we need to say what the symbols mean. X shows John's age; N shows his brother's age. The sentence is X = $\frac{1}{2}$ of N Have students take patty and box drink orders for their groups. Using x to represent the cost of 1 patty and y the cost of 1 box drink, have students create algebraic expressions for the cost of lunch for each group.		Write a correct algebraic equation to represent a given situation/sentence

Students will be able to:

 \checkmark 1. Write a number a) an expression b) an equation from given words or phrases e.g. add 5 to 7 as 7 + 5

Points to Note	Extended Learning	
 Translating from statements, sentences to mathematical symbols is an important skill in using algebra to solve problems. When it comes to algebra, it is easy to run to the abstract; however it is important to start with the concrete so that students are able to link the concrete to the abstract. 	Allow students to explore problem solving tasks that require the recognition, continuation and generalization of patterns. E.g. Pattern 1 Pattern 2 Pattern 3 Have students generate patterns 4, 5, and 6. Generate a rule, using algebra to determine the number of dots in any pattern. Use generated pattern to determine the number of dots in pattern 20.	
Materials and Resources	Key Vocabulary	
Counters, envelopes/boxes/opaque bags, menu/ price list	Symbols, unknown, variables	
Links to Other Subjects		
Digital citizenship: Understand how to use computer number games safely and with ethical behaviour		
Science: Use mathematical symbols for unknowns in formula and o	ther equations and expressions.	

MATHEMATICS GRADE 9 UNITS

NSC

ATTAINMENT TARGETS /STRANDS

National Curriculum Framework

	ATTAINMENT TARGETS	STRANDS
AT1A:	Know the value of numerals, associate them with their names, numbers, ordinals and use concrete objects to model patterns expressions and numbers.	Number: Number Representation
AT1B:	Use the basic operations, number relationships, patterns, number facts, calculators and appropriate software to compute and estimate in order to solve real world problems involving fractions, percentages and decimals.	Number: Number Operations and Application
AT2:	Use the correct units, tools and attributes to estimate, compare and carry out the processes of measurement to given degree of accuracy.	Measurement
AT3:	Explore paths, geometric shapes and space and make generalization about geometric relationships within the environment	Geometry
AT4:	Employ algebraic reasoning through the use of expressions, equations, and formulae to interpret, model and solve problems involving unknown quantities.	Algebra
AT5:	Collect, organize, interpret and represent data and make inference by applying knowledge of statistics and probability.	Data Handling and Probability



























Mathematics Scope and Sequence for APSE III

Grade 9 (Year 3) – Term 1

APSE III –Gr. 9 Term 1	Theme: Number and Data	Theme: Sets and Number	Theme: Space and Measures	Theme: Equal Groups
 Benchmarks: Understand whole number as amount of objects in a group Use base 10 place value system to write numbers Compute and solve problems with whole, numbers Compare, and measure larger distances, and amounts of liquids 	AT#1A: Know the value of numerals, associate them with their names, numbers, ordinals and use concrete objects to model numbers. AT#5: Collect, organize, interpret and represent data and make inference by applying knowledge of statistics and probability.	AT#1A: Know the value of numerals, associate them with their names, numbers, ordinals and use concrete objects to model numbers. AT#1B: Use the basic operations, number relationships, patterns, number facts, calculators and appropriate software to compute, estimate in order to solve real world problems	 AT#3: Explore paths, geometric shapes and space and make generalization about geometric relationships within the environment AT#2: Use the correct units, tools and attributes to estimate, compare and measure to given degree of accuracy. 	AT#1B: Use the basic operations, number relationships, patterns, number facts, calculators and appropriate software to compute and estimate in order to solve real world problems AT#4: Employ algebraic reasoning through to interpret, model and solve problems involving unknown quantities.
 Observe and name quadrilaterals in the environment using their properties Use sets and Venn diagrams to show number relationships 	Unit 1A: Whole numbers to millions; Indices Unit 1B: Sampling in surveys (3 weeks)	Unit 2: Venn diagrams to solve problems (3 weeks)	Unit 3A: Measuring Distance Unit 3B: Triangles Unit 3C: Measuring Volume (2 weeks)	Unit 4A: Unit 4A: Computing with money and decimals Unit 4B: Computing with per unit rates (3 weeks)
	Content outline : millions, relating this to the population of Jamaica and other countries;	Content outline : Describe set in words; list members of a set using symbols { }, ε.	Content outline : Compare and order distances in km (road signs, distances by road); 1000 m = 1km;	Content outline : Write amounts of money as decimal to hundredths;

APSE III –Gr. 9 Term 1	Theme: Number and Data	Theme: Sets and Number	Theme: Space and Measures	Theme: Equal Groups
	Content outline : Standard and extended numerals with indices and word names using place value up to millions. Positive indices to write large numbers: a0 = 1, where 'a' is any integer. Statistics: idea of sampling to represent a population polls. Interpreting data – tables and bar graphs that show population growth, exports etc., Research project.proper, improper, mixed as a decimal to tenths.	Content outline : Finite and infinite sets and how to show these. Factors, composite, multiples, prime factor; members belonging to more than one set - intersection (u) of two sets. Venn diagram to show a set, intersection of two sets. Solve problems by drawing Venn Diagrams. Factors, quotients using concrete, pictorial or algebraic models.	Content outline : Convert distances in m to km; and km to m. Basic shapes: triangles - types of triangles – right-angles, isosceles, equilateral, scalene Properties – equality of sides, and angles; build larger shapes with tangram pieces. Perimeter of simple polygons and compound shapes. Liquid measures – use of scale and measuring cup in L and mL; 1000 mL = 1 L; Convert measures in mL to L.right angle. Explore use of degrees to measure angles.	Content outline : Add, subtract money to ten thousands and hundredths; multiply and divide amounts of money by up to 2 digit whole numbers; quotient in division to 2 decimal places; rate as comparing two measures; understanding and using per unit rate to compute total costs etc. Solve problems with per unit rates in purchasing or other situations. Use a calculator to 2 decimal places
	Skills: Using numbers to millions; writing numbers using indices	Skills: listing members of a set; identifying factors, composite, prime numbers. Using Venn Diagrams	Skills: comparing, measuring and computing with distance, and liquid measures; Identifying types of triangles	Skills: computation with decimal amounts of money; per unit rates; use of calculator

UNIT 1 GRADE 9 TERM 1 (3 WEEKS)

SECTION A TITLE: WHOLE NUMBERS TO MILLIONS, INDICES

ATTAINMENT TARGET 1A: Know the value of numerals, associate them with their names, numbers, ordinals and use concrete objects to model patterns expressions and numbers.

ATTAINMENT TARGET 5: Collect, organize, interpret and represent data and make inference by applying knowledge of statistics and probability.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will:	Give students the place value chart with millions.	Read and write	Correctly read numerals that
Write and interpret	Remind students of the following:	numbers up to	represent groups of objects up to
words and numerals	a) the same number (digit) could represent	millions	99 million
that represent objects	different place (nosition) values	Lico baco 10 placo	Correctly write numerals that
up to 99 million using		value to show whole	represent groups of objects up to
base 10 place value.	b) each place (position) is 10 times the one on its right.	numbers	99 million
Identify:	Show that millions is the group to the left of		Identify correctly, place value of any digit in an 8-digit numeral
a. the place value	thousands as 10 times 1 hundred thousand is one		
and	million. Not every student may understand up to		Correctly identify the total value
b. the total value of	ten million, so different targets could be set for		of any digit in an 8 digit numeral.
any digit in up to an 8 digit	the groups.		Choose from a list, real life
standard numeral	Millions Thousands		groups/situations that involve
that shows whole	Hundred Ten one H T O H T O		large numbers (up to 8 digits).
numbers.	7 8 3 4 5 0 7		Give appropriate examples of
			real-life situations that involve
			larger numbers (up to 8 digits)

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Associate millions with the population of countries including Jamaica.	Give students a number and have them do the following: a) identify the place value of a given digit, e.g. identify the place value of 7 in the following digit		Compute accurately with 4- digit whole numbers
	7, 638,950b) identify the digit in a given place e.g. which digit is in the millions place? Work though several examples with digit cards or other games.		
Compute with up to 4 digit whole numbers and link to problem solving.	Discuss the concept of up to ten million. Have students give examples of things usually counted in millions a) Look in the newspaper and see items that value /could be purchased with up to ten million dollars; b) examine the population of various large countries	Read tables or charts with numbers in the millions	
Write whole numbers in index form, i.e. am, where a and m are whole numbers.	Introduce the idea of indices beginning with 3^2 as 3 x 3. Indices are a shortened method of writing repeated multiplication of the same number e.g. $3^4 = 3 \times 3 \times 3 \times 3$. Give examples that show the number raised to an exponent and the equivalent multiplication involved.	Use indices and bases to write numbers	Correctly write a whole number as a product of its prime factors Correctly write a whole number in index form Correctly identify the base and

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Identify the a) base, b) index or c) total value	Point out that in 3^4 , 3 is the base and 4 is the index or exponent, and the total value is the value of 3 x		Index form of a number correctly written
index form.	3 X 3 X 3 01 81. 3 = 81		Correctly write a number written in index form as a product of its prime factors
			Accurately determine the total value of a number written in index form
Understand that am where m = 0 = 1; that is, a0 is always equal to 1.	Introduce the idea that a ⁰ = 1 (At this time students may not be able to demonstrate this without using negative numbers).		Demonstrate understanding of the first law of indices; a0=1, where a ≠0
Write and interpret numerals using expanded notation	Practise writing exponents of ten and the total value e.g. $10^3 = 10 \times 10 \times 10 = 1000$; a) What is 10^5 ?	Write numbers in expanded form using indices of 10.	Correctly write a number in expanded notation with powers of 10 shown in exponential form
shown in index or exponent form.	Review the use of expanded notation - have students choose the standard numbers and show them in expanded form using indices (powers, or exponents) of ten.		Correctly convert numbers from exponential form to standard form

- ✓ Read and write whole numbers to two places of millions
- ✓ Use whole number indices, and base to write any whole number
- ✓ Write whole number up to millions using exponent form with indices (powers, exponents) of base 10.Round 4, 5, and 6-digit numbers to nearest thousand, ten thousand, hundred thousand respectively

Points to Note	Extended Learning
 Introduce the idea of indices beginning with 3². Do not begin with 2² as the base (2) x base (2) and index (2) times the base (2), both give the same result4. The most frequent error students make with indices is to multiply the base by the index. The correct method is base 7, 638,950x base for the number of times indicated by the index. e.g. students may write in error that 3² = 2 x 3 or 6; which is not correct. The correct method is 3² = 3 x 3 or 9 	 Extend the place value to hundred million Can you show that any number with an index of zero power is equal to 1, e.g. 10⁰= 1; 5⁰= 1
Materials and Resources	Key Vocabulary
Place value chart showing up to three places of million, chart with an explanation of how to write numbers in index form (whole numbers as an index)	million, index, indices, exponent form, power, base
Links to Other Subjects	
Digital citizenship: Understand how to use computer number game	s safely and with ethical behaviour
Science: Use indices to write large numbers	

UNIT 1 GRADE 9 TERM 1 (3 WEEKS)

SECTION B TITLE: SAMPLING IN SURVEY RESEARCH PROJECTS

ATTAINMENT TARGET 1B: Use the basic operations, number relationships, patterns, number facts, calculators and appropriate software to compute and estimate in order to solve real world problems involving fractions, percentages and decimals.

ATTAINMENT TARGET 5: Collect, organize, interpret and represent data and make inference by applying knowledge of statistics and probability.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will:IntUnderstand how andquwhy it may bequnecessary to sample.GaIdentify the'population' and the'population' and the'sample' in a situationposed.WillIdentify a 'sample' thatnomay /may not besuitable for drawing aconclusion about aIdegiven population.ab	ntroduce the idea that when there is a large quantity it may be difficult to ask everyone a question or count everything. Give an example; Gabrielle wants to know how many <u>adults who</u> <u>ive in Jamaica</u> think that Bob Marley should be a National Hero. What could Gabrielle do? Who should Gabrielle ask? Write a list of the suggestions students make, If no one suggests using a sample, ask if there may be a way to get the information using a part of the population. dentify the population in the example given above as <u>adults who live in Jamaica</u> .	Identify a sample to match a population Conduct a research project	For a given situation, correctly identify those samples that are appropriate and those that are not from a list State a suitable sample for a given situation Correctly identify situations that would require sampling Choose a suitable form of representation for collected data Correctly represent data using tables or graphs Make reasonable/accurate conclusions from collected data

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Conduct and write up a simple survey research project with the following sections: a. pose a question, b. decide on a sample; c. collect data; d. present data in tables and charts and e. draw conclusions.	Discuss with students what part of the population could give similar information as if the entire population were asked the question. This part of the population would be a <u>sample</u> . Ask students to give other instances when they encountered the use of sampling. Discuss things like the Don Anderson Election Poll, Vox Pops, Newspaper polls some ideas are tasting food while cooking, or tasting guineps before you buy them; a small amount (a teaspoon) of the rice and peas allows you to tell how the entire amount in the pot tastes. Give students problem situations and ask them to identify the population, and what could be a suitable sample. Guide students in doing a project (this could be in groups). Using a manageable situation, help students step by step: i) find a question to ask, ii) identify the population, iii) choose a sample and iv) collect data from the sample, v) represent the data using tables and bar graphs, and vi) draw conclusions about the population.		Correctly round numbers (up to 6- digits) to the nearest thousands Round 5 or 6-digit numbers to the nearest ten thousands correctly Correctly round 6- digit numbers to the nearest hundred thousands Give reasonable examples of large amounts of objects, e.g. population Select relevant data from tables for problem solving Accurately solve problems using data from tables Compute accurately using whole numbers having up to 6- digits Use calculators appropriately to check answers to computation with whole numbers having up to 6- digits

- \checkmark Use a sample to answer a question posed and draw conclusions for the population
- ✓ Conduct a simple survey research project to answer a question posed.

Points to Note	Extended Learning
 A population is not fixed and depends on the question that is being asked. The sample needs to reflect the population, so it is no use asking a sample of all men a pointed question about women's health issues. 	 Review other surveys done and identify the population and the sample used Show students Vox Pop videos. Place students in small groups and give permission for one member of the group to take a recording device to school. Have students go around the school and create their own Vox pop videos.
Materials and Resources	Key Vocabulary
Newspaper or other short articles of surveys carried out e.g.	population, survey, sample
health surveys, polls, vox pop videos, newspaper polls	
Links to Other Subjects	
Digital citizenship: Explore vox pop videos on social media.	
Science: Scientist use samples everyday as it would be costly, time of population. In other cases, the experiment itself may require damaged	consuming or impossible in some cases to examine an entire ging/destroying the object.

UNIT 2 GRADE 9 TERM 1 (3 WEEKS)

TITLE: WHOLE NUMBERS TO MILLIONS, INDICES

<u>ATTAINMENT TARGET 1A</u>: Know the value of numerals, associate them with their names, numbers, ordinals and use concrete objects to model patterns expressions and numbers.

ATTAINMENT TARGET 1B: Use the basic operations, number relationships, patterns, number facts, calculators and appropriate software to compute and estimate in order to solve real world problems involving fractions, percentages and decimals.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
------------	-------------------------------	------------	------------

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Describe a set in words when given its members or otherwise. List the members of a set described in words e.g. even numbers up to 20.	Understand that a set has members with common attributes. Give examples of a group of objects, numbers as a set and ask students to describe the set by giving the attribute of the set. What do these objects have in common? Can you find another member of the set? 1. { \Box , Δ , \Box , Δ , , , , } = Set A; 2. Set B = {2, 4, 6, 8, 10 } Show how to describe the set in specific terms:	Identify members of a set Use symbols to show sets and their members	Give an appropriate description of a set, given its members Correctly list the members of a set based on a given description Use the symbols A ¹ or B ¹ to describe objects that are not members of a given set
Use different ways of naming a set: a. describing in words, b. listing the members, c. using a letter as in A or set A.	 a) Set A is a set of polygons (not shapes as shapes would include a circle) b) Set B are multiples of 2, or numbers that can be divided exactly by 2. Work with students to describe sets in precise terms. Note that we name sets by a. describing the members in words, b. listing the members, c. giving it a Letter e.g. Set A, or A = {1, 2, 3}. 		finite and infinite Correctly use ": when listing the members of an infinite set Correctly use "" when listing the members of a finite set

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Use symbols: a) ε , b) { } when listing members of a given set. Understand the difference between finite and infinite sets and how to indicate a finite set will continuation marks i.e. ''	 Look again at the sets listed in #1. These members are enclosed in brackets that are always used when listing the members Give students practice in a. listing the members of a set from a description in words; b. describing a set whose members have been listed. Introduce the symbol ε – meaning 'is a member of' Ω ε set A, this is interpreted as: Ω is a member of set A. 		
Understand the terms used in multiplication – factor, product. Identify a) factors b) prime factors of a given composite number less than 100. Understand that a prime number has as factors only itself and 1. E.g. 5 is a prime number 5 x 1 = 5	Give students practice in the skills introduced – namely describing and listing members of a set; using symbols when listing members of a set. Introduce or revise the use of a) factor, b) product, in multiplication - Factor x factor = product and extend to prime factors, and composite numbers. Give students examples of prime numbers and ask them to define a prime number and give other examples. Students could use a hundredths chart to aid in this find.	Identify a prime, composite number Identify factors of a given number	Correctly identify the factors and product in a multiplication sentence Correctly identify factors of a given composite number less than 100 Correctly write a composite number as a product of two or more of its factors Correctly identify prime numbers from a list of numbers

