MATHEMATIC SYLLABUS FOR UPPER PRIMARY (P4-P6)

Second edition

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FOREWORD

The Rwanda Basic Education Board is honored to present the syllabus for Upper Primary Mathematics (P4-P6). It serves as both official documents and as a guide to competence-based teaching and learning of Mathematics. The syllabi ensure consistency and coherence in the delivery of quality education across all levels of general education in Rwandan schools.
The Rwandan education philosophy aims to ensure that young people at every level of education achieve their full potential in terms of relevant knowledge, skills and appropriate attitudes in order to prepare them to be well integrated into society and access employment opportunities.

In line with efforts to improve the quality of education, the Government of Rwanda emphasizes the importance of aligning the syllabus, teaching and learning and assessment approaches in order to ensure that the system is producing the kind of citizens the country needs. Many factors influence what children learn, how well they learn and the competencies they acquire. They include the relevance of the syllabus, the quality of teachers' pedagogical approaches, the assessment strategies and the instructional materials available. The ambition to develop a knowledge-based society and the growth of regional and global competition in the job market has necessitated the shift to a competence-based syllabus. With the help of the teachers, whose role is central to the success of the syllabus, learners will gain appropriate skills and be able to apply what they have learned in real life situations. Hence they will make a difference not only to their own lives but also to the success of the nation.

I wish to sincerely extend my appreciation to the people who contributed to the development of this document, particularly the REB staff who organized the whole process from its inception. Special appreciation goes to the development partners who supported the exercise throughout. Any comment of contribution would be welcome for the improvement of this syllabus.

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Director General REB

ACKNOWLEDGEMENT

I wish to sincerely extend my special appreciation to the people who played a major role in the development of this syllabus. It would not have been successful without the participation of a range of education stakeholders and the financial support from different donors. For this, I would like to express my deep gratitude.

My thanks firstly go to Rwanda Basic Education Board leadership who supervised the curriculum review process and the Rwanda Basic Education Board staff who were involved in the conception, writing, translation and adaptation of the syllabus. I wish to extend my appreciation to teachers and lecturers for their valuable efforts during the development of this syllabus.

I owe gratitude to the different education partners such as UNICEF, UNFPA, DFID and Access to Finance Rwanda for their financial and technical support. We also value the contribution of other education partner organizations such as CNLG, AEGIS trust, Itorerory'Igihugu, Gender Monitoring Office, National Unit and Reconciliation Commission, RBS, REMA, Handicap International, Wellspring Foundation, Right To Play, MEDISAR, EDC/L3, EDC/Akazi Kanoze, Save the Children, Faith Based Organizations, WDA, MINECOFIN and Local and international consultants. Their respective initiatives, co-operation and support significantly contributed to the successful production of this syllabus.

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1. INTRODUCTION

1.1 Background to curriculum review

The rationale behind the Upper Primary Mathematics syllabus review process was to ensure that the syllabus is responsive to the needs of the learner and to shift from objective and knowledge based learning to competency based learning. Emphasis in the review has been on building skills and competencies, as well as streamlining the coherence of the existing content by benchmarking against a number of best practice syllabi.

The new Upper Primary Mathematics syllabus guides the interaction between the teacher and the learner through the learning processes and highlights the essential practical skills and competencies a learner should acquire during and at the end of each unit of learning.

1.2 Rationale of teaching and learning mathematics

1.1.1 Mathematics and society

The Upper Primary Mathematics syllabus has put emphasis on integrated production skills and on an integrated approach in all disciplines. Mathematics is an excellent vehicle for the development and improvement of a person's intellectual competence in logical reasoning, spatial visualization, analysis and abstract thought. Learning mathematics develops numeracy, logical reasoning skills, critical thinking skills, and problem solving skills. This will result in mathematics being used in many activities of daily life thereby serving as an important tool to the society. In this way the subject will be demystified and user friendly.

Therefore, mathematics plays an important role in society through abstraction and logic, counting, calculation, measurement, systematic study of shapes and motion. It is also used in natural sciences, engineering, medicine, finance and social sciences. Applied Mathematics like statistics and probability play an important role in game theory, in the national census process, in scientific research, etc. In addition, some cross-cutting issues such as financial awareness are incorporated into some of the mathematics units to improve the social and economic welfare of Rwandan society.

1.1.2 Mathematics and learners

Learners need enough basic mathematical competencies to be effective members of Rwandan society, including the ability to count, estimate, measure, calculate, handle and manage money, interpret statistics, assess probabilities, and read commonly used mathematical representations and graphs. Reading or listening to the news requires many of these competencies and citizenship requires being able to interpret critically the information one receives. For example, understanding an age-length or age-weight graph helps parents and health practitioners monitor the health of a child.

Mathematics also equips learners with knowledge, skills and attitudes necessary to enable them to succeed in an era of rapid technological growth and socio-economic development. Mastery of basic mathematical ideas and operations should make learners confident in problem-solving in life situations. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject.

In this syllabus the teacher has the task of trying to make mathematics a reality in life. Methods and approaches to learning experiences should be mostly practical and based on the experience of the learners. Hence, teaching methods to be emphasized

are those that allow learners to explore, try different procedures and solve problems practically. Learning mathematics needs to include practical problem-solving activities with opportunities for students to plan their own investigations and develop their mathematical competency and confidence. New technologies have had a dramatic impact on all aspects of life. For this reason, wherever possible in mathematics, learners should gain experience of a range of ICT applications.

1.2.3 Competences

Competence is defined as the ability to perform a particular task successfully, resulting from having gained an appropriate combination of knowledge, skills and attitudes.

The mathematics syllabus provides the opportunity for learners to develop different competencies, including the generic competencies.

Basic competencies are addressed in the stated broad subject competences and in objectives highlighted year on year basis and in each of units of learning. The generic competencies, basic competences that must be emphasised and reflected in the learning process are briefly described below and teachers will ensure that learners are exposed to tasks that help the learners acquire the skills.

Generic competences and values

Critical and problem solving skills: Learners use different techniques to solve mathematical problems related to real life situations. They are engaged in mathematical thinking, they construct, symbolise, apply and generalise ideas.

The acquisition of such skills will help learners to think imaginatively and broadly to evaluate and find solutions to problems encountered in all situations.

Creativity and innovation: The acquisition of such skills will help learners to take initiatives and use imagination beyond the knowledge provided to generate new ideas and construct new concepts. Learners will improve these skills through mathematics contests, and mathematics competitions, etc.

Research: This will help learners find answers to questions based on existing information and concepts as well as explain phenomena based on findings from information gathered.

Communication in official languages: Learners communicate effectively their findings through explanations, construction of arguments and drawing relevant conclusions.

Mathematics teachers, irrespective of not being teachers of language, will ensure the proper use of the language of instruction by learners. This will help learners communicate clearly and confidently and convey ideas effectively through speaking and writing and use the correct language structure and relevant vocabulary.

Cooperation, inter personal management and life skills: Learners are engaged in cooperative learning groups to promote higher achievement rather than competitive and individual work.

This will help learners to co-operate with others as a team in whatever task are assigned and to practice positive ethical moral values and respect for the rights, feelings and views of others. Leaners will perform practical activities related to

environmental conservation and protection. They will also advocate for personal, family and community health, hygiene and nutrition and respond creatively to the variety of challenges encountered in life.

Lifelong learning: The acquisition of such skills will help learners update their knowledge and skills with minimum external support and to cope with the evolution of advances in knowledge for personal fulfillment in areas that need improvement and development.

Broad mathematics competences

During and at the end of the learning process, the learner can:

- Promote problem solving in life situations;
- Develop and enrich their aesthetic and linguistic experiences;
- Promote scientific, technical and cultural knowledge, skills and positive attitudes needed to promote development, self-sufficiency and wealth;
- Apply acquired mathematics knowledge and skills in future training;
- Work in a systematic way to develop clear, logical, coherent and creative reasoning;
- Develop imagination, initiative and flexibility of mind;
- Describe, explain, interpret and analyse information;
- Use acquired knowledge and skills to succeed in an era of rapid technological growth and socio-economic development;
- Use ICT tools to solve mathematical problems .

Mathematics and developing competences

The national policy documents based on national aspirations identify some 'Basic Competencies' alongside the 'Generic Competencies'' that will develop higher order thinking skills and help students learn subject content and promote the application of acquired knowledge and skills.

Through observations, constructions, hands-on manipulations, generalisations, and presentations of information during the learning process, the learner will not only develop deductive and inductive skills but also acquire co-operation, communication, critical thinking and problem solving skills. This will be realised when learners make presentations leading to inferences and conclusions at the end of the learning unit. This will be achieved through group work activities and co-operative learning which in turn will promote interpersonal relations and teamwork.

The acquired knowledge in learning mathematics should develop a responsible citizen who adapts to scientific reasoning and attitudes and develops confidence in reasoning independently.

2. PEDAGOGICAL APPROACH

The change to a competence-based curriculum is about transforming learning to ensure that learning is deep, enjoyable and habit-forming.

IT in general and particularly ICT should be used as a pedagogical tool to facilitate teaching and learning of mathematics.

Various teaching strategies and approaches such as direct instruction, discovery learning, investigation, guided discovery or other methods must be incorporated. Among the approaches that can be given consideration include the following:

- Learner-centered learning;
- Different learning abilities and styles of learners (individualisation);
- Use of relevant, suitable and effective teaching materials;
- Formative evaluation to determine the effectiveness of teaching and learning processes.

The choice of a suitable approach will stimulate the teaching and learning environment inside or outside the classroom.

Suitable approaches include the following:

- Co-operative learning;
- Contextual learning;
- Mastery learning;
- Constructivism.

2.1 The role of the learner

In the competence-based curriculum, the learner is the principal actor of his/her education. He/she is not an empty bottle to fill. Taking into account the initial capacities and abilities of the learner, the activities of the learner are indicated against each learning unit and reflect appropriate engagement of the learner in the learning process. The teaching-learning process will be tailored towards creating a learner friendly environment based on capabilities, needs, experience and interests.