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Identify a number as being a) prime, b) composite based on the factors of the number. Write a composite number 100 or less as a product of a. its factors, b. b) its prime factors.	Give students examples of a composite number and ask them: How does a composite number differ from a prime number? Ask the students to give other examples of composite numbers, and to list factors of a given composite number. Explain and use set notation to list all the factors of a composite number; two or three composite numbers and find factors that these numbers may have in common.		Correctly identify the prime factors of a composite number less than 100 Correctly write a composite number as product of its prime factors
Draw a Venn Diagram to show the members of a set. Understand that an object or number may be a member of more than one set (group). Draw Venn diagrams to show the relationships of member of two sets with or without members in common.	Introduce the idea of drawing a Venn Diagram to show the members of a set. E.g. Set A = all factors of 12 greater than 1. As a list this is: set A = $\{2, 3, 4, 6, 12\}$ as a Venn Diagram this would be: Set A $2 \ 3 \ 12$ $4 \ 6$ Introduce the idea that a quantity could be a member of more than one set. Look at these pairs of sets. Are there any members in Set A and also in Set B? Set A = $\{2, 3, 4, 6, 12\}$ Set B = $\{2, 3, 6, 9, 18\}$ Yes! 2, 3, and 6 are members of set A and also members of Set B.	Use Venn diagrams to show sets and their members Use a Venn diagram to show the relationship of two sets	Correctly represent a set and its members using a Venn Diagram Draw an appropriate Venn Diagram to represent the relationship between two sets with no members in common Draw an appropriate Venn Diagram to represent the relationship between two sets that share common members Identify relevant information from a problem situation

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Solve problems by drawing a Venn Diagram from given information showing 2 sets. Identify common factor or factors of two or three composite numbers using sets.	Draw a Venn Diagram of the two sets. Use different colour crayons or strings to show the sets and the placement of the members in each set and in the overlap of sets. (Members in the overlap are written once). $12 \qquad 2 \qquad 6 \qquad 9 \qquad \\ Set A \qquad Set B \qquad \\ Discuss the Venn Diagram above, noting themembers only in set A, those only in Set B and$		Correctly represent relevant information on an appropriate Venn Diagram from problem situation Use Venn Diagram to accurately solve problems Correctly list all factors of a composite number in a set Use sets to correctly identify common factors of 2 or 3
	those in the overlap of Set A and B		composite numbers

- \checkmark Use Set notation to show the members of a set
- \checkmark Use Venn Diagram to show the relationship of two sets with overlapping members
- \checkmark Identify members in the intersection of two sets

Points to Note	Extended Learning
• The idea of numbers of a set can be applied to other areas of mathematics. In this unit we apply the idea of set to geometric shapes and numbers – fractions, prime, composite. The overlap of two sets can also be used to find common factors, highest common factors.	 Use Venn diagram of intersecting sets to solve problems e.g. there are 14 children in the Science Club; three of these children are also in the Mathematics Club. There are 21 children in all? How many children are in the Mathematics club? Explore the use of a Venn diagram to show two sets, with one as the subset of the other – all members of one set are in the intersection Disjoint Sets
Materials and Resources	Key Vocabulary
Coloured chalk or coloured sting can be used to show the different sets, chart with definitions, symbols and examples of set, members of a set and Venn Diagram with overlapping sets	Factor, prime, composite, intersect, intersection, Venn Diagram

UNIT 3 GRADE 9 TERM 1 (2 WEEKS)

SECTION A TITLE: MEASURING LONGER DISTANCES

ATTAINMENT TARGET 2: Use the correct units, tools and attributes to estimate, compare and measure to given degree of accuracy.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Measure and record distances in m and cm; decimal amounts of m. Know that 100 cm = 1 m and use this fact to convert measures using cm and/or m. Convert from: a. larger to smaller units within the metric system e.g. m to cm, km to m b. smaller to larger units within the metric system e.g. cm to m; or to m and km.	Review how to find distances in metres and centimetres and introduce writing distances in centimetres as a decimal of a metre. e.g. 1. 15 cm = $\frac{15}{100}$ of a metre or 0.15 m 2. 7 metres 40 cm = $7\frac{40}{100}$ = 7.40 m Ask students to measure given distances in the classroom or around the school e.g. from the gate to the front door or along the corridor, using a metre ruler or a tape measure in metres (like the one trade men use). Allow students to write these distances in: a) metres and cm e.g. 5 m 56 cm b) metres only as 5.56 m or c) cm only as 556 cm. Show students how to convert measures given from a) a larger unit to a smaller unit e.g. m to cm; or m and cm to m; b) a smaller to a larger unit e.g. cm to m (may give a fraction of a m), or m and cm.	Write distance measures in decimal of metres Convert between main units of distance measures	Accurately measure given distances using a ruler or measuring tape Correctly record measured distances in m, cm Correctly record decimal amounts of m and cm of measured distances Correctly convert measurements stated in whole numbers to a smaller unit in the metric system Correctly convert measurements that include a decimal amount to a smaller unit in the metric system Correctly convert measurements stated in whole numbers to a larger unit in the metric system

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Compare and order	Students work in groups to find given distances		Correctly use decimals when
distances in km	on the road using a map or a chart of distances		converting a measurement stated
between main towns	between the main towns in Jamaica. e.g. What		in whole numbers to a larger unit
in Jamaica using a road	is the distance between your town and a)		in metric system
map, road signs or in a	Falmouth cruise ship pier b) rafting on the Rio		
distance chart.	Grande?		Correctly convert measurements
			that include a decimal amount to a
Use the fact that 1000	Use the prefix kilo or otherwise to show the		larger unit in the metric system
m = 1 km, to convert	relationship 1000 m = 1 km, and use this		
distances a) given in	relationship to write distances		Correctly use decimals to convert
km; km and m to	a. in km; km and m in metres; e.g. 6 km 245		measurements stated in two units
metres, b) given in m	m in metres is 6245 m.		to a single unit (e.g. 2 m and 25 cm
to decimal amount of	b. in metres as km or km and m.		correctly written as 2.25cm)
km, or km and m.			
Use the meaning of			
the prefix kilo to			
remember the			
relationship between			
kilometre and metre			
units			

- ✓ Know the relationships between the cm and m; m and km and use these relationships to convert distance measures.
- ✓ Measure, compare and record distances in m and cm, as a decimal of a metre.
- ✓ Understand the use of kilometre to measure longer distances, and record these distances in km and m.

Points to Note	Extended Learning		
 In this section of the unit students are consolidating what they know about distances in m and cm and extending this to distances in km. Conversion between units is a foundation skill that is needed for computation, and writing smaller units as a decimal of larger unit. When converting between cm and m there are three skills (a) knowing the relationship e.g. (100 cm =1 m) and what factor to use (b) multiplying (x) by the factor - 100 (larger unit to smaller unit) e.g. to write 3 m as an amount of cm multiply 3 m by 100 to give 300 cm. b) <i>divide</i> (÷) by the factor - 100 (smaller unit to larger unit) e.g. to write 500 cm as an amount of metres divide by 100 to get ^{500 cm}/₁₀₀ or 5 m A distance chart is found in many diaries, and can easily be made for towns or communities within the school environment. 	 The conversion of m to km or decimal of km in objective 5b) needs the skill of dividing by 1000. Or changing a fraction on denominator 1000 to a decimal. This skill may be an extension for some students. 		
Materials and Resources	Key Vocabulary		
Distance chart, road maps	metre, centimetre, kilometre, map, distance		
Links to Other Subjects			
Digital citizenship: Use phone and computer apps to convert between various units of measure			

Science: Use measurement skills for measuring distances in the study of science, e.g. height of plants, length of leaves etc.

UNIT 3 GRADE 9 TERM 1 (2 WEEKS)

SECTION B TITLE: TRIANGELS; MEASURING PERIMETER

ATTAINMENT TARGET 3: Explore paths, geometric shapes and space and make generalization about geometric relationships within the environment.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will:GiveClassify triangles as being: a. right-angled, b. isosceles c. equilateral and d. scalene.Give allow the g noteUse the properties of the sides and equality of angles in a triangle to aid classificationa. 0 f f b. 7 c. 1b. 7 c. 1b. 7 c. 1b. 7 c. 1	 students cut outs of a variety of types of agles, and allow them to sort them by shape. a named model of each type of triangle and w students to match the named model against group of triangles that are being sorted and e similarities and differences. Guide students to classify a triangle as follows: Pick up a triangle and ask themselves: How many sides are the same length? Type of triangle none two three lsosceles three equilateral Are all the angles the same size? Is any angle a right angle? k! Can a triangle be both right angled and celes? Can an equilateral triangle have any tangles?	Classify triangles by their properties	Sort triangles into logical groups Give reasonable explanations for how triangles were sorted Correctly identify triangles that are a. Right-angled b. Isosceles c. Equilateral d. Scalene Correctly match the type of triangle with its properties (equality of sides and angles)

ATTAINMENT TARGET 2: Use the correct units, tools and attributes to estimate, compare and measure to given degree of accuracy.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Measure and/or calculate the perimeter of polygons and other objects without using formula. Make decisions and find solutions in real world situations that need the calculation of perimeter.	Review the idea of a perimeter, by demonstrating using the triangles students were just using. Allow students to measure the length of each side of a triangle and add the three lengths together. Ask students to work in groups to trace the perimeter and then find the perimeter of different polygons and other objects. e.g. perimeter of the top of the desk, the floor of the classroom. Students want to decorate their classroom by putting coloured tape in three stipes around the room. How much tape would they need?	Measure (and/or calculate) the perimeter of shapes or other objects	Take accurate and relevant measurements when asked to find the perimeter of a polygon Correctly calculate the perimeter of a given polygon Correctly identify that perimeter should be calculated in given problem solving situations

- $\checkmark~$ Classify triangles by the size of angles and the lengths of sides.
- ✓ Name and recognize the properties of different types of triangles.
- ✓ Measure and/or calculate the perimeter of polygons with/without the use of formula.

Points to Note	Extended Learning		
Right angled triangles Scalene triangle Equilateral triangle Isosceles triangle	Allow students to create compound shapes using quadrilaterals and triangles and find the perimeter of these shapes from given measures. e.g. What is the perimeter of this compound shape which uses an isosceles triangle and a rectangle? 6 cm. 5 cm. 10 cm		
Materials and Resources	Key Vocabulary		
Sets of cut out of different types of triangles different sizes, 1 set of named model of different types of triangles, tangram sets of different shapes (perimeter)	triangle, right-angled, equilateral, isosceles, scalene; perimeter, compound		
Links to Other Subjects			
Digital citizenship: Use computer apps and online software to explore different types of triangles.			
Science: Do you know that the triangle is one of the strongest shapes used in structures? Relate to the use of triangles in construction or other areas.			

UNIT 3 GRADE 9 TERM 1 (2 WEEKS)

SECTION C TITLE: MEASURING VOLUME

ATTAINMENT TARGET 2: Use the correct units, tools and attributes to estimate, compare and measure to given degree of accuracy.

ATTAINMENT TARGET 1B: Use the basic operations, number relationships, patterns, number facts, calculators and appropriate software to compute and estimate in order to solve real world problems....

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Distinguish between volume and capacity. Associate capacity with empty containers, and volume with amounts of liquids.	Introduce both ideas of measuring amount of space occupied- volume and capacity. Capacity: Present two containers and ask: a. Which holds more? e.g.	Compare capacity or volume Estimate capacity of containers	Correctly match terms volume and capacity to their respective definitions Make reasonable estimates about the capacity of various containers Make reasonable estimates of the volume of amounts of liquids
Compare the capacity of containers by a) direct comparison, b) using the amount it holds in litres. Understand use of 1 litre unit to estimate and measure the capacity and/or volume of objects.	After some discussion ask: b. How can we be sure? Allow students to compare the capacity of containers by filling each with water or other liquid and pouring from one container to the other. Include a container that holds 1 litre. Ask how many 1 litre containers will fill the plastic pool and fill the jug. This is the capacity in litres. Compare the capacity of these two objects using the amounts of litres.		Correctly use measuring instruments to measure an amount of 1L Accurately measure volumes of liquids using graduated instruments Correctly record measurements of volume in a single metric unit (L only or mL only)

Objectives	Teaching /Learning Activities	Key Skills	Assessment
	Show a variety of actual (or pictures of familiar) containers to estimate their capacity in litres. Ask: Will this hold more than or less than 1 L? How much more than 1 L? e.g a) b) b) b) c) c) d)		Correctly record measurements of volume in two metric units (L and mL)
Understand the use of mL to estimate and measure the capacity and volume.	Introduce the idea of using millilitres to measure capacity of containers that will hold much less than 1 L. Show what 5 mL look like (a teaspoon of liquid)	Use a measuring cup in metric units litres or millilitres.	
Use a measuring cup (jug) to measure in a) L and mL, or b) in mL only. Know that 1000 mL =1L	Introduce the idea of measuring amounts of liquids- volume. Ask: How much liquid is in this container? Show different sized containers with 1 litre of water including a 1 L container (a tall narrow drink bottle?)		

Objectives	Teaching /Learning Activities	Key Skills	Assessment
	Show a measuring cup (jug) and allow students to look at the scale (the numbers) on the side. Ask a. What unit is being used? b. What is the capacity of the cup? c. What amount is shown between each of the smaller marks? (Count off between 500 mL and 1000 mL)		
	Allow students to use a 2- L measuring cup marked in litres (L) and millilitres (mL) to measure different amounts of liquid and record these in L and mL (e.g. 3 L 500 mL) Introduce the relationship 1000 mL = 1 L by looking at the measuring cup or otherwise.		

- ✓ Understand volume as the amount of three-dimensional space a substance occupies.
- Understand capacity as the amount of material or substance that could be held within a 3- dimensional object (a solid or a container).
- ✓ Use appropriate skills, tools and metric units to estimate, compare and measure volume and capacity.

Points to Note	Extended Learning
 Volume and Capacity are very similar as both refer to amounts of 3-dimensional space, e.g. air in a room, liquid in a bottle. Volume refers to the space a substance (solid, liquid or gas) occupies, while capacity refers to the amount of material or substance that a solid holds or a container could hold. When learning to read the numbers on the side of a measuring cup or jug (cylinder in Science), think of a number line and counting in consistent amounts. Each measuring instrument may have the capacity to measure different amounts, and are marked off in different amounts of units, some have 100 mL, others 50 mL markings. Examine the measuring instrument carefully as shown. 	 Solve problems comparing or sharing amounts of drinks. e.g. John has invited 5 friends to the beach. If each cup holds 200 mL, how many persons will get drinks from a 2 L (2000 mL) bottle of drinks? Show students how to convert measures in L and mL, or L to mL (larger to smaller) by counting in 1000's or multiplying by 1000: e.g. 3 L 500 mL is 3500 ml. Show students how to convert measures in mL to L or L and mL by dividing by 1000 or counting off in 1000's. e.g. 5460 mL is 5L 460 ml.

Materials and Resources	Key Vocabulary		
Set up stations as follows:	volume, capacity, litre, millilitre, solid, liquid, space, three-		
Station 1	dimensional (oral)		
• 2 L measuring cup			
• 2 different amounts of liquid – about 1.5 L; and the other about ¾ of a litre.			
Station 2			
 1 L measuring cup marked in mL 			
• Amount of liquid about 600 mL			
Station 3			
• Teaspoon (5 mL) or small medicine cup			
 Amount of liquid about a small drink cup. 			
Printable Math Worksheets @ <u>www.mathworksheets4kids.com</u>			
measuring volume			
Links to Other Subjects			
Digital citizenship: Estimate, measure and compare volume of substances using measuring instruments and metric units.			
Food and Nutrition: Baking, cooking using recipes that need the measurement of liquids, sugar (by volume) or other materials.			

UNIT 4 GRADE 9 TERM 1 (2 WEEKS)

SECTION A TITLE: COMPUTING WITH MONEY AND DECIMALS

ATTAINMENT TARGET 1B: Use the basic operations, number relationships, patterns, number facts, calculators and appropriate software to compute and estimate in order to solve real world problems involving fractions, percentages and decimals.

ATTAINMENT TARGET 4: Employ algebraic reasoning through the use of expressions, equations, and formulae to interpret, model and solve problems involving unknown quantities.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Write amounts of money as a decimal numbers to hundredths Add, subtract amounts of money with up to 2 places of decimal Multiply amounts of money to 2 decimal places by a 1 or 2 digit whole number. Divide amounts of money to 2 decimal	Review how to write amounts of money given in \$ and ¢ as a decimal of a dollar to 2 decimal places e.g. as a decimal of a \$; 324 dollars 57 cents is \$324.57 Show how to apply addition and subtraction skills with decimal numbers to amounts of money. There is no difference with the regrouping and adding by using the place value but the dollar sign must always show that we are adding money. Use progressively larger numbers to demonstrate that the underlying technique is the same. Have students check their work. Review multiplication and division skills with up to 2 places of decimal and apply to amounts of money.	Writing amounts of money using decimals Add money in decimals Subtract money in decimals Multiply amounts of money Divide amounts of money Write quotients (answer) in division as a decimal	Correctly write amounts of money given in words as decimal numbers to hundredths Accurately add amounts of money written in decimals to hundredths Accurately subtract amounts of money written in decimals to hundredths Multiply accurately, amounts of money written in decimals to hundredths by a 1 or 2 digit whole number without regrouping
digit whole number.	Show students how to continue the division to write the quotient with up to 2 decimal places		
Objectives	Teaching /Learning Activities	Key Skills	Assessment
---	---	---	--
Write the quotient (answer) to the division as a 2 place decimal when there is a remainder. Use a calculator to add, subtract, multiply, divide with amounts of money up to two decimal places.	Introduce the calculator and show how to use the keys for entering numbers, and the sequence for adding, subtracting, multiplying and dividing. Allow student to practice using the calculator without compromising the skill of doing the calculations by hand. Students could do the computation then use the calculator to check the answers.	Use a calculator to compute with decimals	Accurately divide amounts of money written as a decimal to hundredths by a 1 or 2 digit whole number Accurately write the remainder of a division of a sum of money as a decimal to hundredths Use a calculator correctly to perform basic calculations with sums of money written as decimals to hundredths
Solve problems finding a. sums (addition) b. missing addends c. difference (subtraction) d. products (multiplication) e. factors (quotients or divisors) Use number sentences with missing numbers when solving problems.	Give students problems to solve that require them to find a missing addend or factor given the sum or product respectively. e.g. Present students with the following price list. Price List Burger \$350.00 Fries \$100.25 Hot Dog \$200.67 Juice \$88.99 Chips \$97.41 Ask students, "If Patrice spent \$539.77 on food, what did she buy?"	Solve problems using money	Identify appropriate operation to be used in a given problem situation Create correct number sentences that describe any given problem situation Accurately solve problems with missing numbers (addend/sum/product/difference/ factor etc.)

- ✓ Write amounts of money as 2 places decimal.
- ✓ Compute with amounts of money written as a decimal.
- ✓ Solve problems that use amounts of money written as a decimal.

Points to Note	Extended Learning		
• This unit applies number skills with decimals to writing amounts of money- dollars and cents as a decimal, and to computing (adding, subtracting, multiplying and dividing) with money as a decimal.	 Use the calculator efficiently and accurately. Apply to other areas of mathematics such as Consumer Mathematics - purchases, shopping, buying and selling, saving. 		
Materials and Resources	Key Vocabulary		
Write a problem each day for students to solve.	decimal, add, subtract, multiply, divide		
• Develop a chart that shows how to write dollars and cents as a decimal.			
Links to Other Subjects			
Digital citizenship: Understand how to use computer number game	es safely and with ethical behaviour		
Science: Incorporate and match the use of money in the study of science.			
Reading: Read and understand mathematical concepts and words related to money etc.			
Physical Education: Use amounts of money in purchases for various activities – refreshments, equipment etc.			
Food and Nutrition: Shopping for food, recipes			

UNIT 4 GRADE 9 TERM 1 (2 WEEKS)

SECTION B TITLE: COMPUTING WITH PER UNIT RATES

ATTAINMENT TARGET 1B: Use the basic operations, number relationships, patterns, number facts, calculators and appropriate software to compute and estimate in order to solve real world problems involving fractions, percentages and decimals.

ATTAINMENT TARGET 4: Employ algebraic reasoning through the use of expressions, equations, and formulae to interpret, model and solve problems involving unknown quantities.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will:GUnderstand that aalrate compares twotwquantities of differentAmeasures. e.g. 3 shirtsAsell for \$1500.thGive the units that arebeing compared in agiven rate.Understand that in aper unit rate one ofththe quantities is 1.E.g. earning \$500 forevery 1 hour of work,or \$500 per hour.unit rate one ofthsell for \$500 per hour.St	 Give students a variety of examples of rates and allow students to determine that a rate compares two quantities of <u>different measures</u>. Ask students to tell the two different measures that are being compared in given situations. e.g. a. <i>A manager earns \$1800 in 2 hours.</i> Money and time are compared. b. <i>A store sells 3 shirts for \$1500</i>. Amount of shirts (goods) and money are compared. c. <i>US\$1 sells for JA \$141</i>. Jamaican dollars and US dollars are compared. d. There are 180 students in 6 classes. Amounts of students and number of classes are being compared. Students need to further understand that a 'per unit' rate implies the application of equal units. Per unit' means 'for every 1' unit. e.g. Earning 5500 for each hour of work, or \$500 per hour. 	Use per unit rates in computation	Correctly identify the units being compared in a given rate Correctly identify the two quantities being compared by a given rate Give a reasonable explanation for a given unit rate Correctly list examples of per unit rates used in daily life Use per unit rates to accurately compute the total cost in purchasing situations Correctly use per unit costs to calculate totals such as total distance travelled in given time given speed

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Use per unit rates to	We can use the 'per unit' rate and one amount to		Correctly identify suitable
compute a) total costs	compute the total in situations. e.g. The price of a		operations to be used in problem
in purchasing	shirt is \$1300 per shirt how much would 5 (of the		situations involving rates
situations; or b) total	same) shirts cost? (To do this we multiply 5 by the		
amounts in other	price of each shirt, 5 x \$1300 = \$6500).		Write correct number sentences
situations.			involving rates based on problem
	Give students practice in using the 'per unit' rate		situations given
Solve problems using	and one amount to compute the total amount.		Accurately solve problems
the per unit rate and	(Rate x amount = total amount)		involving per unit rates
one amount to	Look back at the examples in #2 and work out the		
compute total cost or	per unit rate (assuming equal amounts)		Correctly determine the unit for a
amounts.	a A manager earns \$1800 in 2 hours how much		rate that compares two given
Compute the per unit	a. A manager earns \$1800 m 2 nours now mach		quantities
rate given the	uoes sne eurit per nour?		
auantitios in the two	b. A store sells 3 of the same type shirts for		Correctly calculate the per unit
monsures compared	<i>\$1500,</i> what is the cost per shirt?		rate given the two quantities to
measures compared.			be compared

- ✓ Understand the use of 'per unit' rates.
- \checkmark Use the 'per unit' rate and the amount to find the total amount or costs.

Points to Note	Extended Learning			
 When using a rate look for the two different measures that are being compared. One measure could simply be an amount, a quantity or a count. Rate x amount = total amount. Given any two values we can compute the third; e.g. if we know the rate and the amount we can compute the total amount or cost by multiplying. To find the rate we divide the total amount by the quantity. To find the quantity we divide the total by the rate. 	 Give students some of the harder computation a) to find the rate or b) to find the quantity using division. Apply to computations in Consumer Arithmetic 			
Materials and Resources	Key Vocabulary			
	rate, per unit rate			
Links to Other Subjects				
Digital citizenship: Understand how to use computer number games safely and with ethical behaviour.				
Science: Incorporate the use of per unit rates and rates in the study	of science.			
Physical Education: Apply the idea of per unit rate to the computation	ion of speed. (distance per unit time).			





Mathematics Scope and Sequence for APSE III

Grade 9 (Year 3) – Term 2

	APSE III – Gr. 9 Term 2	Theme: Number and Data	Theme: Sets and Number	Theme: Space and Measures	Theme: Equal Groups
Be •	nchmarks: Begin to understand ratios, Use systems other	AT#1B: Use basic number operations, relationships, patterns, facts, calculators and software to compute	AT#1A: now the value of numerals, associate them with their names, numbers and amounts	AT#1A: Know the value of numerals, associate them with their names, numbers and amounts	AT#2: Use the correct units, tools, attributes to estimate, compare and measure.
 than base 10 place value to write numbers Compute and solve problems with ratios and fractions Measure, and write temperature using –negative numbers Recognise and name solids in the environment Compute and solve problems including with money 	and estimate in order to solve real world problems	AT#2: Use the correct units, tools, attributes to estimate compare and measure AT4: Employ algebraic reasoning to interpret, model and solve problems.	AT#2: Use the correct units, tools, attributes to estimate compare and measure	AT#3 : Explore paths, shapes and space andspatial relationships in the environment	
	Unit 1: Computing with fractions to hundredths (3 weeks)	Unit 2: Comparing and computing with ratios	Unit 3A: Roman Numerals, Positive Indices, Unit 3B: Temperature (2 weeks)	Unit 4A: Area Unit 4B: Solid shapes	
	 Content outline: Fractions to hundredths Common multiples, least common multiple; 	 Content outline: Understanding comparisons of parts and wholes using ratios; Write ratio in different formats including a:b; 	 Content outline: Use symbols I, V, X, L, C, M in the Roman numeration system; to write up to 1000 Write a composite number using positive indices – a x a x a = a³; a⁰ 	 Content outline: Area on a grid; using square metre (m²), square cm (cm²) Drawing or sketching solids using shape of faces, corners, lines; 	

APSE III –Gr. 9 Term 2	Theme: Number and Data	Theme: Sets and Number	Theme: Space and Measures	Theme: Equal Groups
	 Content outline: Equivalent fractions on unlike denominators – not factors or multiples of each other; Use equivalent fractions to add and/or subtract two fractions – proper, improper mixed, and to compare two fractions, on unlike denominators; Simplest form; Fractions in problem solving, e.g. make up number stories from pictures and number sentences and find answers with fractions. 	 Content outline: Convert parts shown as ratios to fractions of the whole amount; Divide amounts into given ratio; Solve problems that involve sharing amounts into given ratios given the parts. Check equality of ratios by using the cross products; Link equal ratios to equivalent fractions. 	 Content outline: Square numbers up to 20; and their square roots; Use thermometer to measure temperature and record using °C (degrees Celsius); Associate a temperature with events – fever, boiling point of water, winter Write temperatures below 0 °C with as – 7 °C; Compute degrees warmer or cooler than a temperature 	 Content outline: Develop and use formula A = L x W for area of rectangular regions. Solve problems involving finding and using the area of objects and spaces Solids in the environment – difference between prisms, pyramids; Names of common solids – sphere, cube, cuboid, triangular prism; triangular and rectangular pyramid;
	Skills: Add, subtract problem solve with fractions on unlike denominators.	Skills: Ratios to compare amounts; cross- products for equal ratios.	Skills: Write numbers with Roman symbols; indices, temperatures.	Skills: Find area, identify and draw solid shapes.
	Vocabulary (written): equivalent fractions, improper fractions, mixed numbers	Vocabulary (written): ratio, cross products	Vocabulary (written): Roman Numerals, Indices, above zero, below zero	Vocabulary (written): square centimetre; square metre prisms; pyramid parallel, perpendicular

UNIT 1 GRADE 9 TERM 2 (3 WEEKS)

TITLE: COMPUTING WITH FRACTIONS

ATTAINMENT TARGET 1B: Use basic number operations, relationships, patterns, facts, calculators and appropriate software to compute and estimate in order to solve real world problems.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will:	Review work with fractions ensuring that	Write fractions in	Correctly model fractions to
Write or show	students thoroughly understand skills	simplest form	hundredths using grid paper
fractions to	previously learned.		
hundredths using grid			Correctly convert a fraction with a
paper. (Review)	Which of this set of equivalent fractions is in the lowest form?		denominator of 100 to a decimal
Convert a fraction	$\frac{10}{5}, \frac{5}{2}, \frac{25}{2},$		Correctly convert a fraction with a
(proper, mixed) on	12 8 30		denominator a factor of 100 to a
denominator	Discuss with students how to change a fraction		decimal
hundred, or a factor of	to its simplest form by finding common factors.		
100 to a decimal and vice versa (review)	e.g. write $\frac{25}{30}$ in simplest form.		Correctly convert a decimal to a fraction
Write a fraction in its	$\frac{25}{30} = \frac{5 \times 5}{5 \times 6} = \frac{5}{6}$ because $\frac{5}{5} = 1$		Write a fraction in its simplest
simplest form. (Review)	$\frac{5}{6}$ is the simplest form of $\frac{25}{30}$		form

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Identify common multiples, Lowest (least) Common Multiple (LCM) of given numbers Change a fraction to an equivalent fraction on a denominator that is a multiple. Identify equivalent fractions on unlike denominators that are not factors or multiples of each other.	 Students can use the idea of sets to identify common multiples of two numbers in which one of the numbers is not a multiple of the other. e.g. 6, and 9; The procedure is to list the multiples of each number, then identify the common multiples Multiples of 6 = 6, 12, 18, 24, 30, 36 Multiples of 9 = 9, 18, 27, 36, 45, 54 In this instance 18 and 36 are common multiples of both 6 and 9; but 18 is the lowest common multiple. Another method of finding the least common multiple of two numbers is by using the factors of both numbers. What is a common multiple of 14 and 21? e.g. 21 = 7 x 3; 14 = 7 x 2. The least common factor once and the factors unique to each number). Give students practice using list of multiples and/or factor method to find the least common multiple of other pairs of numbers: e.g. a. 10 and 15 b. 8 and 12 	Determine the least common multiple of two numbers	Correctly identify multiples of a given number Correctly identify common multiples of two or more given numbers Correctly identify the lowest common multiple of two or more given numbers Correctly write a given number as a product of its prime factors Use prime factors to correctly identify the lowest common multiple of two or more numbers

Objectives	Teaching /Learning Activities	Key Skills	Assessment
	Challenge students to tell whether or not two fractions are equivalent. It may be easy if one denominator is a multiple of the other. What happens when there is no obvious relationship? Is $\frac{4}{6}$ equivalent to $\frac{6}{9}$?		Correctly use multiplication to find an equivalent fraction for a given fraction Correctly identify equivalent fractions where denominators are not factors or multiples of each other

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Add, subtract proper fractions on unlike (unequal) denominators that are not factors or multiples of each other. Add and subtract improper and mixed fractions on unlike (unequal) denominators that are not factors or multiples of each other with/without renaming whole numbers.	Present two fractions on unequal denominators to be added/ subtracted e.g. $\frac{5}{6} - \frac{7}{9} =$ <i>The rule is that the fractions have to be on equal</i> <i>denominators to be added or subtracted</i> . a. Ask students: What denominator can we use to get both fractions on equal (same) denominators? <u>Step 1</u> : find a number that could be the lowest common multiple of 6, and 9 (see #2 or #3 above) <u>Step 2</u> : Change both fractions to use the Lowest common multiple of 6, and 9 as the new denominator. <u>Step 3</u> : Add or subtract <u>Step 4</u> : Check - Is the answer in the simplest form, if not change to the simplest form. <u>Note</u> that we can simply multiply 6 and 9 to get 54, but is 54 the least common multiple of 6 and 9? Show that using 54 or 18 as the common denominator would give the same results But using 54 gives bigger numbers and the need to reduce to the simplest form.	Add fractions on unequal denominators Subtract fractions on unequal denominators	Correctly write equivalent fractions with the same denominator for two or more proper fractions with unequal denominators Accurately add two or more proper fractions with unlike denominators Accurately subtract a proper fraction from another with unequal denominators Accurately add two or more improper fractions with unlike denominators Accurately add two or more mixed numbers with unlike denominators Accurately add two or more mixed numbers with unlike denominators Accurately add any combination of proper fractions, improper fractions and mixed numbers with unlike denominators

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Use fractions in problem solving, e.g. comparing, changing to equivalent forms, adding, subtracting.	Use understanding and skills with fractions in problem solving. E.g. One child got $\frac{3}{6}$ of a cake and another child got $\frac{4}{8}$ of a cake of the same shape and size. Who got more cake? Explain the answer.	Solve problems using comparison or computation skills with fractions	Accurately subtract a proper fraction from an improper fraction with unlike denominator Accurately subtract a proper fraction from a mixed number with unlike denominator Subtract an improper fraction from another with unlike denominator accurately Subtract a mixed number from another with unlike denominator accurately Accurately perform subtraction involving a combination of mixed numbers and improper fractions Correctly Identify relevant information in problem situations involving fractions Write suitable number sentences to represent information given in problem solving situations involving fractions Accurately solve problems involving fractions

- ✓ Convert fractions to equivalent formats including
- ✓ simplest form
- ✓ Identify the lowest common multiple of two or more numbers
- ✓ Add, subtract fractions on unequal denominators
- ✓ Solve problems comparing, adding, subtraction fractions on unequal denominators

Points to Note	Extended Learning
• When using unequal and unrelated denominators we can simply multiply. However if the denominators are 6 and 9, for example, multiplying would give 54. But is 54 the least common multiple of 6 and 9? Show that using 54 or 18 as the common denominator would give the same results But using 54 gives bigger numbers and the need to reduce to the simplest form.	Challenge students to solve the following: • $1\frac{1}{2} + \frac{5}{3} + \frac{1}{4}$
Materials and Resources	Key Vocabulary
Materials and Resources Chart with steps to find the Least Common Multiple of two numbers	Key Vocabulary Lowest common multiple, equivalent fractions, simplest form.
Materials and Resources Chart with steps to find the Least Common Multiple of two numbers Links to Other Subjects	Key Vocabulary Lowest common multiple, equivalent fractions, simplest form.
Materials and Resources Chart with steps to find the Least Common Multiple of two numbers Links to Other Subjects Digital citizenship: Understand how to use computer number game	Key Vocabulary Lowest common multiple, equivalent fractions, simplest form.

Main Content and Skills	Suggestions for Differentiation		
 Content Convert fractions to equivalent formats including simplest form Identify the lowest common multiple of two or more numbers Add, subtract fractions on unequal denominators Solve problems comparing, adding, subtraction fractions on unequal denominators Skills Converting fractions Add, subtract, compare fractions Solve problems 	Time /Pace of Instruction Go at a steady pace. Students have been working with fractions on related denominators (where one denominator is a multiple of the other). The new skill here is to find a common denominator when the given denominators are NOT multiples of each other. Two methods are presented to find the LCM allow students to use any one, and use smaller numbers for some students. Quantity of work Provide more practice for those who need it.	Output/Assessment Encourage students to change answers to simplest form by giving an additional point for those who do so. Level of Support Provide written steps to help students who may be struggling to do this task.	

UNIT 2 GRADE 9 TERM 2 (3 WEEKS)

SECTION A TITLE: WHOLE NUMBERS TO HUNDRED THOUSAND

ATTAINMENT TARGET 1B: Use basic number operations, relationships, patterns, facts, calculators and appropriate software to compute and estimate in order to solve real world problems.

ATTAINMENT TARGET 4: Employ algebraic reasoning through the use of expressions, equations, and formulae to interpret, model and solve problems involving unknown quantities.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Use ratio in the format a : b to compare two quantities of the same measure. Interpret ratios when written in the given format.	Introduce students to ratios through pictures of groups of objects, or actual groups of objects. Give students a group with two types of objects e.g. black balls and grey balls; or balls and stars. Ask: a. How many are black balls? 4 b. How many are grey balls? 2 Say: The ratio of black balls to grey balls is 4 to 2. Point out to students the order in which the ratio is written 4 refers to the first part named. Give students practice with other sets of objects and ask them to write the given ratio paying attention to the set that was named first.	Compare groups of objects using ratios	Correctly use the format a: b to compare two quantities of the same measure.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Interpret ratios when written in the given format	 Give students a simple recipe such as for cooking rice that calls for 2 cups of water and 1 cup of rice. Discuss the ratio of cups of water to cups of rice. Ask students how many cups of water would be needed for 2 cups of rice or 3 cups of rice. Guide students to the understanding that a ratio of 2:1 can be interpreted as the first object being twice as much as the second object. The discussion may be expanded to look at the importance of maintaining the ratio; "What happens if too much/too little water is used?" Discuss other situations in which it is important to maintain a given ratio such as building construction or the mixing of chemicals in hairdressing. Discuss different ratios and their interpretation e.g. a ratio of 1:1 can be interpreted as equal amounts. 	Interpret ratios	Give reasonable verbal explanation of ratios written in a: b format.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Write ratios in the	In example 6 and 7 we note that a ratio of 2:1 is	Write equivalent	Accurately write a ratio in the
lowest terms by	the same as a ratio of \$200:\$100. We can think	ratios	lowest terms
applying concepts of equivalent fractions. Understand how to	of equal ratios in the same way that we think of equivalent fractions. Are 4:6 and 6:9 equal ratios? We can check this	Check equivalent ratios by cross multiplying	Correctly identify equal ratios Use cross products to correctly
check by cross products that two ratios are equal.	by cross multiplication as follows. For these two ratios to be equal then 4×9 must be equal to 6×6 .		determine if two ratios are equal
Understand that equal ratios (like equivalent fractions) have equal cross products of the numerator and denominator.	These multiplications give the same product 36 so 4:6 is the same ratio as 6:9 and the fraction $\frac{4}{6}$ is equivalent to fraction $\frac{6}{9}$. These two fractions are both equivalent to $\frac{2}{3}$. Check it out!		