Therefore, the following are some of the roles or expectations from learners:

- Learners construct the knowledge either individually or in groups in an active way. From the learning theory, learners move in their understanding from concrete through to pictorial to abstract. Therefore, the opportunities should be given to learners to manipulate concrete objects and to use models.
- Learners will be encouraged to do research and present their findings through group work activities.
- A learner is co-operative: learners work in heterogeneous groups to increase tolerance and understanding.
- Learners are responsible for their own participation and for making sure others participate.
- Help is sought from within the group and the teacher is asked for help only when the whole group agrees to ask a question.
- Consensus on the answer is required from the whole group.
- The group evaluates its own strategies and ideas rather than relying on the teacher for this evaluation.
- The learners who learn at a faster pace do not do the task alone and then the others merely sign off on it.

- Participants ensure the effective contribution of each member, through clear explanation and articulation of constructive arguments, to improve their English literacy, develop a sense of responsibility and to increase their self-confidence, and public speaking ability, etc.

2.2 The role of the teacher

Some of the specific duties of the teacher when implementing competence-based activities are as follows:

- He/she is a facilitator: his/her role is to provide opportunities for learners to meet problems that create interest and challenge them and that, with appropriate effort, they can solve.
- He/she is an organiser: his/her role is to organise the learners, in the classroom or outside, and engage them through participatory and interactive methods through the learning processes as individuals, in pairs or in groups. To ensure that the learning is personalised, active and participative, the teacher must identify the needs of the learners, the nature of the learning to be done, and the means to shape learning experiences accordingly.
- He/she is an advisor: he/she provides counseling and guidance for learners in need. He/she comforts and encourages learners by valuing their contributions in the class activities.
- He/she is a conflict-solver: when members of a group have problems such as the attribution of tasks he/she should provide useful and constructive ideas. The teacher should settle disputes among the group.
- He/she is ethical: he/she teaches by example, by being impartial, by being a role-model, and by caring for individual needs, especially for slow learners and learners with physical impairments.

2.3 Special needs education and inclusive approach

All Rwandans have the right to access education regardless of their different needs. The underpinnings of this provision would naturally hold that all citizens benefit from the same menu of educational programs. The possibility of this assumption is the focus of special needs education. The critical issue is that we have persons/learners who are totally different in their ways of living and learning as opposed to the majority. The difference can either be emotional, physical, sensory and/or intellectual learning challenged, traditionally known as mental retardation.

These learners equally have the right to benefit from the free and compulsory basic education in nearby ordinary/mainstream schools. Therefore, the schools' role is to enroll them and also set strategies to provide relevant education for them. The teacher therefore is requested to consider each learner's needs during the teaching and learning process. Assessment strategies and conditions should also be standardized to the needs of these learners. Detailed guidance for each category of learners with special education needs is provided for in the guidance for teachers.

3. ASSESSMENT APPROACH

Assessment evaluates the teaching and learning process through collecting and interpreting evidence of an individual learner's learning progress and makes a judgment about the learner's achievements measured against defined standards. Assessment is an integral part of the teaching learning process. In the new competence-based curriculum, assessment must also be competence-based, whereby a learner is given a complex situation related to his/her everyday life and asked to try to overcome the situation by applying what he/she has learned.

Assessment will be organised at the following levels: School-based assessment, District examinations, National assessment (LARS) and National examinations.

3.1 Types of assessments

3.1.1 Formative assessment:

Formative assessment helps to check the efficiency of the process of learning. It is done within the teaching/learning process. Continuous assessment involves formal and informal methods used by schools to check whether learning is taking place. When a teacher is planning his/her lesson, he/she should establish the criteria for performance and behavioral changes at the beginning of a unit. Then at the end of every unit, the teacher should ensure that all the learners have mastered the stated key unit competencies based on the criteria stated, before going to the next unit. The teacher will assess how well each learner masters both the subject and the generic competencies described in the syllabus and from this, the teacher will gain a picture of the all-round progress of the learner. The teacher will use one or a combination of the following: (a) observation (b) pen and paper (c) oral questioning.

3.1.2 Summative assessments:

When assessment is used to record a judgment of the competence or the performance of the learner, it serves a summative purpose. Summative assessment gives a picture of a learner's competence or progress at any specific moment. The main purpose of summative assessment is to evaluate whether learning objectives have been achieved. The results of summative assessment are also used to rank or grade learners, for deciding on progression, for selection into the next level of education

and for certification. This assessment should have an integrative aspect whereby a student must be able to show mastery of all competencies.

Summative assessment can be internal school based assessment or external assessment in the form of national examinations. School based summative assessment should take place once at the end of each term and once at the end of the year. School summative assessment average scores for each subject will be weighted and included in the final national examinations grade. School based assessment average grades will contribute a certain percentage as teachers gain more experience and confidence in assessment techniques. In the third year of the implementation of the new curriculum it will contribute 10% of the final grade, but will be progressively increased. Districts will be supported to continue their initiatives to organise a common test per class for all the schools to evaluate the performance and the achievement level of learners in each individual school. External summative assessment will be done at the end of P6, S3 and S6.

3.2 Record keeping

This is gathering facts and evidence from assessment instruments and using them to judge the student's performance by assigning an indicator against the set criteria or standard. Assessment procedures generate data in the form of scores which will be carefully be recorded and stored in a portfolio. These scores will contribute to remedial actions and alternative instructional strategies. They will also be used to provide feedback to the learner and their parents to check learning progress and to provide advice, as well as be used in the final assessment of the students.

This portfolio is a folder (or binder or even a digital collection) containing the student's work as well as the student's evaluation of the strengths and weaknesses of their work. Portfolios reflect not only the work produced (such as papers and assignments), but also provide a record of the activities undertaken over time as part of student learning..

Besides, it will serve as a verification tool for each learner that he/she attended the whole learning before he/she undergoes the summative assessment for the subject.

3.3 Item writing in summative assessment

When developing a question paper, a plan or specification of what is to be tested or examined the assessment task must show the units or topics to be tested, the number of questions in each level of Bloom's taxonomy and the marks allocation for each question. In a competency-based curriculum, questions from higher levels of Bloom's taxonomy should be given more weight than those from the knowledge and comprehension level.

Before developing a question paper, the item writer must ensure that the test or examination questions are tailored towards competency based assessment by doing the following:

- Identify topic areas to be tested on from the subject syllabus.
- Outline the subject-matter content to be considered as the basis for the test.
- Identify learning outcomes to be measured by the test.
- Prepare a table of specifications.
- Ensure that the verbs used in the formulation of questions do not require memorisation or recall answers only but test for broad competencies as stated in the syllabus.

Structure and format of the examination

There will be one paper in mathematics at the end of Primary 6. The paper will be comprised of two sections. The first section will be composed of short answer items or items with short calculations which include questions testing for knowledge and

understanding, investigation of simple patterns, quick calculations and applications of mathematics in real life through simple word problems. The second section will be composed of long answer items or answers with constructions, simple demonstrations, investigation of simple patterns and generalisation, interpretation and explanations. The items for the second section will emphasise the mastering of mathematical facts, the understanding of mathematical concepts and their application in real life situations. In this section, the assessment will find out not only what skills and facts have been mastered, but also how well learners understand the process of solving a mathematical problem and whether they can link the application of what they have learned to the context or to real life. The time required for the paper is three hours (3hrs.).

The following topic areas have to be assessed: Number & operations; fractions, decimals and proportional reasoning; metric measurements; algebra; geometry; statistics and elementary probability. Topic areas with more weight will have more emphasis in the second section where learners should have the right to choose to answer 3 items out of 5.

3.4 Reporting to parents

The wider range of learning in the new curriculum means that it is necessary to think again about how to share a learners' progress with their parents. A single mark is not sufficient to convey the different expectations of learning that are outlined in the learning objectives. The most helpful reporting is to share what students are doing well and where they need to improve.

4. RESOURCES

4.1 Materials needed for implementation

The use of teaching resources and teaching materials is crucial in guiding learners to develop mathematical ideas.
Teachers should use real or concrete materials to help learners gain experience, construct abstract ideas, make inventions, build self-confidence, encourage independence and inculcate the spirit of cooperation. Some resources that can be used are:

- Reference books
- Manila cards
- Geometrical instruments like rulers, pair of compasses, rubbers, pencils, dividers, sharpeners etc
- Computers
- Projectors
- Graph paper
- Abacus
- Calculator
- Counters

4.2 Human resource

The effective implementation of this curriculum requires a joint collaboration of educators at all levels. Given the material requirements, teachers are expected to accomplish their noble role as stated above. School head teachers and directors of

studies are required to follow-up and assess the teaching and learning of Mathematics . These combined efforts will ensure bright future careers and lives for learners as well as the contemporary development of the country.

In a special way, a teacher of mathematics at ordinary level should have a firm understanding of mathematical concepts at the level he/she teaches. He/she should be qualified in mathematics and have firm ethical conduct. The teacher should possess the qualities of a good facilitator, organiser, problem solver, listener and adviser. He/she is required to have basic skills and competency of guidance and counseling because students may come to him/her for advice.

Skills required for the Teacher of Mathematics

The teacher of mathematics should have the following skills, values and qualities:

- Engage learners in variety of learning activities.
- Use multiple teaching and assessment methods.
- Adjust instruction to the level of the learners.
- Use creativity and innovation in the teaching and learning process.
- Be a good communicator and organiser.
- Be a guide/facilitator and a counselor.
- Manifest passion and impartial love for children in the teaching and learning process.
- Link the use of mathematics with other subjects and real life situations.
- Have good mastery of mathematics content.
- Have good classroom management skills.