- ✓ Understand and use ratios to show relationship of given amounts
- ✓ Share a given amount in a given ratio
- ✓ Find one person's share, given the amount and the ratio

Points to Note	Extended Learning
 <u>Ratio</u> Important things about ratio Ratios show comparisons of two or more quantities that are parts of a whole. The order of the comparison is important. We can think of equivalent ratios in the same way that we think of equivalent fractions. Cross multiplication (multiplication across an equal sign) is a technique that can be used to check if two ratios are equal. Please be careful in the presentation of cross-multiplication or cross products. It must be across an equal sign (not any other numeric operation). 	 Solve problems using three ratios or Solve problems given one share and the ratio find the amount that was shared Apply the idea of ratios to mixing drinks syrup to water; diluting drinks, etc.
Materials and Resources	Key Vocabulary
Groups of objects: balls, stars, geometric shapes, with different colours for persons to practice giving the ratio and sharing into different ratios	Ratio, cross multiply, equivalent ratio, share in a given ratio
Links to Other Subjects	

Science: Incorporate and match the use of ratios in the study of science, mixing solutions.

Home Economics: In cooking and baking, the ratio of ingredients has to be maintained; if too much or too little of a specific ingredient is used the texture/appearance/taste of the final product may be very different from the desired intent.

Building Construction: The consequences of not maintaining certain critical ratios of construction material can be dangerous/life-threatening. In the case where buildings are able to be completed, they may not be structurally sound and their collapse could have catastrophic effects.

Main Content and Skills	Suggestions for Differentiation		
 Content Ratios to show relationship of given amounts Share in a given ratio Skills Using ratios 	Time /Pace of InstructionIt may be sufficient to have some students staywith the naming of ratios, while others move onto sharing amounts in given ratios and solvingproblems with ratios.The idea of checking equivalent ratios by crossmultiplying is a difficult concept and may beomitted for some students.Quantity of workGive sufficient work for students to understandthe concept.	Output/AssessmentHave students show the ratios using objects in a practical way. e.g. Show me using these objects the ratio 2:1.Level of SupportProvide concrete objects for student to use and not present the idea entirely as an abstract concept.Input (Instructional delivery)Use a variety of materials concrete objects, pictures, worksheets for students to use. The topic is often treated as an abstract.	

UNIT 3 GRADE 9 TERM 2 (3 WEEKS)

SECTION A TITLE: ROMAN NUMERALS, INDICES

ATTAINMENT TARGET 1A: Know the value of numerals, associate them with their names numbers, ordinals and use concrete objects to model patterns expressions and numbers.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Give the numeric value of each symbol I, V, X, L, C, M in the Roman numeration system. Demonstrate how to write numbers up to 100 using the symbols and the additive and subtractive properties of Roman Numerals. Write a composite number using indices. Understand that a ⁰ = 1, where 'a' is any number other than 0.	 Andrew saw IV written on the face of an old clock and wondered what it meant. Introduce the idea that this seems to be a number but which number? How do we know how to read it? The Romans wrote numbers with a combination of 7 letters that had different meanings. a. The basic symbols are: M – 1000; D – 500; C – 100; L – 50; X – 10, V – 5 and I – 1 b. The symbols are additive e.g. XXX means 10 + 10 + 10 or 30 c. The symbols can be subtracted e.g. X before L as in XL means 50 – 10 or 40. Only one symbol can be subtracted. Can you read the number Andrew saw on the clock? It is I – 1 V- 5; 5 – 1 or 4. What do you think XL means? Write 75 in Roman Numerals. 	Using Roman Numerals to show number Using positive indices to show number Understand squares and square roots of numbers	Correctly state the value of Roman numerals: I, V, X. L. C and M Correctly write numbers up to 100 using the additive property of Roman numerals Correctly write numbers up to 100 using the subtractive property of Roman numerals Correctly convert Roman numerals up to 100 to decimal numbers Accurately write a composite number using indices Accurately interpret a ⁰ as 1, where a is any non-zero whole number

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Identify the	Review the meaning of indices and how to write		Write correctly, a ² as the product a
a. square of a set of whole numbers up	a number using indices. Indices is the format a " where a is the base and m is the index 4^3		x a.
to 20,	means $4 \times 4 \times 4$ (4 multiplied by itself 3 times.		Correctly determine the square of whole numbers up to 20
(up to 20) of a set	What is 5^2 ? 5^2 is 5 x 5 or 25. Numbers written with an index of 2 are referred to a square, we		Correctly identify the square root
Identify taking the	say 5 squared, and the product 25 is referred to		of a number written in exponential form. i.e. if a ² =b, then the square
square root as the			root of b is a
opposite of finding the	Give students practice with identifying squares and square numbers. What is 9 squared?		Correctly determine the square
square.	Which of these is a square number? a) 15 b) 36		root (up to 20) of whole numbers
Use and understood	c) 20 d) 81 e) 100		Correctly read and interpret the
root sign.	Introduce the square root as the opposite of		square root sign
	the square. $5^2 = 25$; the square root of 25 is 5.		Correctly use the square root sign

- ✓ Write and use numbers using Roman Numerals
- ✓ Write numbers using positive indices

Points to Note	Extended Learning
See <u>www.coolconversion.com</u> for Roman numeral to Arabic	Introduce the idea of cubes, cube roots of numbers
numeral conversion, a few are given below:	 Introduce harder squares and square roots
IV - 4 XC - 90	
V - 5 C - 100	
VI – 6 CD400	
X - 10 D - 500	
XX = 20 CM –900	
XL - 40 M - 1000	
L - 50	
LX - 60:	
 Have students recognize that the position of a symbol takes different meaning for example XL and LX means 50 - 10 and 50 + 10 respectively. 	
Materials and Resources	Key Vocabulary
Chart with Roman Numerals and the equivalent standard numeral	Roman numerals, index, indices, squares, square roots
Links to Other Subjects	
Digital citizenship: Understand how to use computer games safely a	and with ethical behaviour
Science: Use positive indices to write numbers, measures. Begin to understand the use of indices to write large numb measures	
Social Studies/ Geography: Begin to understand the use of indices t	o write large numbers, and measures

Main Content and Skills	Suggestions for Differentiation		
 Content Roman Numerals Positive indices Skills Write numbers in different ways 	 Time /Pace of Instruction Use smaller numbers for students who are having difficulty with the Roman Numerals. This unit uses positive indices only. (Do not extend this to other indices) Quantity of work Vary the exercise and amount of work 	Output/AssessmentGive small numbers. Have students build a clockusing Roman Numerals on the face of the clock.Level of SupportProvide pictures of actual clocks, and otherobjects with Roman NumeralsInput (Instructional delivery)Make this activity as interesting as possible	

UNIT 3 GRADE 9 TERM 2 (3 WEEKS)

SECTION B TITLE: TEMPERATURE

ATTAINMENT TARGET 2: Use the correct units, tools, attributes to estimate, compare and measure.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will:	Review concepts of temperature and how it is	Associate	Correctly use thermometer to
Associate temperature	measured – how hot? Ask what is the likely	temperature with the	measure temperature
with hot and cold and	outside temperature in the school yard today?	environment	
the use of the	Is the temperature hotter in the early morning		Accurately record thermometer
thermometer	or at midday?	Read a thermometer	readings
Measure temperature	Give examples or research examples of events	Write temperatures	Correctly use degrees Celsius (°C)
using a thermometer	with different temperatures e.g. the	using degree Celsius	when recording temperature
and record	temperature at which water boils or freezes, or	and negative	Correctly match 0°C and 100°C
temperatures as	at which someone has a fever.	numbers	with the freezing and hoiling
degrees Ceisius (°C)	Discuss what is meant by normal body		noints of water respectively
Associate a	temperature.		
temperature of a) 0 °C			Correctly identify temperatures
with the freezing point	Have students use a thermometer to tell the		that indicate normal body
of water b) 100 °C with	temperature outside, or in a bucket of ice. Talk		temperature and that of a person
when water boils c) a	about countries in which the outside		having a fever
body temperature	temperature is sometimes similar to the		Correctly indicate identify
above 38°C with a			correctly indicate identify
fever d) -15 °C with a	Watch the movie 'Cool Runnings' of the		warm/cold day
very cold day in a	Jamaican Bobsled Team and discuss what is		
country in a temperate	associated with cold temperatures		Correctly label given temperatures
climatic zone.			on a thermometer

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Objectives Understand that as temperatures fall the area/room gets colder and as temperatures get higher the area/room gets hotter. Write temperatures below 0 °C with a negative sign e.g. – 7 °C Use a vertical number line to show temperatures above zero degrees, at zero degrees and below zero degrees. Compute temperatures a given number of degrees cooler or warmer than a given temperature	Teaching /Learning Activities Show students how to write temperatures below zero with a negative sign. Image: State of the sign of the	Key Skills	Assessment Use negative signs correctly to write temperatures below zero Accurately calculate the temperature that is a given number of degrees warmer/colder than the stated temperature
(both above zero)			

- ✓ Use a thermometer and record temperatures as degrees Celsius (°C)
- ✓ Write temperatures below 0 °C as -7 °C
- ✓ Understand that temperatures can be above, at or below zero
- ✓ Determine which of two temperatures both above zero is warmer or cooler

Points to Note	Extended Learning		
 Degrees Celsius is the metric system but students may have encountered degrees Fahrenheit in their everyday life. Normal body temperatures ranges between 36 °C to 38 °C Any Temperature above 38 °C would indicate a fever. Reference www.babycenter.com For computing with temperature (determining warmer or cooler or degrees warmer or cooler) the skills are a) when both temperatures are above zero; b) both are below zero c) one is above and the other is below zero. Skills b and c are the harder skills and students need to have model thermometers to understand these skills. 	 Determine a temperature a number of degrees warmer or cooler when a) both are below zero or b) when one is above and the other is below zero. <u>Group Project:</u> Pick ten countries and look at today's temperature in the capital city of these countries. Which of these cities has a temperature: a. cooler than Kingston, Jamaica b. warmer than Kingston, Jamaica c. The same as or close to that of Kingston, Jamaica. 		
Materials and Resources	Key Vocabulary		
Actual Thermometers, models of thermometers	Temperature, degrees Celsius, warmer, cooler		
Links to Other Subjects			
Digital citizenship: Use weather apps (computer or cellular phone) to explore temperature of various towns/cities			
Science: Use measures of temperature			
Social Studies/Geography: Link with climate of countries			

Main Content and Skills	Suggestions for Differentiation		
 Content Use a thermometer Temperatures can be above, at or below zero Negative numbers can be used to show temperatures below zero Temperature changes - warmer, cooler Skills Measure temperature Read a thermometer Write temperature using negative number 	Time /Pace of Instruction Judge how much of these skills a student is ready to understand. For those students who are not ready, introduce the skills of determining number of degrees warmer or cooler without using below zero temperatures (use both temperatures above zero) Quantity of work Vary the amount of practice students get. Focus on the practical measurement skill	 <u>Output/Assessment</u> Use actual thermometers (not digital) and make models of thermometers for students to use during the assessment. The skill of reading the thermometer, and associating temperatures with outdoor scenes are critical. <u>Level of Support</u> Provide sufficient instruments for students to use in groups. <u>Input (Instructional delivery)</u> Take this section of the unit step by step 	

UNIT 4 GRADE 9 TERM 2 (3 WEEKS)

SECTION A TITLE: AREA

ATTAINMENT TARGET 3: Explore paths, geometric shapes and space and make generalization about geometric relationships within the environment.

ATTAINMENT TARGET 2: Use the correct units, tools and attributes to estimate, compare and carry out the processes of measurement to given degree of accuracy.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Objectives Students will: Make and use a grid to estimate the area of regular and irregular polygons or other shapes. Use square centimetre (cm ²) or square metre (m ²) when measuring or computing area.	Teaching /Learning ActivitiesReview the use of a grid of squares 1 cm by 1 cmto find the area of irregular or regular shapes bycounting of the squares within the shape.Introduce the idea of finding area of larger regionssuch as the classroom, the football field, andneeding a larger unit. Introduce the square metre.Have students make several actual models of asquare the size of a square meter (1m by 1 m) anduse it to measure the area of a large region.Ask students in groups to draw rectangles of a	Key Skills Determine area using a grid Compute area of rectangular shapes using formula	Assessment Count squares inside a closed shape on a grid when asked to find the area of said shape Give reasonable estimates by counting squares on a grid to find the area of a closed shape Correctly identify appropriate units for measuring given areas (square centimetre/cm ² or square metre/m ²)
Associate the square metre (m ²) with areas of classrooms or school auditorium etc.	given length and width e.g. 15 cm by 6 cm.Divide each rectangle into square centimetres and count the number of square centimetres.Collect each group's work and create a table, with headings L, W, A. Ask: Can you see a pattern in the table? Is there an easier way of finding the area of a rectangle than counting?		Correctly state the formula for calculating the area of rectangular regions Apply correct substitution in the formula for calculating the area of a rectangular region Accurately calculate the area of a

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Explain the use of and use formula A= L x W to compute the area of rectangular (including square) regions, when given measures of the length and width. Use the formula to compute an unknown length or width when given the area and one other measure.	Develop the formula that works only for rectangles (including squares) A = length x width. (A= L x W). Does this formula work for other shapes?		given rectangular region/shape Accurately transpose the formula to find an unknown length given the area and one length of a rectangular region Transpose the formula to accurately calculate an unknown length when the area and one length of a rectangular region is known
Solve problems such as finding a cover for a table, a floor or tiling that are based on computing the area of a rectangular regions	Solve real world problems by relating the shapes drawn to real objects such as the size of the chalkboard, the top of a table, the floor of a classroom. Remember that area is coverage, or surface. How much plywood would it need to cover the chalkboard in your classroom? (Is your chalkboard rectangular most are!)	Solve problems involving area	Correctly identify problem solving situations that utilize area concepts Correctly identify relevant data in problem situations involving area Accurately solve problems involving area

Students will be able to:

- ✓ Determine the area of irregular or regular shapes using a grid
- \checkmark Use the square centimetre, square metre and associate both units with area.
- \checkmark Compute the area of a rectangular region using the formula A=L x W
- ✓ Solve problems using area

Points to Note	Extended Learning
• This unit is still working with the area of irregular polygons and the formula for rectangular polygons but uses larger units – the square meter.	 Extend the formula for computing area to that of parallelograms (base time perpendicular height) and triangles – one half of the area of a rectangle, or a parallelogram Class Tiling Project Have students measure their classroom and determine the area. Ask them to research the cost and size different tiles they would like to use to tile their classroom and to determine the cost. If desired this may be expanded to include other number concepts and students may actually start a drive to purchase tiles.
Materials and Resources	Key Vocabulary
Place value chart showing up to three places of million, chart with an explanation of how to write numbers in index form (whole numbers as an index)	million, index, indices, exponent form, power, base

Links to Other Subjects

Science: Area is used to calculate pressure in science. This relationship in turn has several real life applications and sometimes critical implications in architecture/construction, plumbing, medicine and engineering

Physical Education: Different sports utilize special turf (natural or artificial) on the court/track/field. Area is used to determine how much turf is needed to cover a court/field/track for different sports.

Main Content and Skills	Suggestions for Differentiation		
Content	Time /Pace of Instruction	Output/Assessment	
 Area of irregular or regular shapes using a grid Metric units for area: - the square centimetre cm2, square metre m2 Use formula for area of a rectangular (including square) region using the A=L x W Area in real life situations – mats, rugs, football fields, 	Each student should be able to cover the content of this unit especially if the skills are taught in a practical method. Use the grid or geoboard to build the concept of square units Before using formula. <u>Quantity of work</u> Give practice when needed	 Ask students to: a. draw regions on a grid to show different areas in square centimetres b. find the area in square centimetres of different irregular or regular shapes on a grid c. Use the formula to find Areas of rectangular shapes given the length and width d. Use the formula to find an unknown length of a side given the area and the length of one other side. 	
 tiling etc. Skills Determine area by counting squares Compute area by using formula Use standard metric units 		<u>Level of Support</u> Allow students to work in groups especially when determining the area of larger regions. <u>Input (Instructional delivery)</u> Allow students to work in a practical way and make the study of area interesting in a real-world cituation	

UNIT 4 GRADE 9 TERM 2 (2 WEEKS)

SECTION B TITLE: SOLID SHAPES

ATTAINMENT TARGET 3: Explore paths, geometric shapes and space and make generalization about geometric relationships within the environment.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will:	Make a collection of different shaped boxes,	Identify solid shapes	Accurately sort and describe
Identify and model	bottles (clean) and other solid shapes in the	by name	objects
solid shapes in the	home or at school.		
environment – boxes,		Associate the solid	Provide reasonable justification for
containers etc.	Work in groups to observe and describe the different sets of boxes, and other solids that	shape with objects in	decisions made about grouping
Differentiate between	you have collected. Notice for example.	the environment	Accurately identify solid shapes
the outline of a solid	a. Does the solid shape have a side?		from actual objects or drawings of
shape –e.g. a box, and	b. What shape is the side?		these objects
a solid shape itself e.g.	c. Are all of the sides the same shape?		
a block of wood.	d. How many sides are there?		Accurately identify real life objects
	e. Does the shape stay the same or does it		which compare to a solid shape.
Describe completely	taper off to a point?		e.g. Which solid shape does a
different solid shapes	f. Try to make a sketch or draw the shape.		look like?
saying a) whether they			a. can of soup
taper off to a point or	Put the shape into two groups: those that taper		b. book
not, b) the geometric	off to a point (pyramid) / those that are the		c. marble
shape of each side c)	same to the end, (prisms) and name these		d. paper cup
the number of sides.	groups- prisms and pyramids.		
Identify a solid shane			Accurately sketch objects using
as a) a prism or h) a			parallel and perpendicular lines
nvramid			
pjrama.			

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Identify and name a) the sphere, b) different types of prisms: cube/ cuboid, cylinder, triangular based c) different pyramids: cone, square-based pyramid, triangular-based pyramid	Help students identify and name the most common solid shapes: cube/cuboid; cylinder; triangular pyramid; triangular prism; rectangular pyramid; cone; sphere; and link them to everyday objects. Show students techniques of sketching or drawing the solid shapes by using the shape of the sides, and noting hidden edges.		
sketches of solid shapes using their properties – shapes of sides, number of sides parallel and perpendicular lines.			

- ✓ Identify and model solid shapes in the environment
- ✓ Describe completely solid shapes using properties
- ✓ Identify a prism, a pyramid
- ✓ and name different ones
- ✓ Make a reasonable sketch of a solid shape

Points to Note	Extended Learning	
 Solid shapes take us into 3-D (3 dimensional) space. This unit introduces solid shapes by linking to objects in the environment, by noting features of the shapes such as number and shape of the sides, and by naming the most common shapes. Students need to be able to sketch these shapes 	 Introduce other features of solid shapes such as the edge, number of edges, vertices, vertex, number of vertices. Introduce the idea of making nets of the most common solids and building models of these solids. The building of the solid could be used to make mobiles to hang in and decorate the classroom. 	
Materials and Resources	Key Vocabulary	
The collection of solids and solid shapes could include: a set of solid wooden or plastic objects, empty toothpaste box, a bar of soap, perfume bottles and boxes; a candle. $ \begin{array}{c cccc} \hline $	Solid shape, prism, pyramid, sphere, cube, cuboid, cylinder, triangular prism, cone, square-based pyramid, triangular- based pyramid (tetrahedron)	
Links to Other Subjects Extended thinking and problem solving: Use sketches of solid shapes when solving problems in different situations		

Digital citizenship: Understand how to use computer number games safely and with ethical behaviour

Reading: Read and understand mathematical concepts and words related to solid shapes

Visual Arts: Link to the use of solid shapes, lines, regions, 3-D space

Main Content and Skills	Suggestions for Differentiation	
 Content Solid shapes in the environment Properties of solid shapes Sphere Prisms: cube, cuboid, cylinder, triangular based prism; Pyramids: cone, triangular based (tetrahedron), square based 	Time /Pace of InstructionMove at a steady pace introducing the shapes in a practical way. Reduce the number of names some students may be required to know when written- focussing on the most common, sphere, cube, cuboid, cylinder, coneQuantity of work Vary the quantity of work. Most students should be able to do most of the unit	Output/AssessmentHave students demonstrate their skills in a practical way.Level of SupportStudents work in groups to support each other.Input (Instructional delivery)Allow students to work with actual models of the various solids, or actual objects and not just drawings as the hidden sides in drawings may confuse some students at first.
Make a reasonable sketch of a solid shape		
 Skills Identify and name solid shapes in the environment Sketch a given solid shape using the properties Know and use the properties or features of each solid shape, or group of solid shapes 		
(|+ 3 S + R JT = 3 , 14 NŚC \int^2 А **FS** ¥= 82-4ac **GRADE 9 TERM 3** 2a ฦๅ=3, 24 = 3 <u>2</u>a حلي 2.8 = 3,

Mathematics Scope and Sequence for APSE III

Grade 9 (Year 3) – Term 3

APSE III – Gr. 9 Term 3	Theme: Number and Data	Theme: Sets and Number	Theme: Space and Measures	Theme: Equal Groups
 Benchmarks: Understand fractional number as showing parts of a whole. Compute and solve problems with whole, fractional numbers Circles, angles in the environment and data Employ algebraic reasoning and use conventions Compare using percent 	AT#3: Explore paths, geometric shapes and space AT#2: Use units and instruments to measure AT#5: Collect, organize. represent and interpret data;	AT#1B: Use the basic number operations, relationships, patterns, facts, calculators and software to compute and estimate in order to solve real world problems	AT#1A: Know the value of numerals, associate them with their names numbers, model patterns and expressions.	AT#4: Employ algebraic reasoning through the use of expressions, equations, and formulae to model and solve problems
	Unit 1A: Angles Unit 1B: Circles and data (3 weeks)	Unit 2: Percent (3 weeks)	Unit 3: Directed numbers (Integers, and rational numbers) (3 weeks)	Unit 4: Conventions in Algebra (2 weeks)
	 Content outline: Definition of an angle Name angles – acute, right, straight angles; Measure size and draw angles with a protractor; 	 Content outline: Understand percent as 'per hundred' and relate to fractions on denominator 100; and to decimals to 2 places; Convert from percent to fractions and decimals and vice versa, simplifying the fractions; 	 Content outline: Consolidate computation with decimals – multiply and divide decimals in hundredths by decimal in tenths; Use rounded numbers to estimate answers; 	 Content outline: Understand use of symbols for unknown amounts; Convert statements in English to symbols including letters of the alphabet; Conventions in algebra:-a + a + a = 3a; 3a means 3 x a; a means 1 x a etc.

APSE III –Gr. 9 Term 1	Theme: Number and Data	Theme: Sets and Number	Theme: Space and Measures	Theme: Equal Groups
	 Content outline: Identify and create circles in the environment; naming parts of circles – centre, radius, diameter, circumference; compass and pencil to draw circles; Use proportion of area in the circle to interpret data shown on a pie (circle) graph; 	 Content outline: Know that one whole is 100%; Write and interpret percent greater than 100%. Compute a given percent of a given number; write a number as a percent of another number. Apply calculation of percent to real world situations including purchases: sales tax, discounts etc. 	 Content outline: Understand directed numbers and relate to temperature, above/below ground level; debt etc.; Compare directed numbers both positive; both negative; one positive one negative; Model directed numbers on a vertical or horizontal number line; Rules for adding, subtracting multiplying and dividing directed numbers. 	 Content outline: Simple addition, subtraction, multiplication; division with symbols, and letters including the use of indices. Use logical reasoning – if thento substitute in a formula; Find and write rules for continuing patterns in mappings, and sequences etc.
	Skills: Angles of different sizes, know parts of the circle; draw circles, interpret pie chart	Skills: Compute with percent changing to a fraction or decimal	Skills: Understand directed numbers; add, subtract, multiply, divide with directed numbers	Skills: Use algebraic symbols, letters of the alphabet to show unknown amounts
	Vocabulary (written): circles, radius, centre, diameter, circumference, angles, degrees	Vocabulary (written): percent	Vocabulary (written): Vocabulary (oral): integers, directed numbers	Vocabulary (written):

UNIT 1 GRADE 9 TERM 3 (3 WEEKS)

SECTION A TITLE: ANGLES

ATTAINMENT TARGET 2: Use the correct units, tools and attributes to estimate, compare and measure to given degree of accuracy.

ATTAINMENT TARGET 3: Explore paths, geometric shapes and space and make generalization about geometric relationships within the environment

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Understand that angles are formed between two rays that meet at a vertex. Name the parts of an angle – vertex, rays Understand that a complete turn in a circle is indicated by an angle of 360° at the centre of the circle. Determine the position of the rays of angles to give a quarter turn (90°), half -turn (180°).	Review the idea and parts of an angle, and an <i>angle</i> as the amount of turn between two rays the vertex of the angle, and the radius as rays. $\begin{aligned} & ray - & y \\ & vertex - & angle \\ & ray & y \end{aligned}$ Allow students to use the moveable angle display described in the materials to demonstrate how different sized angles are formed by beginning with both arms together then turning one arm anti-clockwise (opposite to the hands of a clock) to make 90°. Continue turning one arm to make 180°. Ask students to describe an angle of 180°. Then continue turning a complete turn to make 360°.	Recognize angles, types of angles Estimate and draw angles Measure angles with a protractor	 What is an angle? Ask: show me an example of an angle in the environment. Draw or show without a protractor an angle of a) 90° b) 40° c) 180° Use a protractor to draw an angle of a. 60° b. 90° c. 130°

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Estimate and draw angles of different sizes	Ask student to estimate and draw different angles and give points to groups of students who are most accurate.		
 Recognize and use a protractor to a. draw angles of a given size. b. measure a given angle. Classify angles as being acute, right angle, obtuse, reflex. 	 Introduce the protractor and show students how to use it to measure and draw angles between a) 0° to 180°; b) 180° to 360°. Give students practice in drawing and measuring angle of different sizes, and in naming and classifying angles as being acute, right angled, obtuse or reflex. 		

- ✓ Understand how an angle is formed and name parts of an angle
- ✓ Estimate, and draw angles of different sizes
- ✓ Use a protractor to measure angles
- ✓ Name different types of angles acute, right angle, obtuse, reflex

Points to Note	Extended Learning			
 Protractor Begin with a making and using a circular protractor before using the usual half protractor. See <u>www.teachersprintables.net</u> Remember that angles are measured anti-clockwise i.e. in this direction. 	 Use the fact that angles on a straight line add to 180° to find unknown angle or angles. e.g. In the diagram below, what is the size of the unknown angle? ? 60° Use the fact that angles at a point add to 360° to find an unknown angle out of a set of angles at a point. 			
Materials and Resources	Key Vocabulary			
 Make moveable angle displays by joining two strips of stiff cardboard using a drawing pin, so that the arms can move. Create an interactive power-point to show the rotation of rays around a point. 	angle, vertex, rays, protractor, acute, right angle, obtuse, reflex			
Links to Other Subjects				
Digital citizenship: Understand how to use computer number games safely and with ethical behaviour				
Technology: Relate to the use of angles in drawing				

Main Content and Skills	Suggestions for Differentiation		
Content1• How an angle is formed0• Names for parts of an angle.0• Protractor are used to measure angles0• Name different types of angles – acute, right angle, obtuse, reflex0Skills6• Estimate, and draw angles of different sizes.0• Use a protractor0• Measure the size of angles with a protractor0	Time /Pace of Instruction Go at a steady pace, and make sure students understand the main concepts about angles: types, estimating and measuring different angles. Students who have mastered the main skills can move on to the extended learning objectives – computing with angles. Quantity of work Most students should be able to master the content and skills in this unit.	Output/AssessmentAsk students to demonstrate skills in estimating and measuring in a practical way. Observe as students use a protractor to measure a given angle.Level of SupportHave students work in groups to support each other as they learn to use a protractor. Try the circular protractor before using the usual semi- circular protractor.Input (Instructional delivery) Demonstrate how an angle is formed and allow students to use the material to demonstrate how an angle is formed.	

UNIT 1 GRADE 9 TERM 3 (3 WEEKS)

SECTION B TITLE: CIRCLES AND DATA

ATTAINMENT TARGET 3: Explore paths, geometric shapes and space and make generalization about geometric relationships within the environment.

ATTAINMENT TARGET 5: Collect, organize, interpret and represent data and make inference by applying knowledge of statistics and probability.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Identify circles, parts of circles in the environment. Understand that circles are created when an object keeps an equal distance around a central point. e.g. spinners Identify on a drawing the following parts of a circle: a. the centre b. the radius c. circumference d. diameter	Students work in groups to create circles in the air and on large sheets of paper, e.g. make spinners, twirl an object on a piece of string, piece of string with chalk at one end. Why is the path of the object or spinner a circle? Are there any other patterns in which circles are created? What about the maypole dance? or create a dance move in which a circle or part of a circle is formed. On the circles drawn ask students to place labels – Where do you think the centre would be? Let's label it. Say: <i>The radius is the line from the centre of the</i> <i>circle to the path the object made</i> . Show me a radius. Ask: Does a circle have only one radius? (radii - plural) Show me as many radii as you can. Ask: Are all the radii equal in length? Show this.	Draw circles Recognize, name or label parts of a circle Use a pair of compasses to draw a circle	Oral questioning a. Show me how a circle is formed? b. Complete these labels on a circle: Use a pair of compasses and a pencil to draw a circle with radius 5 cm.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Know that a) a radius is a line from the centre to the circumference of the circle b) a circle has many radii and these are all the same length. Know that a circumference is a path that is made by keeping an object equal distance from the centre.	The path made by the object you spun is the circumference of the circle. Show me the circumference of the circles you made. Use a similar pattern of questioning and demonstrations to introduce the concept: diameter, and its relationship to the radius. Allow students to practice drawing circles of different radii using a pair of compasses - 7. holding them properly and turning to make light marks on the paper. <u>Pens are not used to draw</u> <u>lines in Geometry!</u>		
Know that the diameter a) is a line across the circle that passes through the centre of the circle, b) is twice the length of a radius.			
Use a pair of compasses and a pencil to draw a circle of a given radius.			

Objectives	Teaching /Learning Activities		Key Skills	Assessment
Interpret data shown in a pie (circle) chart, telling which area	Show students a pie chart, such as the one below.	shown	Read information in a pie chart	Make accurate inferences from a given pie chart. For example a. Which is the most/least?
shows the biggest /smallest share.	Budget		Proportional reasoning	b. About how much more was spent on than?
Estimate quantities represented on a pie chart.	Water Electricity Rent Food Savings	he pie rmation	Estimation	Make reasonable estimates of quantities represented on a pie chart.
	to use their knowledge of fractions (propo reasoning) to make estimates of the amou money budgeted for each area.	rtional nt of		
	Give students more practice by presenting graphs with other information and have the make appropriate inferences.	pie em		

- \checkmark Identify circles in the environment and how a circle is formed
- ✓ Name and label parts of a circle and their relationships
- ✓ Use a pair of compasses to draw a circle of a given radius
- ✓ Interpret data given in a pie chart

Points to Note	Extended Learning	
• It is important for students to understand that each point on the circumference of the circle is the same distance from the centre. Hence the use of informal ways to make circles with spinners etc. before using a pair of compasses. Practical real world examples of a maypole dance or tying an object to a tree or pole. The circumference of a circle is also its perimeter.	 Explore the relationship between the length of the radii and the diameter Give students a table with relevant information and have them create a pie chart by shading sections on a hundredth disc using different colours to represent different quantities in the table provided. Use circles to create/design patters of their choice. 	
Materials and Resources	Key Vocabulary	
Pairs of compasses, pencil, pie charts with variety of data and questions	Circle, radius, radii, diameter, circumference	
Links to Other Subjects		
Digital citizenship: Use computer software to create pie charts		
Consumer Arithmetic/ Home Management: Understand a budget a	and how a budget can be best displayed in a pie chart	

Main Content and Skills	Suggestions for Differentiation			
 Content Circles in the environment How a circle is formed Parts of a circle and Relationship of radius and diameter Draw a circle of a given radius Pie chart to present data Skills Use a pair of compasses Draw a circle Name and label parts of a circle Interpret data presented in a pie chart 	Time /Pace of Instruction Go at a steady pace and make sure the concepts and skills are understood. These basic concepts of a circle are repeated in different formats in future study of mathematics. Quantity of work All students should be able to work on this unit.	Output/AssessmentGive practical examples, asking students to identify or draw a circle. Ask some students to paste labels on parts of the circle, while others may be able to write in the names of the different parts.Level of SupportAllow students to work in groups. Be careful and supervise students closely when they are using the compasses, as the compasses have a very sharp point.Input (Instructional delivery) Provide practical examples to introduce these concepts.		

UNIT 2 GRADE 9 TERM 3 (3 WEEKS)

SECTION A TITLE: PERCENT

ATTAINMENT TARGET 1B: Use the basic operations, number relationships, patterns, number facts, calculators and appropriate software to compute and estimate in order to solve real world problems involving fractions, percentages and decimals.