5. SYLLABUS UNITS

5.1 Presentation of the structure of the syllabus units

The mathematics subject is taught and learnt in Upper primary education as a core subject, i.e. in P.4, P.5 and P.6 respectively. At every grade, the syllabus is structured in Topic Areas, sub-topic Areas where applicable and then further broken down into Units. This breakdown promotes the uniformity, effectiveness and efficiency of teaching and learning mathematics. The Units have the following elements:

1. Each Unit is aligned with the. number of periods
2. Each Unit has a Competence whose achievement is pursued by all teaching and learning activities undertaken by both the teacher and the learners.
3. Each Unit Key Competency is broken into three types of Learning Objectives as follows:
    a. *Type I:* Learning Objectives relating to Knowledge and Understanding (*Type I* Learning Objectives are also known as Lower Order Thinking Skills or LOTS).
    b. *Type II a*nd *Type III:* These Learning Objectives relate to acquisition of skills, Attitudes and Values (*Type II* and *Type III* Learning Objectives are also known as Higher Order Thinking Skills or HOTS) – These Learning Objectives are actually considered to be the ones targeted by the present reviewed curriculum.

4. Each Unit has content that indicates the scope of coverage of what is to be taught and learnt in line with the stated Learning Objectives.
5. Each Unit suggests a non-exhaustive list of Learning Activities that are expected to engage learners in an interactive learning process as much as possible (learner-centred and participatory approach).
6. Finally, each Unit is linked to other subjects, the Assessment Criteria and the Materials (or Resources) that are expected to be used in the teaching and learning process.

The mathematics syllabus for ordinary level has got 7 Topic Areas: Number and operations, Fractions and proportional reasoning, Metric measurements, Geometry, Algebra, Statistics and Elementary probability. As for units, they are 18 in P.4, 16 in P.5 and 16in P.6.

5.2 Mathematics program for primary four

5.2.1 Key competencies at the end of primary four

At the end of Primary Four, learners can:

- Read, write, compare and calculate whole numbers up to 100,000.
- Solve mathematical problems involving time, length, mass, capacity, money, area or perimeter.
- Solve simple problems involving fractions and decimals.
- Collect, represent and interpret data using bar graphs and tables.
- Solve missing number problems involving addition and subtraction.
- Explain the concept of probability by playing games of chance and deciding on whether or not they are fair.

5.2.2 Mathematics units for primary four

Topic Area: NUMBERS AND OPERATIONS		
P.4 MATHEMATICS	**UNIT 1:** Mathematical operations on whole numbers up to 100000.	**Number of Periods:** 48
Key Unit Competence: To be able to read, write, compare and make calculations on whole numbers up to 100000.		

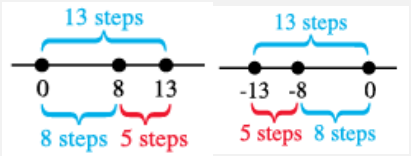
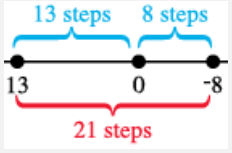
Learning Objectives			**Contents**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Name all place values through to 100,000, in spoken and written form. - Identify the place values in written numerals. - Read written numerals correctly in English. - Explain the process of addition of 2 numbers of 5 digits with or without carrying. - Explain the process of subtraction of 2 numbers of 5 digits or	- Use place value to compare numbers of any size. - Correctly translate between written numerals and spoken English. - Apply comparison of numbers in daily life. - Carry out addition and subtraction of 2 or more whole	- Developing personal confidence in the use of numbers. - Appreciate the importance of addition, subtraction, multiplication and division in daily life. - Appreciate the importance of working out numbers quickly and accurately.	**Reading and writing whole numbers up to 100,000:** - Reading and writing whole numbers in words. - Reading and writing whole numbers in figures. **Place value and comparing whole numbers:** - Place value of whole numbers	- Each learner in a group of five gets a little slip of paper with his or her own large number. The learners arrange themselves in order, and read their numbers out loud. - *Using number cards to form and read numbers up to 100,000* - Dictation: learners write the words or the numerals from the teacher's dictation. - Matching game: learner matches large numbers

more with or without borrowing. - Explain process of multiplication of 2 numbers or more with or without carrying. - Explain the process of division of 2 digit numbers with or without remainders. - Explain the process of solving mathematical word problems involving 4 operations on 2 or more numbers of 2 digits or more.	numbers. - Carry out multiplication of 2 or more whole numbers whose product does not exceed 100,000. - Solve daily life mathematical problems involving addition, subtraction, multiplication or division.		up to five digit numbers. - Comparing whole numbers using <, > or = **Operations:** - Addition of 2 or more whole numbers, with or without carrying, whose sum does not exceed 100,000. - Subtraction of whole numbers between 0 and 100,000 with or without borrowing. - Multiplying whole numbers by two digit numbers. - Product of a 2 digit number by 10, 100, 1,000, 10,000. - Multiply whole numbers by 5 using quick	written as numerals and as words. - Using different digits in a group, learners make 2 numbers of 5 digits and arrange them from the largest to the smallest number and vice versa. This activity can be done using flash cards or cutouts. - *Use local abacus to introduce the addition of numbers* - Observation of worked examples on charts and carrying out addition or subtraction in groups using abacus or objects of different colors. - Group work activity on mathematics word problems involving addition, subtraction, multiplication or division. - Using flash cards in pairs, form 2 different numbers and carry out operations. - Using the practical method

			multiplication. - Divide by a single digit number (without a remainder and with a remainder); - Solve mathematical problems involving addition, subtraction, multiplication or division of whole numbers.	of division to find the quotient and show the proof by showing the relationship between multiplication and division.
Links to other subjects: *English: contribution to the practice of spoken and written use of the English language.*				
Assessment criteria: *Learners should be able to accurately compare whole numbers in terms of size, carry out addition, multiplication, division and subtraction of 2 or more whole numbers, and solve problems involving addition, multiplication, division and subtraction in groups and make a group presentation.*				
Materials**:** *Manila cards or slips of paper; abacus and textbooks; and objects of different colours. Scissors to make cut outs of numbers. Markers to write numbers that can be seen from back of the room.*				

Topic Area: NUMBERS AND OPERATIONS		
P.4 MATHEMATICS	**Unit 2:** Positive and negative integers.	**Number of Periods:** 16
Key Unit Competence: To be able to solve problems related to comparing, ordering, and finding the distance between negative and positive integers.		

Learning Objectives			**Contents**	- Learning Activities
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Locate positive and negative numbers on the number line. - Explain that when two numbers are placed on the number line, the number to the right is greater than the number to the left.	- Locate positive and negative numbers on the number line - Apply knowledge of position on a number line to determine which of two numbers is greater. - Computing distance between integers.	- Appreciate the importance of using positive and negative numbers in practical contexts.	- The meaning of negative and positive numbers in contexts like temperature, buying and selling, etc. - Location of positive and negative numbers on a number line. - *Distance between integers on a number line* - Comparison/ordering of negative and positive numbers using a number line. - Solve problems involving integers, including computing distance between integers: o If two numbers are on the same side of zero, the distance between them is the difference of their magnitudes.	- In groups: learners can use numbers on cards and place them on a number line backwards and forwards (on the board or using other material made of hard paper). - Game: In a large play area (schoolyard or field), mark a number line from -24 to 24 (for a 48-child class, or -30 to 30 for a 60-child class, to allow all children to play). Each player is “named” and

			 ○ If two numbers are on opposite sides of zero, the distance between them is the sum of their magnitudes. 	labelled as a number (not including 0) and stands on his or her number on the line. The teacher calls out a command like "Negative 8, run to 2" or "12, run to 4." The child runs, and then says how far, and in which direction, positive or negative. - Mental activities: learners picture the number line and state the distance between the numbers on either side (e.g. distance between -3 and 10, or -30 and -10, or -25 and 20). - Puzzles: A number gives clues about where it is (e.g. "I am exactly 10 steps away from 7. I am odd. I am more than 5 steps away from 12. Where

				am I?") and the learner must find the number on the number line. 10 steps away from 7 could be in either direction, so it could be 17 or –3, but only –3 is more than 5 steps away from 12. So the number is –3.
Links to other subjects: *Science and Geography: introduction of negative numbers in the context of temperatures in different locations in Rwanda.*				
Assessment criteria: *Learners should accurately compare pairs of numbers like -3 and -7 and say which is greater and why. (-3 is greater because it is to the right of -7).*				
Materials: *Masking tape to mark number line on floor; manila cards for number line; and string marked off evenly with knots (same distance between knots on a rope).*				

Topic Area: NUMBERS AND OPERATIONS		
P.4 MATHEMATICS	**Unit 3:** Classifying numbers by their properties.	**Number of Periods: 24**
Key Unit Competence: Be able to classify numbers flexibly, seeing them as belonging to various families.		

Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Explain the meaning of odd, even, square numbers, square root, prime numbers, multiples of numbers, factors of numbers. - List numbers in each family and explain the properties of different families of numbers. - State the method/steps for calculating the Lowest Common Multiple (LCM).	- Classify numbers as odd, even, square numbers, prime numbers, multiples of a given number, factors of a given number. - Calculate the LCM of two numbers. - Calculate the square of a number and find the square root of a square number ≤ 100.	- Appreciate the importance of using square and square roots. - Being cooperative and displaying a teamwork spirit. - Demonstrate creativity in problem solving. - Being attentive.	- Odd, even, square numbers, square root, prime numbers, multiples of numbers, factors of numbers. - Squares and exact square roots. - Problems involving square roots. - Calculating the LCM.	- Different families of numbers can be introduced through games, role plays, etc. Example: Each learner receives a card with a different number, from 0 to the number of learners in the class. They arrange themselves in a large circle. The teacher has cards naming various families of numbers: odd, even, multiples of 2, square, prime, multiples of 5, numbers that are not multiples of 3, etc. The teacher gives the card to a learner, the learner calls out the family of numbers, and all learners with numbers in that family run to a line marked on the ground, and arrange themselves in

				order. When they are done, they call out their number names, in order, and the remaining learners check to see if they all belong. Then they go back to the circle and a new family of numbers is called. (Note: this game obviously follows some instruction on the properties of the family of numbers and the English names for them). - Learners work in groups to discover more numbers belonging to a particular type/family of numbers (e.g. even, odd, square…) - Let learners suggest more numbers in each type/family of numbers, and explain why they suggest so. - Link Periods in this unit to content from unit on number sequences.
Links to other subjects: *English: new English vocabulary.*				
Assessment criteria: *Learners should name three types/families that a given number belongs in (e.g. 36 is a square number, even number, multiple of 3).*				
Materials: *Manila cards or slips of paper for labeling learners with numbers.*				

Topic Area: FRACTIONS, DECIMALS AND PROPORTIONAL REASONING		
P.4 MATHEMATICS	**Unit 4:** Fractions of same denominator.	**Number of Periods:** 24
Key Unit Competence: Be able to explain the meaning of fractions, add and subtract same-denominator fractions, multiply and divide fractions accurately.		

Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Read and write fractions. - Explain the meaning of numerator and denominator in the size of a fraction. - Explain and show how adding or subtracting same denominator fractions is like adding any other unit: metres, grams. - Explain how to multiply fractions by whole numbers and by fractions. - Explain how to	- Compare two fractions with the same denominator. - Add and subtract fractions that have the same denominator. - Apply the knowledge of fractions to solve mathematical problems that involve operation of fractions.	- Appreciate the importance of accuracy in carrying out operations on fractions. - Develop personal confidence in carrying out operations on fractions. - Develop the spirit of sharing.	- The meaning of fractions - Comparing fractions with the same denominator by the use of real materials such as circle set fractions - Read, write, and compare fractions with the same denominator, including mixed fractions. - Addition of fractions with the same denominator.	- Using real materials such as circle set fractions to discover the meaning of a fraction and comparing fractions of the same denominator - Given a fraction, learners can find a fraction with the same denominator, so that the two fractions add up to 1. - In groups Learners can write and read fractions on flash cards, reflecting the given English names (a half, a third, a quarter, a fifth, a sixth, etc.). - Learners compare fractions like: 3/5, 2/5, 4/5, 1/5 etc.

divide fractions by whole numbers and by fractions. - Explain the process of solving problems involving addition, subtraction, multiplication and division of fractions.			- Subtraction of fractions with the same denominator. - Problems involving addition and subtraction of fractions. - Multiplication of fractions by whole numbers. - Multiplication of fractions by fractions, conceptually (not an arbitrary rule). - Division of fractions by a whole number. - Problems involving multiplication and division of fractions.	and discover that the bigger the numerator, the bigger the fraction when they have same denominators. - Using a circle, or a number line or other length images of fractions, help learners to see equivalence of fractions. - Learners can multiply fractions by whole numbers using repeated addition. E.g. $3x\frac{1}{2}$ to mean $\frac{1}{2}+\frac{1}{2}+\frac{1}{2}$ let them arrive at $1\frac{1}{2}$. Write more of these fractions on the manila cards and let learners practice in their groups. - Through drawings or simple examples e.g. $\frac{1}{2}\div 6=\frac{1}{2}x\frac{1}{6}=\frac{1}{12}$, learners can divide fractions by a whole number and discover that the answer is a smaller fraction than the previous one.

Links to other subjects: *Geography: representation of fractions when calculating scales of maps.*
Assessment criteria: *Learners should compare, add, subtract multiply and divide same denominator fractions accurately.*
Materials: *Concrete objects like oranges, paw paws, sugar canes; wall charts to show fractions; scissors, knives, plain papers or manila cards for learners to cut.*

Topic Area: FRACTIONS, DECIMALS & PROPORTIONAL REASONING		
P.4 MATHEMATICS	**Unit 5:** Decimal fractions/ numbers.	**Number of Periods:** 16
Key Unit Competence: Add, subtract and compare decimal numbers using place values of decimals up to 2 decimal places.		

Learning Objectives			Content	Learning Activities
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Explain the concept of decimal numbers using place values up to 2 decimal places. - Correctly read and write decimal numbers in figures and in words. - Identify the place values in written decimals.	- Compare 2 or more decimal numbers using >, < or = - Correctly translate between written decimals and spoken English. - Carry out addition or subtraction of decimal numbers up to 2 decimal places. - Apply decimal concepts in	- Develop personal confidence in the use of decimal numbers. - Appreciate the importance of decimal fractions in comparing and sharing.	- The concept of decimal fractions through examples, and through "zooming in" on the number line. - Place value of decimals up to 2 decimal places - Comparing decimal numbers. - Addition of decimal fractions. - Subtraction of decimal fractions. - Problems involving addition and subtraction of decimals.	- Locating decimals on the number line and show how it works the same way as integers. Each time we zoom in, we make 10 new spaces. ○ What is exactly halfway between 0 and 100 ○ What is exactly halfway between 0 and 10 ○ What is exactly halfway between 0 and 1 - Mental activity: learners can develop the idea of decimal numbers through the following "zooming in" activities: Activity 1: Learners can review multiplying and dividing by 10 through the given example like: 1400 → 140 → 14 → 1.4. Then they discover that 14 ÷ 10 is a number

	solving daily life math problems.			(1.4) that is more than 1 and less than 2 Activity 2: When we “zoom in” to create 10 smaller equal-sized intervals, we find them separated by nine new numbers. When we zoom in to create 2 smaller equal-sized intervals, we find one number separating them, half way between the two endpoints of the original interval (e.g. we find 45 halfway between 40 and 50, and we find 4½ halfway between 4 and 5). - Find pairs of decimals whose sum is 1 (e.g. 0.4 and 0.6) or 10 (e.g. 9.3 and 0.7 or 8.3 and 1.7), or paralleling pairs of whole numbers whose sum is 10 (e.g., 4 and 6) or 100 (e.g. 93 and 7 or 83 and 17) - Using place values, learners should be asked to discover the difference between two or more different decimal numbers; add or subtract two or more decimal numbers in groups or individually. - Through the observation of worked examples on addition or subtraction of decimal numbers, learners should be given exercises to be completed and presented by groups.

Links to other Subjects: *Science: components of air e.g. carbon dioxide and rare gases use decimals. History: decimals are linked to the time line Geography: uses decimal scales.*				
Assessment criteria: *Learners should accurately add, subtract and compare decimal numbers, and represent a decimal to 2 decimal places on a number line.*				
Materials: *A ruler, a rope; charts (with number line, worked examples on place values up to 2 decimal places), and textbooks.*				

Topic Area: METRIC MEASUREMENT		
P.4 MATHEMATICS	**Unit 6:** Length measurements.	**Number of Periods: 24**

Key unit Competency: Convert between units of length and apply them in solving mathematical problems related to daily life situations, including perimeters.

Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Build on knowledge and understanding of measurement of length. - State different units of length measurements. - Explain the relationship between the units of length measurements. - Explain the perimeter of a	- Appropriately estimate length and provide a justification. - Select and use appropriate instruments/tools/ materials to measure lengths, using and interpreting scales correctly. - Read and write units of length measurements. - Accurately convert length measurements between different units.	- Appreciate the importance of metric measures in daily life. - Recognise the importance of using measuring tools correctly.	**Distance/length:** - Estimate different small distances. - Measure the length and perimeter of various objects in different units e.g. metres, centimetre, decametre, etc. using a ruler, a rope, sticks, foot, or hand span. **Units of length measurements:** - Reading and writing measurements of	- Using observation, estimate the length of different distances (distance between the opposite wall of the classroom etc.). - In groups, measure different distances: less than or up to 1 metre using different tools (foot, metre ruler, rope, stick, etc.) to discover the standard unit of length that is a metre.

shape as the distance around it.	- Apply the knowledge of addition or subtraction and multiplication by a whole number in solving mathematical problems involving length measurements.		length: km, dam, m, cm, mm. - Addition and subtraction of length measurements of whole and decimal numbers up to 2 decimal places in meaningful contexts. - Conversion of length measurements with application problems in meaningful contexts.	- Use measurements to create problems for one another that include using a mix of units.
Links to other Subjects: *Social studies: geographical distances between places. ES: metric units for measurement of mass and temperature.*				
Assessment criteria: *Learners should be able to accurately select, convert, add, subtract and compare length measurements through solving problems related to daily life situations, including, measuring lengths accurately in practical contexts.*				
Materials: *Metre, decameter, ruler, rope, sticks, charts (with a conversion table, worked examples on length measurement), and textbooks.*				

Topic Area: METRIC MEASUREMENT		
P.4 MATHEMATICS	**Unit 7:** Capacity measurements**.**	**Number of Periods: 8**
Key Unit Competence: Convert between units of capacity and apply them in solving mathematical problems related to daily life situations.		

Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Distinguish the capacity of different liquid containers through observation. - State the different units of capacity measurement. - Explain the relationship between units of capacity measurement. - Show the process of solving	- Estimate the capacity of a liquid container through observation. - Select and use an appropriate tool/material to measure the capacity of different liquid containers. - Correctly read and write units of capacity measurement. - Accurately convert different capacity measurements	- Show an ability to properly use a range of materials to measure different liquids in daily life. - Be honest and trustworthy when measuring different capacities. - Show respect to one another when working in	- Estimation of the capacity of different objects. - Measuring different capacities in litres. - Read and write measurements of capacity from hl to ml. - Application: Compare capacities of containers and solving real life problems involving capacity measurement - Addition and subtraction of capacity measurements of whole and decimal numbers up to 2 decimal places	- Through observation of different liquid containers, learners will estimate their capacities. - In a group, learners measure liquids using different liquid containers (bottle of 1 litre, cup, bucket, jag, jerry can, etc.) to understand units of capacity. - In groups or individually, solve problems involving addition or subtraction of capacity measurements. - In pairs, learners compare capacities of various containers in litres. Then, through explanations from

mathematical problems involving capacity measurement.	- Apply the knowledge of addition or subtraction and multiplication by a whole number in solving mathematical problems involving capacity measurement.	groups.	in meaningful contexts. - Conversion of capacity measurements, with application problems in meaningful contexts.	their observation, learners deduce that all liquid containers are made using a litre as the standard unit of capacity measurement.
Links to other Subjects: *Physics: capacity measurement is linked to the states of matter. EST: capacity of liquids in containers which are used in scientific experiments.*				
Assessment criteria: *Learners should be able to accurately convert, add, subtract and compare capacity measurements through solving problems related to daily life situations.*				
Materials: *Bottles of different capacities, bucket, charts (with a conversion table, worked examples on capacity measurement), and textbooks.*				

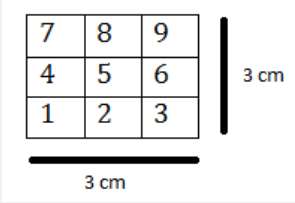
Topic Area: METRIC MEASUREMENT		
P.4 MATHEMATICS	**Unit 8:** Mass measurements.	**Number of Periods: 8**
Key Unit Competence: Convert between units of mass and apply them in solving mathematical problems related to daily life situations.		

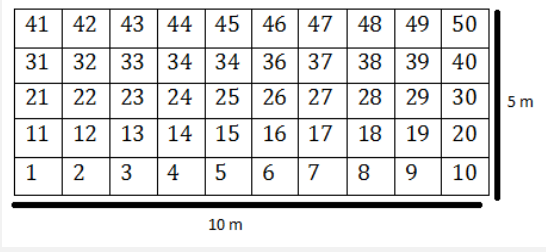
Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- State the units of mass and relate them to objects they best measure (e.g., few sheets of paper for grams; a small notebook for dag; a small quantity of fruit for kg; approximately, a 10 year old child for 32 kg). - Estimate the mass of different	- Select and use the appropriate tool/material to measure the mass of different objects. - Correctly read and write units of mass measurement. - Accurately convert different measurements of mass. - Apply the knowledge of addition or subtraction and multiplication by a	- Appreciate the importance mass measurement in daily life situations. - Show confidence when working out mass measurement. - Respect one another when working in groups and welcome other's ideas.	- Estimating mass of different things. - Measuring different objects using a balance. - Units of mass measurement. - Reading and writing measurement of mass from tone (t) to milligram (mg). - Addition and subtraction of mass measurement of whole and decimal numbers up to 2 decimal places in meaningful	- Through observation of different objects, learners will estimate the mass by telling which object is heavier or lighter than the other. - In a group, learners measure the mass of different objects using different types of balances (beam, scale spring balances, weight balances, etc.). - In groups or individually, solve problems involving addition or subtraction of mass measurement. (Group presentation activities

objects through observation. - Recognise the relationship between the units of mass measurement. - Explain the process of solving mathematical problems involving mass measurement.	whole number in solving mathematical problems involving mass measurement. - Appropriately estimate the mass of different objects and provide a justification. - Show an ability to properly use different scales (beam balances, baby scale, etc.) to measure different masses in daily life situations.	- Show the spirit of hard work in groups. - Be honest and trustworthy when measuring mass.	contexts. - Conversion of mass measurement, with application problems in meaningful contexts.	should be given to learners to improve cooperation, discussion and communication in the classroom). - Design practical activities for finding the mass of various things/objects using materials you prepared e.g. stones, a bottle full of water, soil, beans, etc. Allow the learners to feel the mass of 500g and 1 kg. Avoid explaining the difference between mass and weight.
Links to other Subjects: *EST: in finding the densities of objects, mass of different objects to be used in experiments.*				
Assessment criteria: *Learners should be able to accurately convert, add, subtract and compare mass measurements through solving problems related to daily life situations.*				
Materials: *Different scales (beam balances, baby scale, etc.) to measure different masses, charts (with a conversion table, worked examples on mass measurement), and textbooks.*				

Topic Area: METRIC MEASUREMENT		
P.4 MATHEMATICS	**Unit 9:** Area and land measurements.	**Number of Periods: 16**

Key Unit Competence: To be able to understand area as the 2D space enclosed by a boundary, and use square and land units in solving mathematics problems.

Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Explain the concept of square units. - State the units of area measurement. - Establish the relationship between the units of area measurement. - List the units of area and land measurement in ascending and descending order. - Correctly read	- Practically differentiate the measurement of area from the measurement of length. - Convert, add, subtract or compare area and land measurements. - Solve mathematical problems related to	- Appreciate the importance of measurements of area and land in daily life. - Show how to properly use different area and land measurements in daily life situations.	**Area and land Measurements:** - Concept of unit of area/land measurement by the use of real objects or a geoboard. - Reading and writing measurements of area/land. - Relationship between area and land measurements. - Understand area as the	- Outside the classroom, learners should work in groups and measure a square of 1m by 1m and then show the surface area of that square which is written as $1m^2$. - Using charts, manila paper or squared paper, learners should discover and explain the concept of square units.  A square of 3cm by 3cm is divided into 9 squares of 1cm by 1cm each. The surface area of the big square is 9 cm^2 - In groups, using the relationship between

and write units of area measurement. - Explain the process of adding, subtracting or converting area measurement. - Understand the concept of land units. - State the units of land. - Establish the relationship between the units of land and area measurement. - Correctly read and write units of land measurement. - Explain the process of adding, subtracting or converting land measurement.	finding the surface area of different shapes and plots of land. - Calculate the area as a space enclosed by a boundary without using the formula.		space enclosed by a boundary. - Conversion of area and land measurements. - Area of a rectangle including a square - Area of a rectangular piece of land (2D shapes). - Addition and subtraction of area/land measurement of whole and decimal numbers up to 2 decimal places in meaningful contexts.	length measurement (1 dam =10m), learners should discover that a square of 10m by 10m has a surface area of 100 m^2 which should help learners establish a relationship between area measurements (100 m^2 = 1 dam^2). - Using charts, manila cards or squared paper, learners can discover and explain the concept of land units. - A rectangle of 5m by 10m is divided into 50 squares of 1m by 1m each. The surface area of the big rectangle is 50 m^2 (on the drawing 1cm = 1m).  - In groups, using the relationship between area and land measurements, learners should understand that one square of 1m2 is represented by 1 ca, 50m^2=50 ca, 100m^2=1a (acres). - Solve problems involving conversion, addition or subtraction of area/land measurements in groups or individually.

Links to other Subjects: *Social studies and geography: in the representation and notation of surface areas.*
Assessment criteria: *Learners should accurately convert, add, subtract and compare area and land measurements through solving problems related to daily life situations.*
Materials: *Meter ruler, tape measure, rope, sticks, squared paper, manila cards, charts (with a conversion table, worked examples on area measurements), and textbooks.*

Topic Area: METRIC MEASUREMENT				
P.4 MATHEMATICS	**Unit 10:** Time.			**Number of Periods: 8**
Key Unit Competence: To be able to tell, write and convert time appropriately.				
Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Recognise different units of time. - Explain the process of solving mathematical problems involving time. - Explain the meaning of am and pm.	- Read and tell the time accurately. - Apply acquired knowledge to convert between units of time. - Correctly write units of time.	- Appreciate the value of time management in daily situations.	- Reading and telling the time accurately using a calendar, digital and analogue or face watches or clock. - Write the time using Ante Meridiem to mean before noon (AM) and Post Meridiem to mean after noon (PM). - Conversion of time: seconds into minutes, minutes into hours and vice versa. - Solve problems involving time: minutes and hours, dates and hours.	- In groups discuss the units of time: seconds, minutes, hours, days, weeks, months and years. - Learners can draw clock faces similar to the familiar ones somewhere in the classroom, display large cards on which are written a.m, p.m. - In groups learners should tell the time drawn and show the time given. - In groups discuss different activities at a specified time. - Guide learners to convert between the units of time.

				- Learners will solve problems involving time.
Links to other subjects: *Geography: telling the time and conversion of time when calculating GMT basing on prime meridian.*				
Assessment criteria: *Learners should tell, write and convert time accurately.*				
Materials: *Real clock, clock faces and calendars, wall chart showing clock faces.*				

Topic Area: METRIC MEASUREMENT		
P.4 MATHEMATICS	**Unit 11:** Money and its financial application.	**Number of Periods:** 8
Key Unit Competence: To be able to understand money and its financial applications.		

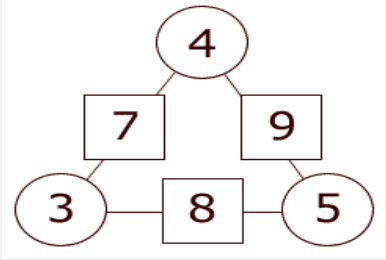
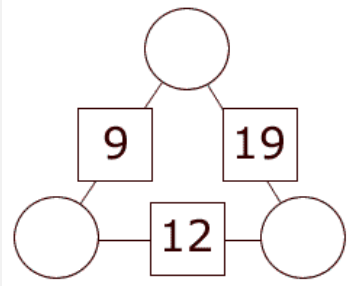
Learning Objectives			**Contents**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Recognise and identify the various denominations of Rwandan currencies. - State different ways of using money to meet the needs of families. - *Explain the process of simple budgeting basing on priorities.*	- Classify needs and wants. - Carry out calculations in simple business transactions. - Solve problems involving buying and selling.	- Appreciate the importance of money in daily life situations. - Show concern of using money honestly.	- Rwandan currency denominations and changing them: coins and notes. - Buying and selling - Simple Budgeting: ○ Sources of money ○ Uses of money ○ Planning according to needs and wants - Problems involving buying and selling: ○ Cost price ○ Selling price ○ Profit/loss	- In group discussions, let learners talk about bank notes and coins used in Rwanda and how to change them from higher to smaller units and vice versa (e.g. a bank note of 1,000 Rwf can be changed into 2 bank notes of 500 Rwf). The activity can be done using a collection of some Rwandan currency notes and coins or pictures and drawings. - Role play: learners should be involved in role plays about buying and selling, then introduce the main terms used: cost price, selling price, profit and loss. - Learners discuss different ways of gaining money, how money is used to meet the needs of an individual,

				family, and the whole community (e.g. money is used to buy items, to do business transactions, to pay school fees for children, etc.), the teacher will lead discussions using simple questions. - Using a list of needs and wants, learners can distinguish and classify them, and make simple plans according to priorities and financial means (e.g. What can you do with 5,000Rwf, etc.).
Links to other subjects: *Entrepreneurship and economics.*				
Assessment criteria: *Learners should honestly use money in different transactions, like buying and selling.*				
Materials: *Real money, pictures and drawings of Rwandan currency. Empty tins, boxes, soap, and pens, to build a classroom shop.*				