ATTAINMENT TARGET 4: Employ algebraic reasoning through the use of expressions, equations, and formulae to interpret, model and solve problems involving unknown quantities.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Understand <i>percent</i> as a number of equal parts out of each 100 equal parts, e.g. 40 out of each 100 parts. Use the '% ' sign to write and understand a percent when written e.g. 25% means 25 out of each 100 parts. Write a given percent as a fraction on denominator 100, e.g. 25%, 25 out of each 100 parts, or $\frac{25}{100}$ as a fraction.	Introduce the idea of percent as meaning per hundred – out of every hundred. This can be related to the per unit rates or the ratios that were introduced in previous terms. Introduce the % sign and show how to interpret a percent as a fraction. What does 50% mean? 50 out of every 100 or $\frac{50}{100}$. Allow students to work with this conversion before reducing the fraction to its lowest term. Introduce the idea of 100% or 100 out of every 100 parts or the whole amount. John ate 100% of the cake. How much of the cake did John eat? In some situations we can think of more than 100%. What do you think 150% would mean?	Use percent Write a fraction, mixed number or a decimal as a percent	Give a reasonably correct definition of percentage. (Must use "of 100") Correctly interpret percentage sign Correctly use percentage sign to write a percentage given in words Correctly model given percentages on a hundred grid Correctly identify 100% as 1 whole Correctly write a given percentage as a fraction with a denominator of 100 Convert, accurately, a given percentage to a decimal in

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Know that all the	Show students that percent, fractions and		hundredths
parts is shown as	decimals are related and so numbers can be		
100%, and understand	changed into the different formats. e.g. a percent		Accurately convert a percentage
a percent that is	can be written as a fraction and as a decimal, and		to a fraction in its lowest terms
greater than 100%	numbers in decimals and fractions can be written		Convert a proper fraction with a
Convert to a percent	as a percent. e.g.		denominator of 100 to a
	45% is the same as $\frac{45}{100}$ (as a fraction)		percentage
a. a proper,	45% is also the same as 0.45 (as a decimal)		
mixed fraction on	And 125% is the same as $\frac{125}{2}$. 1 $\frac{25}{2}$: (as an		Convert a fraction with a
denominator 100	100° 100° 100° 100°		denominator that is a factor of
b. a decimal in	1 25 (as a decimal)		100 to a percentage
hundredths.			Convert an improper fraction
	Fractions can be written in lowest form - begin		with a denominator of 100 to a
Convert a percent to	with fractions on denominator 100 then change to		percentage
a. a fraction in its	equivalent fractions on denominators that are		
lowest term	factors of 100, e.g. 5, 10, 25, 20 50.		Convert an improper fraction
b. a decimal in	Chaugh and the survite of fraction and a demonstrator		with a denominator that is a
hundredths.	Show how to write a fraction on a denominator		factor of 100 to a percentage
Convert a proper	changing the fraction to a denominator of 100		Convert a mixed number with a
improper or mixed			denominator of 100 to a
fraction on a			percentage
denominator a factor			percentage
of 100 to a percent.			Convert a mixed number with a
			denominator that is a factor of
			100 to a percentage

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Write one amount	Explore the use of percent in everyday situations –	Write an amount as	Correctly express one amount as
(part) as a percent of	ask for a situation in which a percent is used: e.g.	a percent of a total	a fraction of the total amount
the total number of	marks on a test; used to tell how much GCT, or tax	Compute a given	Correctly express one amount as
parts.	to pay, purchasing etc. Students make a scrap	percent of a total	a percentage of the total amount
Calculate a given	(newspaper clippings, store catalogues, etc.)	amount	
percent of a total			Accurately calculate a given
amount by using	There are 100 balls in a bag. Twenty- five are		percentage of a number
fractions or decimals.	soccer balls, What percent of the balls are soccer		Give correct examples of the use
Apply the calculation	a Write the numbers as a fraction. There are 25		of percentages in real life
of a given percent of a	soccer balls out of 100 balls.		Apply correctly, the calculation of
total amount to real	b. 25 out of 100 is 25%		decimals to real life situations
world situations such	There are 20 halls in a hag. 6 are green what		
of tax GCT to be	nercent of the halls is green?		a given percentage
charged, or amount of	c. Write as a fraction. There are 6 green balls		
discount to be given.	out of 20 balls in the bag or $\frac{6}{-1}$		Accurately decrease a number by
Understand the ideas	d. Write $\frac{6}{20}$ as an equivalent fraction on		a given percentage
of tax sale discount	denominator 100		Accurately calculate the final cost
'percent off' in	6 5 30		of an item after tax has been
purchasing situations.	$\frac{1}{20} \times \frac{1}{5} = \frac{1}{100}$		added
			Accurately calculate the cost of
	We know that $20 \times 5 = 100$. So 5 times 6.		an item after a discount has been
	e. Express $\frac{1}{100}$ as a percent. The answer is 30%		applied

Objectives	Teaching /Learning Activities	Key Skills	Assessment
	Discuss how to compute a given percent of a number, by changing the percent to a fraction or a decimal and multiplying. a. e.g. Find 30% of \$150 b. as a fraction $30\% = \frac{30}{100}$		
	c. $\frac{1}{100} \times 150 = \frac{1}{10 \times 10} = \frac{1}{1}$ d. The answer is \$75		
	e. e.g. As a decimal 30% = 0.30; 0.30 x 150 = 75		

- ✓ Understand percent as 'out of 100 equal parts' and write this using the symbol %
- \checkmark Convert a fraction or a decimal to percent and vice versa
- \checkmark Know that one whole is 100%
- ✓ Compute with percent and apply these skills to real-world situations

Points to Note	Extended Learning
 The use of percent is introduced in this unit. The understanding of percent is critical in consumer arithmetic, banking, buying and selling and other economic activity. 	There will be situations in which the denominators in the equivalent fractions are not factors or multiples of 100 this can be handled in the following ways • Convert any fraction to a percent by dividing the numerator by the denominator, changing to a decimal then to a percent. • Use proportion and cross multiplication e.g. Judy got 7 out of 30 marks on a test. What percent did Jody get? a. as a fraction, Jody got $\frac{7}{30}$ b. as an equivalent fraction on 100, the proportion is: $\frac{7}{30} = \frac{Unknown}{100}$ Cross multiplying would give $unknown = \frac{7}{30} \times 100$ c. simplifying gives $\frac{700}{30} = \frac{7 \times 10 \times 10}{3 \times 10} = \frac{7 \times 10}{3}$ ($\frac{10}{10} = 1$) d. $70 \div 3 = 23.33\%$ Jody got 23.33% on the test
Materials and Resources	Key Vocabulary
Newspaper clippings, store advertisements etc.	Percent, percentage, equivalent fraction, fraction , decimal, sales tax
Links to Other Subjects	
Digital citizenship: Understand how to use board and computer add	lition games safely and with ethical behaviour
Consumer Arithmetic: Use percent in purchasing situations	

Main Content and Skills	Suggestions for Differentiation	
 Content Percent is interpreted as: 'out of 100 equal parts' and written using the symbol % Know and explore the relationship between a fraction, a decimal and a percent One whole (all) is equivalent to 100% Percent is used in a wide range of real-world situations. Skills Compute with percent Convert between fractions 	Time /Pace of InstructionIt is important that students get a good start with this topic, go at a steady pace building on the skills with each lesson. Allow students to explore the use of percent in real world situations. Most students may only be able to do the basic skills that are outlined while others may be able to move on to the skills in the extended learning section.Quantity of work Give some students the more exploratory work of find out the use of percent in real life. Help these students with the calculations	Output/AssessmentProvide support to some students who may understand the use of percent but may not be very competent in manipulating some fractions, and decimals. Some students may only be able to convert fractions on denominator 100 or factors of 100 to a percent.Level of SupportProvide support to those students and group who need it, as some students could use a calculator to multiply the decimals, or divide the numerator of a fraction by its denominator when computing with percent.Input (Instructional delivery) Use many practical examples and allow some
 Convert between fractions, decimals and percent Write a fraction or a decimal as a percent 		students to visualize the amounts when computing with percent. e.g. What is 36% of 200 marks? This means 36% means 36 parts out of every 100 parts. How many hundreds are in 200 marks? Therefore how many marks would give 36% of 200, 2 times 36 or 72 marks. (0.36 x 200 = 72)

UNIT 3 GRADE 9 TERM 3 (3 WEEKS)

TITLE: DIRECTED NUMBERS (INTEGERS AND RATIONAL NUMBERS)

ATTAINMENT TARGET 1A: Know the value of numerals, associate them with their names numbers, ordinals and use concrete objects to model patterns expressions and numbers.

ATTAINMENT TARGET 1B: Use the basic number operations, relationships, patterns, number facts, calculators and appropriate software to compute and estimate in order to solve real world problems.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will:	Review and consolidate computation skills with	Compute with	Accurately multiply a decimal
Multiply decimals in	whole and decimal numbers. Help students	decimals	number in hundredths by a
hundredths by	determine how to find the number of decimal		decimal in tenths
another decimal (tenths); Divide decimals in up to hundredths by a decimal in tenths, giving the answer in hundredths. Solve 1- or 2 step problems using addition; subtraction, multiplication, and division skills	places in a multiplication. e.g. 15.75 x 0.5 would have 3 decimal places. This can be demonstrated with using fractions. $15 \frac{75}{100} \times \frac{5}{10} = \frac{1575}{100} \times \frac{5}{10} = \frac{1575 \times 5}{100 \times 10}$ $\frac{7875}{1000} = 7.875$ Show students how to use a calculator to check their work.		Accurately divide a decimal in hundredths by a decimal in tenths Accurately solve 1 or 2 step problems involving computation with decimals Give reasonable estimates to calculations by rounding numbers

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Use rounded numbers to estimate sums, difference, products, and quotients. Understand <i>directed</i> <i>numbers</i> as another set of numbers that include both	Review examples of temperature above and below zero and the use of a negative sign e.g. – 7 ° C to indicate that the temperature is below zero.	Write directed numbers using positive (+) and	Give examples of directed numbers in everyday life Give reasonable interpretations
Include both magnitude (size) and direction. Understand and use examples of positive and negative numbers in real world situations, e.g. temperatures, debt, above sea level Write amounts above /below zero, in/not in debt using positive and negative signs.	 Discuss with students other real life situations in which negative numbers can be used, some of these are: + amount of money someone has and - amount of money owed. E.g. Discuss the situation with these two bank accounts: Pat has +\$450, Hope has - \$1000 Who has more money? Point out that with directed numbers consider a. the actual size of the number b. the direction - is it above or below zero. For a bank account what would be the zero position? Show the order and comparison of directed numbers to the left and right of zero. 	negative (–) signs Compare directed numbers Add directed numbers Subtract directed numbers	for directed numbers in everyday life (money, temperature) Correctly use directed numbers to represent given quantities/amounts. (e.g. 3 m below sea level, debts/credit balances) Correctly identify positive and negative integers on a horizontal number line Correctly identify positive and negative integers on a vertical number line

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Show negative numbers on a a) horizontal b) vertical number line understanding the order by size – e.g. – 5 is a smaller number than 4. Compare and place in ascending or descending order a set of positive and negative numbers. Model addition and subtraction of directed numbers by using positive and negative discs, a number line, temperatures and real world situations such as debt. Develop and apply rules for a) adding, b) subtracting integers.	 Model addition of directed numbers with the black (+) and red (-) counters developing the rules for addition and subtraction (these are different from the multiplication and division rules that students seem to understand easily.) <u>Rules for addition</u> a. One black (+) counter plus one red (-) counter is zero. b. When adding numbers of the same sign the numbers are added and the answer uses the same sign e.g. a) + 6 plus +7 = +13; b) -5 plus -9 = -14 c. Adding a negative number is the same a subtracting a positive number e.g. a) +14 plus -8 is the same as +14 subtract +8; or ⁺14 - ⁺8 = +6 d. When adding a negative number subtract the size of the numbers but the answer uses the sign of the larger number. Demonstrate this with the counters 13 black plus 25 red. Ask which is physically more black or red? 13 black ones cancel 13 red ones with 12 red ones left. E.g. +13 plus -25 is the same as +13 subtract +25 or ⁺13 - ⁺25 = ⁻12 		Correctly place missing numbers (positive and negative) on a horizontal number line Correctly place missing numbers (positive and negative) on a vertical number line Correctly use the symbols < and > to compare a positive number to a negative number Use the symbols < and > correctly to compare a negative number to 0 Use the symbols < and > correctly to compare two negative numbers Correctly place in ascending/descending order, a set of negative numbers Correctly write a set of positive and negative numbers in ascending/descending order Correctly model positive and negative numbers using positive and negative discs

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Develop and apply rules for a. multiplying b. dividing integers.	 Allow students to practice adding with positive and negative numbers using the rules and the black and red counters. Students may have difficulty with the rule presented in iv) adding a negative number. Present the rules for subtraction: a. Subtracting a positive number is the same as adding a negative number (see number iii and iv of the addition rules) b. Subtracting a negative number. +7 subtract -7 = +7 plus +7 or +14. (7 - (-7) 		Correctly model addition and subtract of negative numbers using positive and negative discs Correctly model addition and subtraction of directed numbers using positive and negative discs Use number line to correctly model addition and subtraction of directed numbers Correctly apply rules for addition and subtraction of directed numbers Correctly apply rules for multiplication and division of directed numbers

- ✓ Compute with decimal numbers to hundredths
- \checkmark Understand the use of directed numbers and their application to real world situations
- ✓ Compare, add, subtract with directed numbers

	Points to Note	Extended Learning
	• Sometimes called directed numbers the use of positive and	Multiply and divide directed numbers
	negative numbers completes two sets of numbers.	 Use directed numbers in problem solving and algebra
	 <u>Integers</u> (positive and negative whole numbers) 	
	• <u>Rational numbers</u> (positive and negative fractional /decimal	
	numbers)	
	• During this unit, the term <u>Directed Numbers</u> will be used to include both integers and rational numbers.	
	• Be careful as you extend the learning to multiplication and	
	division! Students tend to apply the multiplication and division	
	rule for directed numbers to all computations. The rules for	
	multiplication and division	
L		
	Materials and Resources	Key Vocabulary
	Materials and Resources Use counters (discs) such as those that may be used in games, red	Key Vocabulary Directed numbers, Integers
	Materials and Resources Use counters (discs) such as those that may be used in games, red counters are marked with a minus sign (-), black counters are,	Key Vocabulary Directed numbers, Integers
	Materials and Resources Use counters (discs) such as those that may be used in games, red counters are marked with a minus sign (-), black counters are, marked plus sign (+), help students to know the difference	Key Vocabulary Directed numbers, Integers
	Materials and Resources Use counters (discs) such as those that may be used in games, red counters are marked with a minus sign (-), black counters are, marked plus sign (+), help students to know the difference between the number operation -subtraction (taking away, or	Key Vocabulary Directed numbers, Integers
	Materials and Resources Use counters (discs) such as those that may be used in games, red counters are marked with a minus sign (-), black counters are, marked plus sign (+), help students to know the difference between the number operation -subtraction (taking away, or minus) and a negative number e.g. –7. These can be written at	Key Vocabulary Directed numbers, Integers
	Materials and Resources Use counters (discs) such as those that may be used in games, red counters are marked with a minus sign (-), black counters are, marked plus sign (+), help students to know the difference between the number operation -subtraction (taking away, or minus) and a negative number e.g. –7. These can be written at first using brackets e.g. + (-7) or – (-7)	Key Vocabulary Directed numbers, Integers

Links to Other Subjects

Digital citizenship: Understand how to use computer games safely and with ethical behaviour

Science: Understand the idea of directionality in numbers (i.e., Showing above and below zero)

Main Content and Skills	Suggestions for Differentiation		
 Content Decimal numbers to hundredths Directed numbers and their application to real world situations Skills Compute with decimal numbers Compare, add, subtract directed numbers 	<u>Time /Pace of Instruction</u> Some students may find this unit difficult but the use of the red and black counters helps. <u>Quantity of work</u> Reduce the amount of work for students who need it.	Output/AssessmentAllow students to use the red and black counters or horizontal and vertical number lines as aids during the assessment.Level of SupportRotate teacher support to the groups as students work.Input (Instructional delivery)This unit has to be done with practical examples, and the use of various aids and charts.	

UNIT 4 GRADE 9 TERM 3 (2 WEEKS)

TITLE: CONVENTIONS IN ALGEBRA

ATTAINMENT TARGET 1B: Use the basic operations, number relationships, patterns, number facts, calculators and appropriate software to compute and estimate in order to solve real world problems involving fractions, percentages and decimals.

ATTAINMENT TARGET 4: Employ algebraic reasoning through the use of expressions, equations, and formulae to interpret, model and solve problems involving unknown quantities.

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Students will: Create algebraic expressions to describe word problems using symbols or letters to represent unknowns. Understand the difference between an algebraic expression and an equation Identify like terms in an algebraic expression or equation.	Use emojis to create sentences and have students identify the meaning of each sentence. Use this activity to discuss the idea of writing a sentence using symbols (numbers, letters and symbols) Can you show the meaning of these words using symbols and letters of the alphabet: a. The cost of the shirt is \$300. b. Add twenty dollars to the price of the drink. c. Think of a secret number, multiply the number by 5 then add 20. What did you get? d. Hart is two years older than Morgan (write Morgan's age as t). How old is Hart? The price of a drink is <i>n</i> , what is the price of 5 of the same drinks? Introduce the idea that we can add, subtract, multiply, divide with the letters in a similar way as numbers. 5 drinks would cost n + n + n + n + n Or 5 times n which is written in algebra as 5 n	Translate a phrase in English to a mathematical expression Translate a sentence to a mathematical equation Add, subtract, multiply, divide simple terms using letters of the Alphabet Use positive indices with algebraic terms	Create suitable and correct algebraic expressions to describe information given in word problems Distinguish between algebraic expressions and equations Create suitable and correct equations to describe information given in word problems Correctly group like terms in an algebraic expression or equation Simplify an algebraic expression by adding or subtracting like terms Accurately expand algebraic

Objectives	Teaching /Learning Activities	Key Skills	Assessment
Simplify an algebraic expression by a. adding or subtracting like terms. b. multiplying Understand the use of	Introduce the rules of addition, and subtraction: we can only add terms that are exactly alike; e.g. n and t are different terms so we can write 3n + 5n = 8n; but n + t = n + t When we add or subtract like terms it is called simplifying.		terms containing indices Use indices to simplify algebraic expressions
squared and cubed numbers. E.g $x^3 = x \times x \times x$	Demonstrate with a few examples. Simplify a. $6n + 3n - 2n$ b. $6t + 5t - 3n$ Introduce the ideas of multiplication of algebraic terms including the use of indices. Help students to see that xy means x multiplied by y and is the same as yx. With indices e.g. a x a x a = a ³ ; this is similar to numbers in which 5 x 5 x 5 = 5 ³ . Ask: Is a ² b the same as ab ² ? Discuss the answer with the students.		
Find and write a rule for continuing a pattern or a sequence.	Give students numeric patterns or sequences to find the next term, by first finding the general rule	Find and use rules for patterns, mappings, sequences	Correctly identify a rule for a pattern or number sequence Use an appropriate algebraic expression to accurately describe an observed rule for a pattern or number sequence

- ✓ Understand and write algebraic terms, expressions and equations using symbols and variables
- ✓ Use basic conventions / rules for manipulating algebraic terms
- ✓ Add subtract, multiply divide algebraic terms using appropriate and similar numeric skills
- ✓ Find and use a rule to continue a pattern, numeric sequence

Points to Note	Extended Learning		
 This unit on Algebra with mappings and patterns presents introductory skills in the formal use of variables and other conventions in algebra. An equation compares two algebraic expressions, an expression therefore, does not contain an equal sign or any symbol of inequality. 	 Have students observe a stock taking day at a selected business place. 		
Materials and Resources	Key Vocabulary		
Practice worksheets or cards, patterns, mappings for students to use	Algebra, expression, equation, term, variables		
Links to Other Subjects			
Science: Understand and use relationships of variables and formula			
Other areas of mathematics: Use Algebraic reasoning and conventions to solve problems in Geometry, Measurement, Consumer Arithmetic, and Number.			