Topic Area: ALGEBRA				
P.4 MATHEMATICS	**Unit 12:** Number Patterns.			**Number of Periods: 8**
Key Unit Competence: To be able to describe and generate number patterns following a rule.				
Learning Objectives			**Contents**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Explain how to order whole numbers according to their size in increasing and decreasing order. - Explain the meaning of arithmetic or geometric progression.	- Determine the clue or pattern for a given arithmetic progression/ geometric progression. - Differentiate between arithmetic progression and geometric progression. - Arrange whole numbers in different orders.	- Appreciate the importance of orderliness in daily life. - Appreciate the spirit of hard work and self-confidence.	- Arrange whole numbers in increasing and decreasing order. - Arithmetic progressions. - Find the missing number in an arithmetic progression - Geometric progression.	- In groups, learners will arrange the numbers in an increasing and decreasing order based on place values e.g. 2300, 907, 31825, 99, 456. - Learners in groups can find the missing number in an arithmetic progression and formulate their own examples e.g. 5, 15, 25, 35, 45, 55, ____, _____85. - In groups, learners will discuss arithmetic or geometric progressions on flash cards and discover the clue/pattern. - Learners will show the difference between arithmetic and geometric progression (the arithmetic progression focuses on addition and subtraction while geometric progression

				focuses on multiplication and division).
Links to other subjects: *Geography and science: when measuring the temperature of a mountain, we use decreasing order in degrees. The higher you go, the cooler it becomes.*				
Assessment criteria: *Learners should order whole numbers (in increasing and decreasing order) or generate number patterns following a rule.*				
Materials: *Manila cards, scissors and markers to prepare charts.*				

Topic Area: ALGEBRA				
P.4 MATHEMATICS	**Unit 13:** Filling in missing numbers.		**Number of Periods: 8**	
Key Unit Competence: To be able to solve missing number problems involving addition and subtraction.				
Learning Objectives			**Contents**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Know how to solve simple missing number problems involving addition and subtraction.	- Use relationships between numbers to solve missing number problems. - Create missing number problems	- Appreciate the importance of inverse operations when solving missing number problems and checking answers.	- Solve simple missing number problems involving addition - Solve simple missing number problems involving subtraction. - Solve simple missing number problems involving addition and	- Solve missing number problems in contexts involving addition and subtraction e.g. 35 + ? = 99 or ?-576=324. - Learners create their own missing number problems, e.g. hide a number (some learners may choose to use multiplication as well). - Arithmagon activities: In groups, learners discuss and discover the missing numbers in an arithmagon (a polygon with numbers at its vertices which determine the numbers written on its edges) such that when they add the numbers on 2 vertices the sum will be on the edge between those two vertices.

			subtraction.	Example:  - Rule: to solve the puzzle, simply add the numbers in the three boxes and then divide by 2 to get the centre number for the triangle. To get the number for each vertex, subtract the opposite value on the edge from the centre number.  - More activities on arithmagon are needed
Links to other subjects: *Personal finance: do I have enough money to buy? How much more do I need to save?*				
Assessment criteria: *Learners can solve simple missing number problems involving addition and subtraction.*				
Materials: *Manila cards, masking tape, scissors and markers.*				

Topic Area: GEOMETRY		
P.4 MATHEMATICS	**Unit 14:** Types of lines and angles.	**Number of Periods:** 8
Key Unit Competence: Learner should be able to identify types of lines and angles and use a protractor to measure angles.		

Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- State different types of lines. - Identify and choose appropriate geometrical instruments. - Recognise types of angles: acute, obtuse, right, straight, complementary, supplementary and reflex angles. - Establish the difference between different angles based on their properties.	- Draw straight lines. - Measure line segments using a ruler. - Measure with precision different angles using a protractor (angle measurer). - Draw lines and measure different angles using appropriate geometrical instruments. - Differentiate types of angles based on their properties.	- Appreciate the importance of lines and angles in daily activities. - Be confident and accurate when measuring.	-Types of lines and measuring line segments using a ruler. -Types of angles acute, obtuse, right, straight, complementary, supplementary and reflex angles. Measure angles using a protractor in clockwise and anti-Clockwise directions.	- Through observation of different lines on charts, learners in groups will classify different types of lines (vertical lines, horizontal lines, oblique lines, and 2 intersecting lines). - *Measuring angles using a protractor in clockwise and anti-Clockwise directions* - In groups, learners will be asked to draw 2 intersecting lines and tell the number of angles the 2 intersecting lines make. After naming the angles the learners will use the numbers 1, 2, 3, 4 to compare the angles by showing which are bigger, smaller or equal.

				- Given one a complementary or supplementary angle, learners will be asked to determine the second complementary or supplementary angle.
Links to other Subjects*: Fine Arts: it is linked to drawing different shapes. English: the introduction of new vocabularies. Geography: lines and angles are used in bearings.*				
Assessment criteria: *Learners should identify different types of lines and angles using their properties. Learners should be asked to measure different angles using a protractor.*				
Materials: *Protractor, manila cards, and markers.*				

Topic Area: GEOMETRY				
P.4 MATHEMATICS	**Unit 15:** 2D Shapes and properties.			**Number of Periods:** 16
Key Unit Competence: To be able to use geometric properties, including symmetry, to sort shapes.				
Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Name triangles and special quadrilaterals. - Understand a line of symmetry as a fold that produces matching halves. - Understand order of rotation as the number of times a shape fits into itself. - State the geometric properties that can be used to distinguish	- Select appropriate geometrical instruments to construct triangles, rectangles (including squares), parallelograms, trapezia and rhombi and examine their properties. - Distinguish different 2D shapes using their properties. - Identify triangles and special quadrilaterals in everyday situations.	- Appreciate the use of properties to distinguish shapes. - Recognise that special quadrilaterals are a subset of all quadrilaterals.	- Naming triangles on the basis of edge lengths (equilateral, isosceles, scalene) and greatest angle (acute, right, obtuse). -Exploring triangles and quadrilaterals -Distinguish special quadrilaterals given the special characteristics**:** sides (equal, parallel), angles, diagonals (equal, bisect, perpendicular) - Use of properties, sides (equal, parallel), angles,	- In groups sort a variety of polygons (without specific names, including regular and irregular examples), distinguishing triangles and quadrilaterals (provided as e.g. paper or card objects). Learn the names of triangles. - Investigate the symmetrical properties of shapes by folding paper cutouts (lines of symmetry) and tracing around a shape to see how many times it fits

shapes.	- Determine the symmetrical properties of 2D shapes.		diagonals (equal, bisect, perpendicular), lines of symmetry, order of rotational symmetry to distinguish special quadrilaterals (square, rectangle, rhombus, parallelogram, trapezium, kite). - Distinguish special quadrilaterals given the special characteristics**:** lines of symmetry, order of rotational symmetry	exactly into itself when rotating about the Centre before getting back to the original orientation (order of rotation). - In groups use yes/no questions about geometric properties to sort special quadrilaterals (provided as paper or card objects) – could also be done on computer. - Individually make a table for special quadrilaterals that includes their name, a diagram and all the relevant geometric properties. - Play games based on identifying the quadrilateral given certain geometric properties or in everyday contexts.
Links to other Subjects*: Art and languages: Recognizing shapes across the curriculum.*				
Assessment criteria: *Able to use geometric properties, including symmetry, to sort shapes.*				

Materials: *Ruler, protractor, variety of paper/card shapes for sorting and exploring symmetry, and computers for sorting special quadrilaterals.*

Topic Area: GEOMETRY		
P.4 MATHEMATICS	**Unit 16:** Area of 2D shapes.	**Number of Periods:** 16
Key Unit Competence: To use rectangles to determine the area of triangles and special quadrilaterals.		

Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Explain area as the space enclosed by a perimeter. - Distinguish the area and perimeter. - Select the correct units to use.	- Practically determine the area of triangles and quadrilaterals by relating them to the area of rectangles. - Solve problems involving determination of the area of different 2D shapes.	- Appreciate that the relationship between area and perimeter is simple.	- Recall on the area of a rectangle and the use of a geoboard - Area of a Square and the use of a geoboard - Area of a triangle. - Area of a quadrilateral. - Area of shapes that can be related to rectangles. - Area of	- Practical: Fold any rectangle in half along its diagonal – what is the area of the triangle? - In small groups, each group draw a triangle on squared paper – can its area be related to the area of a rectangle? Explain.. - In small groups investigate how the area of special quadrilaterals other than rectangles can be determined – provide paper shapes, scissors and glue – make a poster to explain. - In pairs find as many triangles and quadrilaterals

			Parallelogram - Area of a Rhombus.	as possible with a perimeter of 24cm – determine the area of each shape, measuring where necessary. - In pairs find as many triangles and quadrilaterals as possible with an area of 36cm2 – determine the perimeter of each shape, measuring where necessary.
Links to other Subjects: *Geography: finding area.*				
Assessment criteria*: Be able to use rectangles to determine the area of triangles and special quadrilaterals.*				
Materials: *Rulers, paper shapes, squared paper, scissors, and glue.*				

Topic Area: STATISTICS AND ELEMENTARY PROBABILITY		
P.4 MATHEMATICS	**Unit 17:** Elementary statistics.	**Number of Periods: 24**
Key Unit Competence: To be able to collect, represent and interpret data.		

Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Explain how data are collected using tables. - Differentiate between quantitative and qualitative data. - Explain the process of interpreting and extracting information from tables. - Describe how to represent information using tables and bar graphs.	- Analyse and describe the possible ways data is collected. - Apply the knowledge acquired to distinguish between quantitative and qualitative data. - Solve mathematical problems involving interpretation and extraction of information from tables in daily life.	- Appreciate the importance of data collection in daily life situations. - Appreciate the importance of interpreting and extracting information from tables. - Appreciate the importance of statistic tables and bar graphs in daily life situations.	- Data collection using tables. - Quantitative and qualitative data. - Interpreting and extracting information from tables and bar graphs. - Representing information using tables and bar graphs. - Project activities in statistics	- Through observation and demonstration, learners will form groups and discuss the possible ways of collecting data. - The learners will be provided information in tables drawn by the teacher and they will discuss the way data is collected. Learners will demonstrate to the entire class about the outcome of the results. - Learners will discuss among themselves the difference between quantitative and

	- Explain different ways of representing data. - Solve mathematical problems involving representation of data in daily life.			qualitative data and also talk about the meaning of data in the broader context. - Through observation and demonstration, learners will form groups and discuss the possible ways of interpreting data using tables. - In groups, the teacher explains to the learners how to interpret and extract information from a table and guides them to do this. - Through observation and demonstration, learners will form groups and discuss the possible ways of representing information (data). - In groups of about 18 learners, the teachers provides each group with a weighing machine and asks members in each group to measure their weight in kg and record it. The teacher will guide the learners as they tally. The learners should interpret the data collected by each group

				through the following questions: o How many learners weigh x kg? o How many learners are heavier than others? o How many learners are in that class? o Represent that information using table. o Represent that information using a bar graph. - Ask each group to represent their data on bar graph and guide them.
Links to other subjects: *Geography: Categorization of the population per ages.*				
Assessment criteria: *Learners should collect, represent and interpret data.*				
Materials: *Manila paper, scissors, tape measures, rulers, glue, masking tapes, and weighing machines.*				

Topic Area: STATISTICS AND ELEMENTARY PROBABILITY		
P.4 MATHEMATICS	**Unit 18:** Introduction to probability.	**Number of Periods: 8**
Key Unit Competence: Play games of chance and decide whether or not they are fair.		

Learning Objectives			Content	Learning Activities
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Know and explain that games have rules and may or may not be fair.	- To take turns when playing games of chance involving coins, dice, and cards. - To decide whether or not a game is fair.	- Appreciate the importance of following rules and taking turns when playing games.	-Play games of chance, and decide whether or not they are fair. -Exploring the coin and play the game of tossing a coin - Tossing three coins at the same time and note the sides of the coin facing up - Play a game using playing cards (hearts, spades, clubs, diamonds and	- In pairs and/or small groups play various games (demonstration, through practice or using a computer game is needed in the class where the other learners are observers) * assessing whether or not the game is fair (e.g. does it matter who goes first? Are there winning strategies?) ○ * Snakes and ladders; Ludo; Bingo; First to 100 - take it in turns to throw a dice as many times as you like and tally the scores – if you throw a six you get nothing for your turn; Three coins – decide on your winning combination (e.g. two heads and one tail or all three tails) – take it in turns to toss three coins and tally the

			jokers) and discover how lucky you are - Playing a game of throwing a die as many times as you like and tally the scores depending on the fixed winning number	number of times you get your winning combination – first to 20 wins; Play snap with sets of cards (e.g. numbers, shapes and their names etc.); Play various games with playing cards; variations on these.
***Links to other Subjects**: C*reative arts				
***Assessment criteria:** Able to decide whether or not games of chance are fair.*				
***Materials:** Various games, coins, dice, and cards.*				

5.1. Mathematics for primary five

5.1.1. Key competencies at the end of primary five

At the end of primary five, learners can:

- Read, write, compare and calculate whole numbers up to 1,000,000, add and subtract integers.
- Solve problems involving measurements of time, length, capacity, mass, money and calculating number of intervals.
- Solve simple problems involving proportions, fractions and decimals.
- Calculate circumference of a circle and volume of cuboids and cubes, draw and construct different angles.
- Collect data, represent and interpret it in order to answer a question or explore a hypothesis.
- Solve missing number problems involving addition and subtraction.
- Explain the concept of probability by conducting experiments to decide how likely something is to happen

5.1.2. Mathematics units for primary five

<table>
<tr><th colspan="5">Topic Area: NUMBERS AND OPERATIONS</th></tr>
<tr><td>P.5 MATHEMATICS</td><td colspan="3">Unit 1: Reading, writing, comparing and calculating whole numbers up to 1 000000.</td><td>Number of Periods: 32</td></tr>
<tr><td colspan="5">Key Unit Competence: To be able to read, write, compare and make calculations on whole numbers up to 1 000 000.</td></tr>
<tr><td colspan="3">Learning Objectives</td><td rowspan="2">Content</td><td rowspan="2">Learning Activities</td></tr>
<tr><td>Knowledge and understanding</td><td>Skills</td><td>Attitudes and values</td></tr>
<tr><td>- Name all place values up to 1,000,000 in spoken and written form.
- Identify the place values in written numerals.
- Read written numerals correctly in English.
- General understanding of place values.
- Explain the concept and process of addition of 3 numbers of 6 digits with</td><td>- Compare numbers of any size using place values with a general understanding.
- Correctly translate between written numerals and spoken English.
- Apply comparison of numbers in daily life.
- Carry out addition, subtraction of 3 or</td><td>- Appreciate the importance of reading and writing numbers correctly.
- Developing personal confidence in the use of numbers.
- Appreciate the importance of addition,</td><td>Reading and writing numbers up to 1,000,000:
- Forming and reading numbers by the use of number cards
- Reading and writing in words.
- Reading and writing in figures.</td><td>- Each learner in a group gets a little slip of paper with his or her own large number (up to 1,000,000). The learners arrange themselves in order, and read their numbers out loud.
- Dictation: learners write in words or in figures any given 7 digit number from the teacher’s dictation.
- Matching game: learner</td></tr>
</table>

or without carrying. - Explain the concept and process of subtraction of 2 numbers of 6 digits or more with or without borrowing. - Explain the concept and process of multiplication of a 3 digit number by a 3 digit number. - Explain the concept and process of division of numbers. - Explain the process of solving mathematical problems.	more whole numbers. - Apply the knowledge of addition, subtraction, multiplication and division in solving mathematical problems in daily situations.	subtraction, multiplication and division in daily life. - Calculate quickly and accurately.	**Place value and comparing numbers:** - Place value of numbers up to 7 digits. - comparing numbers using <, > or = **Operations:** - Using a local abacus to add whole numbers - Addition of 3 or more whole numbers of 7 digits, with or without carrying. - Subtraction of 2 whole numbers of 7 digits with or without borrowing. - Multiplying whole numbers by a 3 digit number. - Quick multiplication of a 3 digit number by 5, 9, 11, 19, 25, 49, and 99. - Division (without a remainder and with a remainder)	matches large numbers (up to 1,000,000) written as numerals and as words. -Use number cards to form and read numbers -In a group, learners use different digits to make 2 numbers of 6 digits and arrange them from the largest to the smallest number and vice versa. This activity can be done using flash cards or cutouts. - Observation of worked examples on charts and carrying out addition or subtraction in groups using abacus or objects of different colors. - Compose and solve simple mathematics problems in a group and make a presentation. These problems are related to real life situations such as problems involving money, transactions, etc.

			of a 3 digit numbers by a 2 digit number. - Solve mathematical problems involving addition, subtraction, multiplication or division of whole numbers.	
Links to other subjects: *English: contribution to practice of spoken and written English.*				
Assessment criteria: *Learners should read, write, compare and solve mathematical problems that involve the calculations up to 1,000,000.*				
Materials: *Manila cards or slips of paper, scissor to make cut outs of numbers, markers to write numbers that can be seen from back of the room.*				

Topic Area: NUMBERS AND OPERATIONS		
P.5 MATHEMATICS	**Unit 2:** Addition and subtraction of integers.	**Number of Periods:** 16
Key Unit Competence: To be able to add and subtract integers		

Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Explain that when two numbers have opposite signs they are located on opposite sides of 0 on the number line. - Explain and show how to locate positive and negative numbers on the number line. - Describe the concept of addition and subtraction of integers.	- Compare integers physically and mentally, using a number line. - Calculate the distance between 2 integers using the position of numbers on the number line. - Solve mathematical problems involving addition and subtraction of	- Appreciate the application of negative numbers in practical contexts. - Appreciate the relationship between positives and negatives in terms of debits.	- Location of positive and negative numbers on a number line. - Comparison, ordering of integers: o using number line o using symbols <, > or = - Addition and subtraction of integers: o Using counters o using a number line o without using	- Groups of five learners get a set of numbers on cards. They place their numbers on a number line drawn on manila card. This activity should also being done on the board and the class assesses correctness. - In groups, let learners use a number line to order integers, ensuring that learners explain when to use the symbol <, > or = - In groups, distribute flash cards showing addition and subtraction of integers. - Through group discussion, let learners discover the concept of additive inverse by finding

	integers.		a number line (calculations) - Additive inverses of numbers. - Solve problems involving addition and subtraction of integers.	out that for every integer, there is another integer such that the sum of the two integers is zero. Then, let them state the additive inverse of some five positive integers and another five negative integers and write these integers on flash cards. - Mental mathematics activities in which learners picture the number line and tell the distance between numbers on either side, where the arithmetic itself is easy.
Links to other subjects: *Science and geography: addition and subtraction of integers includes temperatures differences in Rwanda.*				
Assessment criteria: *Learners should be able to accurately add and subtract integers*				
Materials: *Masking tape to mark a number line on floor, manila cards for the number line, and a string marked off evenly with knots.*				