ALTERNATIVE PATHWAYS TO SECONDARY EDUCATION (APSE)

The 21st century is a time of rapid technological growth and social change. The school curriculum must, therefore, ensure that young people are well prepared for the challenges and opportunities that they will meet as adults in this century. The MoEYI is making every effort to provide for the multiple intelligences of our children and cater to their diverse needs in order to fully maximize their capabilities. Hence, the MoEYI has created alternative pathways to receiving an education at the secondary level.

Providing alternative pathways will be far-reaching in carrying out the Ministry's mantra, "Every child can learn....every child must learn". Learning pathways will allow for an inclusive approach in which instruction is based on tailored curricula, enabling each learner to perform to his/her fullest potential based on aptitude, interest and ability. Alternative Pathways represent a new approach to secondary education. Secondary education in Jamaica is being reframed and re-positioned as customised, diverse, relevant, equitable, outcomes-based, and inclusive; and significantly, this approach will signal the introduction of a seven-year (Grades 7-13) period of instruction for students on all secondary pathways.

Goals of the APSE

- Design the school system to offer differentiated instructional programmes, informed by the National Standards Curriculum (NSC).
- Develop individualized intervention/learning plans based on students' performance profile.
- Provide special educators as Pathway Coaches to support subject teachers of students on Secondary Pathways II and III in the delivery of instruction.
- Facilitate a functional academic approach at the secondary level characterised by response to intervention (Rtl) methodology, interactive, learner-centred, project-based and problem- based learning, reflection and alternative forms of assessment.
- Foster a system for ALL students to exit the secondary level with the knowledge, skills, competences and attitudes which will have them ready for the world of work or to access tertiary level education.

Secondary Pathways I, II & III (SP I, II & III)

All students will access secondary education via the prevailing Grade Six examination. The exit examination will provide individual profiles to inform decisions for pathway access and standards for differentiation.

SPI is a 7-year programme with a curriculum based on the constructivist approach. At Grades 7-9 students will access the National Standards Curriculum (NSC), and at Grades 10, 11, 12 & 13, they will access the curricula/syllabi of the examining body.

SP II is a 2-year transitional programme with a curriculum based on the constructivist approach. Special educators/pathway coaches will work with teachers and students on this pathway. Students will be provided the required intervention and support to allow for transition. At the end of Grade 8 students will be re-evaluated through psycho-educational evaluation to determine their readiness for crossing over into either SP I or SP III.

SP III is a 7-year programme with a curriculum based on the constructivist approach. At Grades 7-9 students will access the National Standards Curriculum (NSC), and at Grades 10 & 11, they will access the curricula/syllabi of the examining body. At the end of Grade 11, SP III students will transition into the Career Advancement Programme.

At Grades 7-9 the NSC, will be modified to meet the needs of the SP III students. Students in SP III will be instructed through a functional academics curriculum in the core subjects- Mathematics, English Language, Communication, Social Studies and Science. Their instruction will be further enriched with Personal Empowerment, Technical and Vocational instruction, as well as the performing and creative arts. Pathway Coaches will collaborate with subject teachers to prepare content, ensuring differentiation in instruction for students on SP II and III. These students will also be supported through use of the Response to Intervention (RtI) methodology.

The 5Es Overview: "The 5E Learning Cycle"

What is a 5E Learning Cycle?

This model describes an approach for facilitating learning that can be used for entire programmes, specific units and individual lessons. The NSC supports the 5E constructivist learning cycle, as it places emphasis on the processes that may be used to help students to be personally involved in the learning situation as they are guided to build their own understandings from experiences and new ideas.

5E Instructional Model



Figure 1. Illustrating one version of the 5E model that conveys the role of evaluation as an interconnecting process that is at the core of the learning experience.



Figure 2, illustrating a cyclical perspective of the model with each process being given similar emphasis in contributing to the learning experience on a whole

EXPLANATION OF THE INSTRUCTIONAL MODEL

What are the 5Es?

The 5Es represent five key interrelated processes that provide the kind of learning experiences for learners to experience the curriculum or planned learning episodes: **Engage, Explore, Explain, Extend** (or **Elaborate**), and **Evaluate.**

ENGAGE: The purpose of the ENGAGEMENT dimension is to help students to be ready intellectually, socially, emotionally etc. for the session. Attention is given to the students' interests and to getting them personally involved in the lesson, while pre-assessing prior understandings, attitudes and/or skills. During the experience, students first encounter and identify the instructional task and their roles and responsibilities. During the ENGAGEMENT activity, students make connections between past and present learning experiences, setting the organizational groundwork for upcoming activities. The engagement activity may be used to (a) help student unearth prior knowledge (b) arouse their curiosity (c) encourage students to ask questions as a sign that they have wonderments or are puzzled. EXPLORE: The purpose of the EXPLORATION dimension is to get students involved in solving a real problem that is based on a selected context. EXPLORATION provides them with a chance to build their own understanding of the phenomenon being investigated and the attitude and skills involved for arriving at a workable solution. In exploring the students have the opportunity to get directly involved with the phenomenon and materials. As they work together in learning teams or independently, the need to share and communicate becomes necessary from the experiences. The teacher functions as a facilitator, providing materials, guarding against obstacles to learning and guiding the students to operate based on agreements. The students become inquirers and co-owners of the learning process. In exploring, they also ask questions, formulate hypothesis, search for answers or information/data, reflect with others, test their own predictions and draw conclusions.

EXPLAIN: The purpose of the **EXPLANATORY dimension** is to provide students with an opportunity to assess their thinking and to use intellectual standards as critical thinkers to communicate their perspectives and/or the meaning of the experiences. They rely on communication tools and their skills as Language users to: (a) organize their thoughts so that they are clear, relevant, significant, fair, accurate etc. (b) validate or affirm others (c) self-motivate. Reflection also occurs during the process and may cause students to adjust their perspective or justify their claims and summarise the lessons being learned. Providing explanations contributes to vocabulary building and self-corrective actions to deal with misconceptions that they become aware of from feedback of their peers and/or their facilitator.

EXTEND: The purpose of this dimension is to allow students to use their new knowledge and continue to explore its significance and implications. Students work independently or with others to expand on the concepts and principles they have learned, make connections to other related concepts and principles within and/or across disciplines, and apply their understandings in new ways to unfamiliar situations.

EVALUATE: The purpose of the EVALUATION dimension is for both students and facilitator to determine progress being made or the extent to which learning has taken place based on the stated objectives or emergent objectives. EVALUATION is treated primarily as an on-going diagnostic and developmental process that allows the learner to become aware of gaps to be treated and progress made from their efforts to acquire the competencies that were the focus of the session. Examples of competencies include understanding of concepts, principles and processes and demonstrating various skills. Evaluation and assessment can occur at different points during the learning episode. Some of the tools that assist in this diagnostic and formative process include rubrics, teacher observation log, self-inventories, peer critique, student interviews, reflective presentations, displays/expositions, portfolios, performances, project and problem-based learning products. Analysis of reflections, video recordings are useful in helping students to determine the depth of their thinking and understanding and the objectives they have or have not achieved.

Who developed the 5E model?

The Biological Science Curriculum Study (BSCS), a team led by Principal Investigator Roger Bybee, developed the instructional model for constructivism, called the "Five Es".

The Link between the 5E model and Types of Learning Activities

The five (5) types of Learning Activities purported by Yelon (1996) can be integrated with the 5E's so as to enrich the teaching and learning process. He noted that every instructional plan should include the following learning activities

- 1. Motivation Activities: Intended to help learners to be ready for the session
- 2. Orientation Activities: Inform students of their roles and responsibilities based the purpose or objectives of a learning episode.
- 3. Information Activities: Allow students to manipulate current knowledge, access/retrieve and generate new ideas

- 4. Application Activities: Allow for the use of knowledge and skills in novel situations
- 5. Evaluation Activities: Allow for reflection, corrective actions and sourcing of evidence to confirm/refute claims about learning.

These activities can be planned to serve one of the purposes of each dimension of the 5E model. For example, ENGAGEMENT may be comprised a Motivation Activity and an Orientation Activity. EXPLORATION and EXPLANATION require an Information Activity, while EXTEND requires an Application Activity. EVALUATION requires the kind of activity that will contribute to the collection of data for assessing and arriving at a conclusion about performance based on stated or expected purpose for which learning is being facilitated.

References

Meegan, G. (2017). *The intellectual standards.* Retrieved from <u>https://theelementsofthought.org/the-intellectual-standards/</u> The 5 E Model (n.d.). Retrieved from <u>http://tiny.cc/7ogijy</u> The 5 E Model (n.d.). Retrieved from <u>http://tiny.cc/oogijy</u>
SCIENCE, TECHNOLOGY, ENGINEERING, MATHEMATICS & THE AESTHETICS (STEM/STEAM) IN RELATION TO THE NATIONAL STANDARD CURRICULUM (NSC)

INTRODUCTION & BACKGROUND

The integration of theoretical principles that relate to STEM/STEAM Education in the NSC began in June 2014. This move was influenced by recommendations of the STEM Steering Committee that emphasized the need to develop learners who are not just productive, but who would also be innovative Jamaicans. STEM integration was also regarded as one of the strategic long term means of addressing the economic challenges being faced by Jamaica using education as a primary vehicle for the implied transformational change to happen, beginning from short term efforts.

Initial discussions and deliberations promoted an emphasis on STEM rather than STEAM Education. However, critical analysis of the conversations conveyed the perspective of STEM as a collection of related disciplines that all learners should have the opportunity of pursuing, to develop the competencies they offer and as a consequence be able to gain employment or become employers in STEM related areas. As stakeholders from different backgrounds processed their understanding of STEM, new meanings of the concept emerged from the discussions. One was the perspective of STEM as a methodology. There was, however, concern about the exclusion of "A" in STEM. This "A" component however, brought to the discussion, multiple meanings. In some instances, "A" was taken to mean a focus on affective development or affectivity. In other cases, it was used in reference to the Aesthetics as a field and was considered an important component to be included if educators are serious about issues of discrimination, holistic learning and current research on the iterative function of the brain that warrants attention to brain based learning and the role of the Arts in promoting knowledge integration to cater to multiple domains of learning. There was also discontent about neglecting the Performing Arts when related creative industries contribute

significantly to economic development. The concern was that the role of the Arts to economic development was being trivialized.

The call for the integration of the Aesthetics or Art forms became more pronounced as STEM took on more national significance. This was supported by research that indicates the importance of the Aesthetics in developing values and attitudes, in promoting holistic learning and in serving as drivers of innovations. By integrating principles from STEM with those from the Arts/Aesthetics, the approach to problem solving would encourage greater appreciation for and reliance on the interdependent nature of knowledge when science and arts intersect. Additionally, STEAM as a methodology encourages the harmonizing of the cognitive and the emotional domains in the problem-solving process.

The concept of STEAM was adopted in 2015, as an integrative approach to education and a methodology that pays attention to the benefits to be derived from the inclusion of the Arts or Aesthetics with STEM related principles. These collective benefits are supported by Jolly (2014), Sousa and Pilecki (2013) and include divergent thinking; differentiated learning; Arts integration; focus on intrinsic motivation and informed decision-making.

PERSPECTIVES OF STEM/STEAM IN THE CONTEXT OF THE NSC

In the context of the NSC, STEM/STEAM is used in a number of ways. These include:

STEM/STEAM as an integrative learning approach and methodology in facilitating learning. This perspective places emphasis on STEM/STEAM as a means of helping learners become creative or innovative problem solvers and lifelong learners who rely on scientific principles (laws and theories) to address issues/concerns or to deal with observed phenomenon that are puzzling for them or that inspire interest. As an approach, the focus is on solving problems based on principles. As methodology, the focus is on the system of practical procedures to be used to translate principles into the problem -solving processes or to choose from available problem- solving models.

STEM/STEAM as an Experiential-Vocational Learning Framework that is based on problem solving through the project-based approach. Emphasis is placed on solving real life problems in a context that requires learners and their facilitators to observe work-based principles. The primary purpose for this focus is for learners to: (i) become employable (ii) prepare for further education and/or for occupational or work readiness.

STEM as types of institutions in which learning is organized as a **meta-discipline** as described by Morrison and Bartlet (2009). Based on this perspective, STEM facilitates the demonstration of knowledge in a manner that removes the boundaries of each discipline for application to problem as would be practised in the real world.

IMPLICATIONS OF PERSPECTIVES OF STEM/STEAM IN LIGHT OF THE NSC

Since the NSC is based on Constructivism principles, STEM/STEAM as an approach and methodology, has to be established on post-positivistic thinking. From this position, STEM/STEAM influences the kind of practice that promotes collaboration, negotiation of meaning and openness to scrutiny.

The NSC developers selected a Constructivist approach that included the **deliberation**, **designing and development** stages of the curriculum process. Evidence of the influence of Constructivism can be seen the NSC Framework Document that conveys the following emphasis:

- (i) The element of objectives is presented in two forms; firstly as Learning Objectives to focus attention on process and experience rather than product. Secondly as Learning Outcomes that serve as some of the outputs of the process. They include the basic understandings, skills and dispositions anticipated from learners' engagement in the planned experiences.
- (ii) **The element of content** is treated as contexts for learners to think critically, solve problems creatively while developing their identity as Jamaicans. Content is not expected to be treated as disciplines to be mastered but as

areas that contribute knowledge, skill sets and attitudes that form the composite of competencies to be acquired from their integration in the learning situations.

- (iii) The element of learning experiences (method) is presented as a set of learning activities that serves as a source of problems to be addressed as a part of the learning process. These real-life activities provide the scope of knowledge, skills and required dispositions or character traits for learners to make sense of that aspect of life or the world that they represent. They are the threads that connect all the other elements of the curriculum and allow for the integration of STEM/STEAM in the following ways:
 - Identification of activities that are presented as problems to be solved using the STEM/STEAM approach based on contextual factors that include the profile of the learner, the learning conditions and the anticipated impact.
 - Integrating activities to form a real problem to be solved as a short, medium or long term project to which the project based learning would be applied.
 - The examination of learning activities by learners and teachers as co-learners through multiple lenses using content of science, technology, mathematics and the humanities that they have already explored to engage in the problem identification and definition processes.
 - Extending learning in the formal setting to the informal by connecting co-curricular initiatives that are STEM/STEAM based that learners are undertaking at the institutional level through clubs and societies, as whole school projects or in partnership with external stakeholders.
 - Using the learning activities to review STEM/STEAM initiatives that form a part of the informal curriculum to and for reflection on action.
 - Using activities as springboards for reflecting on career or occupational interest in STEM/STEAM related areas.
- (iv) **The element of evaluation** is communicated in two major ways; firstly as prior learning which serves diagnostic purpose and secondly as an on-going developmental process. This formative focus is indicated by the inclusion of

explicitly stated assessment criteria that are to be used alongside the learning activities. The use of assessment criteria as counterparts of the learning activities also indicates that assessment is learner centred since it is serving developmental rather than promotional purpose and as a consequence, allows learners to self-correct as they use feedback to develop feed-forward capabilities. Evidence of learning, based on the learning outcomes, can be collected from various types of assessment methods that emphasize the learner centred constructivist orientation. This brings to the fore the need for serious consideration to be given to **differentiation in assessment** for fairness and credibility of claims about learners' capabilities and to inform decisions that will impact their educational journey.

In general, this integrated approach, which is the context of STEAM, is aimed at improving the quality of the educational experience for learners while influencing the achievement of the aims of education that relate to productivity and creativity as part of the profile of the Jamaican learner.

REFERENCES

- 1. Jolly, A. (2014). STEM vs. STEAM: Do the Arts belong? Retrieved from: http://www.edweek.org/tm/articles/2014/11/18/ctq-jolly-stem-vs-steam.html
- 2. Morrison, J., Raymond, V. & Barlett, B. (2009). STEM as a curriculum: An experiential approach. Retrieved from: http://www.edweek.org/ew/articles/2009/03/04/23bartlett.h28.html
- 3. Sousa, D., Pilecki, T. (2013). STEM to STEAM: Using brain compatible strategies to integrate the Arts. London: SAGE Publications Ltd.
- 4. Trochim, Williams, M.K., (2006). Positivism & post-positivism. Web Centre for Social Research Methods. Retrieved from: http://www.socialresearchmethos.net/kb/positivsm.php



Special Education Tips

Below are tips you may find useful when teaching students with special needs:

- ✓ Get to know your students and their individual needs.
- ✓ Ensure that classroom procedures and routines are flexible enough to accommodate individual differences
- ✓ Use positive non-discriminatory language
- ✓ Be deliberate in including students with special needs in all activities
- ✓ Communicate high expectations
- ✓ Model and reinforce appropriate social skills
- ✓ Use assessment data to plan instructions
- ✓ Teach to students' strengths and learning styles
- ✓ Students with special needs respond well to direct instructions or guided discovery
- ✓ Use multisensory teaching approaches that engage two or more learning modalities simultaneously
- ✓ Break content into small steps and teach each step to mastery
- ✓ Differentiate objectives based on students' functioning levels
- ✓ Make ample use of mnemonics and other memory aids

- ✓ Pair students with special needs with learning partners/buddies
- ✓ Provide appropriate accommodations as needed during instruction and assessment:
 - a. Extra time
 - b. Reduced workload
 - c. Material in alternative formats
 - d. Visual cues
 - e. Technological aids
 - f. Alternate activities



LESSON PLANS

Overview

As the demand for competence in mathematics continues to increase, new and novel ways are used to ensure that much learning is taking place. This unit is designed to help pupils in grade 7 to have a deeper understanding and appreciation of geometry. They will be given the opportunity to learn about angles, circles and polygons. They will see how these shapes are used in everyday life and will be given the chance to create and know the salient properties of these shapes.

They will also engage in activities that will make learning more enjoyable, permanent and memorable. The strategies, structures and techniques used throughout the lessons will only seek to enrich their learning. Webb's depth of knowledge, gardener's learning styles as well as questioning will be used to stimulate critical thinking among these learners.

ADVANCE ORGANIZER



The following levels of practice (strategies, structures and techniques) are used throughout the unit to get responses from students.

Structures:

Random call	Voting
Turnto-your-neighbour and share	Corners
K-W-L	Continuum
Ranking	Either/or
Three minute pause	Question and answer pairs
Writing pair	Think- pair -share
Think-pair-square	Think-square-share
Rally table	Roundtable
T-chart	Mix-n-match
Round robin	Numbered heads
Fold-the -line	People hunt
Team building	Venn diagram
To-tell-the-truth	Discussion pairs

Strategies

Jigsaw	Cooperative learning
Group jigsaw	Discovery/Active learning
Mnemonic device	Nonlinguistic representation

Techniques

Getting students' attention	Greeting students
Introducing rules	Taking role quickly
Praise the deed	Encouraging students
Forming groups	Introducing social skills
Setting basic routines	Posting assignment
Teambuilding task	Class building task

Assessment Plan

This unit is based on students' learning and mastering basic geometric ideas. Students will learn through the three levels of practice:

- a) Strategies
- b) Structures
- c) Techniques

Grading in this class is based on mastery. This means that the students are able to complete assignments as time permits. They should meet required expectations. All assignments must be done. No points will be given for incomplete assignments, or for assignments that are poorly done. The following grading system will be applied:

95—100%	А	75—79%	B-
90—94%	A-	70—74%	C+
85—89%	B+	65—69%	С
80—84%	В	60—64%	C-

Below 60%-- not passing

Points will be given for the following areas:

Punctuality10

Assignments......20

Participation.....10

Quest.....20

Final exam (portfolio)...40

Sequence Chart

Lessons	Content	Structures	Strategies	Techniques	DOK	Multiple intelligences
1	Introduction	 Team building Think-pair- share Turn-to-your neighbour T-chart 	Mnemonics (keyword)	 Greet students Praise the deed Introduce rules Get students' attention 	Levels 1,2	 Verbal/linguistic Interpersonal Intrapersonal
2	Angles	 Question and answer pair Think-square- share Three minute pause 	Discovery/ active learning	Post assignment	Levels 1,2	 Mathematical Kinaesthetic Interpersonal Intrapersonal Verbal/linguistic
3	Circles	 Mix-n-match Think-pair-share Roundtable Turn-to-your- neighbour Class building People Hunt Note taking Think-pair- square-share 	 Discovery/ Active learning Mnemonics 		Levels 1,2,3	 Spatial Mathematical Verbal/linguistic

Lessons	Content	Structures	Strategies	Techniques	DOK	Multiple intelligences
4	Polygons	 Either/or Turn-to-your- neighbour Rally table K-W-L Think-square- share Sequencing Round robin Question and answer pair 		Pictorial representation	Levels 3,4	 Verbal/linguistic Spatial Interpersonal Intrapersonal Mathematical
5	Polygons	 T-chart Ranking corners Continuum Think aloud Three minute pause Voting Venn diagram Numbered heads Bar graph 	Group jigsaw	 Shaping Internalising 	Levels 2,3	Interpersonal Intrapersonal Spatial Mathematical

Prerequisites

All students should have mastered the following objectives before starting this unit.

- 1. Differentiate between the concepts of point, space, curved/horizontal/vertical/oblique
- 2. lines or line segments.
- 3. Differentiate between models of parallel and perpendicular line segments when drawn or seen in the environment.
- 4. The teacher may administer a diagnostic test to see if the students attained these objectives.

Lesson #1

Goals

To provide students with an environment which is conducive to learn.

To create a culture that supports and encourages collaboration.

Objectives

Discuss class rules and assign responsibility.

Form cooperative learning groups.

Identify and practice social skills

Discuss the importance of equal participation.

Discuss the learning outcomes.

Lesson #1 (Step by Step)

- 1. Welcome students to the class.
- 2. Have devotion. Sing the song "I love the thrill that we feel when we get together with God's wonderful people." Offer a word of prayer
- 3. Introduce rules:
 - a. When I raise my hand, this signifies that I need your attention. You too need to raise your hand to indicate that you notice me.
 - b. All students must participate in the lesson.
 - c. Listen to what others have to say.
 - d. Respect others and their ideas.

- e. Take your responsibility seriously.
- f. Stick to the task at hand.
- g. Use jargon card when you need an explanation for a term/concept
- h. Use question card when you have a question
- 4. Group students in cooperating groups of four/five and assign responsibility. Roles may change daily, weekly or monthly.

Roles

- Facilitator
- Recorder
- Manager
- Clerk
- 5. Team building activity
 - Choose a name for your team
 - Choose a team address
 - Create a logo for your team
 - Devise a way for greeting and farewell
 - Select/create a team song
 - Choose individual names
- 6. Discuss the social skills needed for cooperative groups to function effectively. (Use think-pair- share, Random card)
- 7. Students examine the following quotation:

"One man can be a crucial ingredient on a team, but one man cannot make a team."

Individuals think about it, select a keyword, then use turn –to –your –neighbour and share their word and give reasons for selection.

- 8. Students discuss in their groups what participation looks like and sounds like. Use the T- Chart to display the responses. (Random call, praise the deed)
- 9. Students peruse the assignment sheet and the assessment criteria. Use jigsaw
 - a. Divide the material into equal parts.
 - b. Distribute the information. In each separate group; each individual assigns one part of the information. (Use clerk to distribute the material)
 - c. Individual student work
 - Each student reads his or her information.
 - The student decides on the 3-5 most important details to learn from his material: and
 - The individual student decides the best way to teach this information to the cooperate groups.
 - Students teach. Each student has an assigned amount of time to present the information.
 - The assessment teacher uses questioning and random card call to assess the learning

10. Individual students will journal.

- a. What went well?
- b. What could be improved?
- c. Write question or comment you may have.

Lesson #2

Goals

- Identify formation of angles.
- Estimate and measure various angles.
- Participate in selected teaching structures and strategies.

Objectives

- Formulate a definition for an angle
- Name the various parts of an angle
- Classify angles as right, acute, obtuse or reflex
- Manipulate angle marker transparency
- Estimate the size of given angles
- Use protractors to measure angles
- Participate in a number of teaching structures and strategies.

Lesson # 2 (Step by Step)

- 1. Teacher welcomes students to the class.
- 2. The teacher reminds students of the rules.
 - a. When I raise my hand, this signifies that I need your attention. You too need to raise your hand to indicate that you notice me.
 - b. All students must participate in the lesson.

- c. Listen to what others have to say.
- d. Respect others and their ideas.
- e. Take your responsibility seriously.
- f. Stick to the task at hand.
- g. Use jargon card when you need an explanation to a term/concept
- h. Use question card when you have a question
- 3. We will be looking at angles today. Examine the diagrams given (see Figure 1 in the appendix). Answer the question: What is an angle? (Use question and answer pair—

Step1. Ask the question.

- Step2. Each member of the pair develops an answer individually.
- Step 3. Both discuss answers by taking turns.
- Step 4. Each listens to partner, comparing answers.
- Step 5. Pair synthesizes by preparing a composite response that utilizes ideas from both answers.
- Step 6. Share responses (use random call cards)
- 4. Teacher will use discovery method for students to explore the parts of an angle. Students will use a mnemonic device (association) to assist them in learning the parts of the angle. (Use think-square-share.) The parts of the angle are the sides (the rays) and the vertex (common endpoint).
- 5. The teacher presents the poem "Angles", teacher asks the students to read the poem and identify interesting and important aspects of the poem. The teacher pauses instruction. Students pair and follow the instruction. The teacher uses random call cards to solicit answers from two or more students. Teacher resumes the instruction by asking students to identify confusions and try to clear them up. (Three minutes pause)

- Students use transparent angle marker to show angles specified by teacher. Individuals think about their answers. In pairs, students discuss their ideas with a partner of their team. Pairs alternatively report to each other. (Rally table) Students share with the whole class. (Use random call card)
- 7. Students are given individual worksheet with various size angles. They are to name the angles, estimate the measure and then use a protractor to measure them. (Use think –square-share)
- 8. Post assignment: Paste pictures depicting angle in the environment in your portfolio. Describe the angles and explain how to estimate and measure these angles
- 9. Journal
 - a. What went well?
 - b. What could be improved?
 - c. Write question or comment you may have.

Lesson # 3

Goals

- Make students aware of the various parts of a circle.
- Participate in selected teaching structures and strategies.

Objectives

- Create a definition of the circle.
- Identify parts of the circle.
- Describe the various parts of the circle.
- Distinguish between the diameter and the chord.
- Create a mnemonic device to remember the parts of the circle.
- Use circles to create a design.
- Participate in a number of teaching structures and strategies.
- Assess the content and process of the lesson.

Lesson # 3 (Step-by Step)

- 1. Welcome students to class.
- 2. The teacher reminds students of the rules.
 - a. When I raise my hand, this signifies that I need your attention. You too need to raise your hand to indicate that you notice me.
 - b. All students must participate in the lesson.
 - c. Listen to what others have to say.
 - d. Respect others and their ideas.
 - e. Take your responsibility seriously.
 - f. Stick to the task at hand.
 - g. Use jargon card when you need an explanation for a term/concept
 - h. Use question card when you have a question.
- 3. Today our first activity will be a Mix & match.
- 4. Students choose a strip of paper with a quotation about parts of a circle.

The nature of God is a circle of/ which the centre is everywhere/ and the circumference is nowhere (Empedocles)

- 5. Do a Mix & match.
- 6. Select a keyword and make a connection from the quote. Use think- pair –share.
- 7. Use roundtable to answer the question "What is a circle?"
 - a. The teacher poses the question.
 - b. The first student in each group writes a response and passes the paper to the second student.
 - c. The second student writes a response on the same paper and passes it to the next student.
 - d. The process continues around the table.

- e. All this is done without students talking to each other. (the teacher uses random call cards to solicit students' answers)
- 8. Given a circle each, teacher demonstrates selected parts of the circle through paper folding. Students practice the skills for self. (Direct instruction with mastery learning)
- 9. In pairs students participate in note taking. One pair taking their own notes whiles the other fill in the blanks as the teacher and students read the passage. Use jargon /question cards when needed
- 10. Turn to your neighbour and discuss the differences between the chord and the diameter. (Round robin)
- 11. Use mnemonic devices to develop a way to remember the parts of the circle discussed. Use Think –pair-square-share for this activity.
- 12. The group makes the presentation. Everyone must participate.
- 13. Class building activity-People Hunt-Questions are based on the angles and the circle. (Assessment)
- 14. Draw or take photographs of hubcap designs that can be found on cars and trucks. Paste the drawings/ photographs in their portfolio. Identify the geometric shapes they see. Create own hubcap designs. Use colours of their choice in the designs. (Assignment.)
- 15. Journal
- 16. Closure Watch the video "10 Amazing Crop Circles that have left authorities stunned".

Lesson # 4

Goals

- 1. Make participants aware of polygons
- 2. Participate in selected teaching structures and strategies.

Objectives

- 1. Identify polygons.
- 2. Determine if a figure is a polygon.
- 3. Formulate a definition for polygons
- 4. Investigate the properties of a selected polygon
- 5. Discuss how polygons are used in everyday situations.
- 6. Participate in a number of teaching structures and strategies.
- 7. Assess the content and process of the lesson

Lesson # 4 (Step by Step)

- 1. Welcome students to class.
- 2. Remind students of the classroom rules.
 - a. When I raise my hand, this signifies that I need your attention. You too need to raise your hand to indicate that you notice me.
 - b. All students must participate in the lesson.
 - c. Listen to what others have to say.

- d. Respect others and their ideas.
- e. Take your responsibility seriously.
- f. Stick to the task at hand.
- g. Use jargon card when you need an explanation to a term/concept
- h. Use question card when you have a question.
- 3. This afternoon our first activity will be an either/or Which shape reminds you of your relationship with God, a triangle or a square?

(Turn -to -your neighbour; rally table)

- 4. We are going to use the K-W-L structure to find out what you know about polygons, what you want to know and at the end of the lesson what you have learnt
- 5. Today we will be looking at a special set of shapes called polygons. Examine the set on your desk to answer the question, "What are polygons?" (Literal) (Use **think- square- share**)
- 6. We will use the **jigsaw** structure to learn about the characteristics of polygons. Each person will learn the material well so as to teach the others who have not read the material. Use sequencing to present your report to the class.
- 7. Have discussion on how polygons are used in art. (Creative) (Round robin)
- 8. Answer the following questions (use question and answer pair)
 - What characteristics do the polygons share? (Analysis)
 - How do the polygons differ from the figures that are not? (Analysis)
 - Why are some polygons more popular than others? (Evaluation)
 - What solutions would you suggest for building durable bridges in Jamaica (synthesis)
- 9. Use three (3) polygons of your choice to create a picture to remind you of what polygons are. (Pictorial representation)
- 10. Complete the K-W-L chart. (Random call).

- 11. Sketch the shape of different kinds of dwellings (tents, tepees, hogans, igloos, etc.). List the names of the geometric shapes in each. (Assessment)
- 12. Journal
- 13. Closure

Lesson # 5

Goals

- Make participants aware of the various types of polygons
- Participate in selected teaching structures and strategies.

Objectives

- Identify triangles, quadrilaterals, pentagons, hexagons and octagons.
- Classify each figure as a triangle, quadrilateral, pentagon, hexagon or an octagon.
- Cut up polygonals into triangles
- Construct a rocket using rectangles and triangles.
- Discuss how triangles are used in every life.
- Participate in a number of teaching structures and strategies.
- Assess the content and process of the lesson

Lesson # 5 (Step by Step)

- 1. Welcome each student.
- 2. Remind students of the classroom rules.
- 3. Students use a pie chart to show the contribution of each team member.
- 4. Use T-chart to discuss what collaboration looks like/sounds like. Use random card call to let students put the information on the chart.

- 5. Examine yourself. How do you view your relationship with your best friend?
 - -----As a square
 - -----As a rectangle
 - -----As a triangle
 - -----As a pentagon

(Ranking and corners)

- 6. Poly means many. How do you view true friendship?
 - One person staying by himself or herself.
 - Two or three persons coming together.
 - Many people coming together. (Continuum).
- 7. Examine various geometric shapes to see the number of triangles can be found within its plane
- 8. Cut squares into smaller pieces and then arranges them to make a rocket. (Think-aloud-)
- 9. constructing model, shaping point out common errors, internalising-speed variation).
- 10. We will use the three-minute pause to learn more about types of polygons.
 - Students listen to the story "The Bermuda Triangle."
 - In pairs write three interesting/important points about the Bermuda Triangle.
 - Share what they have written (random card call)

11. Students respond to the following statement:

All parallelograms are quadrilaterals (use voting)

12. Use the Venn diagram to examine the relationship between a bicycle frame and geometric shapes.

(Circles, line segments, angles) Random call.

13. Answer the following questions

- a. Name the polygon that has 5 sides.
- b. True or false. All squares are rectangles. (Numbered heads)
- 14. Find out the favourite shape of each student in the class. Use **bar graph** to show your findings.

15. Group jigsaw

- Divide the information to be presented in the number of organized cooperative groups
- Assign each cooperative group one part of the information
- Each cooperative group reads their information and decide on the 3-5 most important details to learn.
- Decide on the best way to share the information with the class.
- All group members present the information.

16. Play tournament.

- 17. (Assignment). Explore traffic signs. Draw at least two examples of signs with the following polygonal shapes
 - 1. Triangle 2. quadrilateral 3. Pentagon 4. Octagon 5. hexagon

Appendix for Lesson Plans

Worksheet 1

Poem—angles

Worksheet 2

People Hunt

Rocket

Bermuda Triangle

Portfolio

Angles





Angles

(Unknown)

Angles are made,

When two lines meet,

Their size depends on direction...

They have different values,

Read in degrees, but all angles have a degree of perfection.

This angle's acute



I'm acute

This one is obtuse

I'm obtuse
And this one is 90 degrees

I'm Mr. Right

While the acute one's so small, The obtuse one will fall, He bends back like trees in a breeze.... And then you will find, Old Mr. Right, Its' 90 degrees- let's swim!!! He stands up so straight, Where his lines intersect, Like tennis court lines at the gym. Well angles can't angle, Which means they can't fish,

And an angle can't grant you a wish...

And angles aren't ANGELS,

Or witches or ghosts,

And they can't be served as a dish...

Yet, there are all sorts of angle

For all sorts of needs,

Like there are all sorts of dogs, of all sorts of breeds...

We're surrounded by angles'

And I think it'd be found, that without all these angles

Life would feel really round...

Worksheet # 2

Use a protractor to measure the angles below.

Classify each angle. Choose right, acute, obtuse, or reflex angle.



People Hunt

A Class Building Activity

Find someone who…	Name
1.Keeps a journal	
2.Loves to read	
3.Can list the parts of the circle	
4. Can name the shape of the stop sign	
5.Knows how many degrees in a right angle	
6. Can describes an angle	
7. Can name the instrument used to measure angles	
8. Can name the angle that measures less than 90 degrees	
9.Can name a quadrilateral that has no right angles	
10.Can give the plural of radius	

Rocket Discovery

Students learn how to cut a square into smaller pieces and rearrange the pieces to make a rocket.



Bermuda Triangle Facts

- 1. A triangular region
- 2. Located in the North Atlantic Ocean
- 3. Bounded by Miami, Bermuda and Puerto Rico
- 4. Known for its paranormal activities... disappearance of aeroplanes and ships
- 5. Also known as "the Devil's triangle"
- 6. A similar area known as 'The Devil's Sea, located in the Pacific Ocean
- 7. The lost city.... Atlantis is also linked to the Bermuda triangle.

Portfolio

Name		
Date		

	Required	Included	Comments
Table of content			
Letter from studentExplanation of the contentReason for selection			
Excerpt from journal			
Angles in the environment			
Draw or take photographs of hubcap designs			
Sketch the shape of different kinds of dwellings			
Explore traffic signs			
Display of some arrangements of four different coloured right –angled isosceles triangles			
Subject-area connection			
Corrected or revised homework, quiz, or class work			
Favourite geometry problem			
An essay/song/poem/jingle on geometry			
Use tangrams to create fun shapes people, animals, buildings			