<table>
<tr><td colspan="5">Topic Area: NUMBERS AND OPERATIONS</td></tr>
<tr><td>P.5 MATHEMATICS</td><td colspan="2">Unit 3: Prime factorization and divisibility tests.</td><td colspan="2">Number of Periods: 16</td></tr>
<tr><td colspan="5">Key Unit Competence: To be able to prime factorize, show the rule of divisibility tests less than 13, find the Lowest Common Multiple (LCM) and the Greatest Common Factor (GCF) of whole numbers.</td></tr>
<tr><td colspan="3">Learning Objectives</td><td rowspan="2">Content</td><td rowspan="2">Learning Activities</td></tr>
<tr><td>Knowledge and understanding</td><td>Skills</td><td>Attitudes and values</td></tr>
<tr><td>- Explain prime numbers.
- Explain LCM and GCF.
- Establish the relationship between LCM and GCF.
- Explain and memorize the rule of divisibility tests of numbers.
- Explain the concept of indices (powers) as shorthand for repeated factors.</td><td>- Explain the importance of LCM in daily life situations.
- Factoring numbers using prime factors.
- Calculate and show the rule of divisibility tests.
- Calculate the LCM and GCF of numbers.</td><td>- Appreciate the importance of LCM in daily life situations.
- Show respect to one another.
- Be confident and accurate when carrying out different calculations.</td><td>- Prime factoring of numbers and its uniqueness.
- Use indices as shorthand for repeated factors.
- Calculation of LCM and GCF.
- Divisibility tests for 2, 3, 4, 5, 6, 8, 9, 10, 11 and12.</td><td>- On flash cards, in groups learners will factor numbers and show the prime factors using indices (powers) or exponents. E.g. Prime factorize 40.
<table><tr><td>2</td><td>40</td></tr><tr><td>2</td><td>20</td></tr><tr><td>2</td><td>10</td></tr><tr><td>5</td><td>5</td></tr><tr><td></td><td>1</td></tr></table>40 = 2 x 2 x 2 x 5 = 2^3 x 5. And then, the teacher will guide learners how to find LCM and GCF of different numbers.
- In groups learners will discover how to determine the divisibility tests for 2,</td></tr>
</table>

				3, 4, 5, 6, 8, 9, 10, 11 and 12. Then, they will explain how it works by writing on manila paper or on chalk boards some numeral numbers all divisible by 3, e.g. Learners can work together to divide the following numbers by 3 (27, 84, 111, 2016) to get 9, 28, 37 and 672. After that, they can find the sum of the digits of the original numbers i.e. 27, 84, 111, 2016. They will get 9, 12, 3, and 9. Lastly, learners can discover that each sum of the digits of all given numbers is divisible by 3 or multiples of 3 and this should emerge (shows that 27, 84, 111 and 2016 are divisible by 3). - Through various group activities, learners can discover other rules for other divisibility tests. E.g. learners can discover that any natural number is divisible by 5 if it ends with 5 or 0, etc.
Links to other subjects: *Social studies*				
Assessment criteria: *Learners should prime factorise, show the rule of divisibility tests for numbers less than 13, find LCM and GCF of whole numbers.*				
Materials: *Manila cards, scissors, markers and masking tape.*				

Topic Area: FRACTIONS AND PROPORTIONAL REASONING				
P.5 MATHEMATICS	**Unit 4:** Equivalent fractions and operations.			**Number of Periods: 24**
Key Unit Competence: To be able to add, subtract and find equivalent fractions.				
Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Explain the concept of equivalent fractions. - Explain how to find equivalent fractions. - Give examples of equivalent fractions. - Explain how to add or subtract fractions with different denominators using equivalent fractions and the Lowest Common Multiple (LCM). - Describe the process of solving simple problems involving fractions.	- Apply the knowledge of equivalent fractions in daily life situations. - Explain the use of LCM in addition and subtraction of fractions and calculate and use LCM in addition and subtraction of fractions. - Describe the method for addition and subtraction of fractions.	- Show respect to one another when working in groups. - Be confident and accurate when finding equivalent fractions. - Develop personal confidence in the use of fractions. - Appreciate the importance of accuracy when working out equivalent fractions, and adding and subtracting fractions.	- Exploring and comparing fractions using models - Concept of equivalence of fractions (using models). - Calculation/ determining of equivalent fractions with understanding. - Addition and subtraction of fractions with different denominators using models or	- In groups and individually, learners will discuss how to get equivalent fractions that are written on flash cards. Learners will be given different tasks to assess whether they have understood. - In groups, addition and subtraction of fractions with different denominators using models or circle set fractions - - Form groups of five learners, and write

			circle set fractions - Addition and subtraction of fractions with different denominators (using equivalent fractions and LCM).	addition of fractions using equivalent fractions or using LCM on flash cards and distribute them to the groups. - Form groups of five learners, write subtraction of fractions using equivalent fractions or using LCM on flash cards and distribute them to the groups. Get the learners to discuss how to get the answers.
Links to other subjects: *Geography: representation of scales on maps*				
Assessment criteria: *Learners should add, subtract and find equivalent fractions.*				
Materials: *Manila cards, scissors, markers and masking tape.*				

Topic Area: NUMBERS AND OPERATIONS				
P.5 MATHEMATICS	**Unit 5:** Multiplication and division of decimals.			Number of Periods: 24
Key Unit Competence: To be able to multiply, divide and compare decimal numbers up to 3 decimal places.				
Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Explain the concept of decimal numbers using place values up to 3 decimal places. - Identify the place values in written decimals. - Explain how to multiply and divide decimal numbers. - Match fractions to decimals.	- Compare 2 or more decimal numbers using >, < or = - Correctly read and write decimal numbers in figures and in words. - Carry out multiplication or division of decimal numbers up to 3 decimal places. - Apply decimal concepts in solving daily life	- Develop personal confidence in the use of decimal numbers. - Appreciate the importance of decimal fractions in comparing and sharing.	- Understanding of the concept of decimal fractions through examples. - Place value of decimals up to 3 decimal places. - Comparing decimal numbers. - Multiplication of decimal fractions. - Division of decimal fractions. - Problems involving multiplication and division of decimals. - Converting fractions to decimals and vice	- Using place values, in groups or individually, learners should be asked to discover the difference between 2 or more different decimal numbers and then compare decimal numbers up to 3 decimal places using >, < or = - Using place values, in groups or individually, learners should be asked to multiply or divide 2 or more decimal numbers and then through demonstration they will discuss mixed operation of multiplication and division of decimal numbers. E.g. 0.2 x 0.6 ÷ 0.04

	mathematics problems. - Convert fractions to decimals fractions and vice versa.		versa. - Matching fractions to decimals.	- Learners should be given exercises to be completed and presented to the group. This should be done by observing worked examples on multiplication or division of decimal numbers. - In group discussions, learners will convert fractions to decimals and vice versa. After this they will do more activities on matching fractions to decimals to check exactly whether they have understood the concept of decimals.
Links to other subjects: *Science: components of air e.g. carbon dioxide and rare gases use decimals. History: decimals are also linked to the time line. Geography: scales also use decimals.*				
Assessment criteria: *Learners should be able to accurately multiply, divide and compare decimal numbers up to 3 decimal places.*				
Materials: *Manila cards, scissors, markers and masking tape.*				

Topic Area: FRACTIONS AND PROPORTIONAL REASONING		
P5 MATHEMATICS	**Unit 6:** Application of direct proportions.	**Number of Periods:** 16
Key Unit Competence: To be able to apply direct proportions in a practical context.		

Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Explain the concept of direct proportions. - Explain how to work out problems involving direct proportions. - State where to apply direct proportions in a practical context.	- Apply the knowledge of direct proportions in a practical context. - Calculate numbers involving direct proportions. - Solve mathematical problems involving direct proportions.	- Appreciate the importance of direct proportions in daily life situations. - Be confident and accurate when working out direct proportions. - Show respect to one another when working in groups. - Show the spirit of hard work in groups.	- Direct proportion in contexts e.g. scales drawing, three times size of 1kg. - Constant of proportionality and the application of direct proportion in real life	- Practically introduce the idea of direct proportions using learner's experiences e.g. the number of books possessed by two learners; ages of a brother and a sister; the amount of water in two bottles of ½ l and 1l respectively; the time it takes two learners to walk to school, etc. - Form groups of five learners and give them a task of solving problems involving direct proportion. E.g. the ratio of boys in a group of learners was 3 to 5. Then 24 girls left the group and 24 more boys joined the group. The ratio of boys to girls became

				5 to 3. How many boys and girls were in the original group? - Help learners to fully explain the concept of direct proportion through different examples in context. The rule states that in direct proportions, when one quantity increases, the second quantity increases and vice versa.
Links to other subjects: *Science direct proportion is used in physics in experiments and* chemistry *in mixing different mixtures.*				
Assessment criteria: *Learners should be able to apply direct proportions in a practical context and solve problems involving direct proportion.*				
Materials: *Manila cards, markers, scissors and masking tape.*				

TOPIC AREA: MEASUREMENT		
P.5 MATHEMATICS	**Unit 7:** Solving problems involving measurements of length, capacity and mass.	**Number of Periods: 8**

Key Unit Competence: To be able to solve problems involving measurements of length, capacity, mass and calculating number of intervals.

Learning Objectives			Content	Learning Activities
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Distinguish between the types of intervals. - Explain the use of units of length, capacity and mass in real life situations.	- Calculate the number of intervals. - Apply the knowledge of length in solving problems involving intervals. - Solve problems involving length, capacity and mass.	- Be confident and accurate in performing calculations. - Show the spirit of tolerance. - Appreciate the importance of measurement of length, capacity and mass in daily life situations. - Calculate quickly and accurately problems involving	- Number of intervals between objects (on an open line or on a closed line). - Number of intervals (fixed distance) between objects on an open line - Finding the number of intervals on a closed line - Problems involving intervals. - Select appropriate measures and units when solving problems, interpreting decimal	- Using flash cards in groups, the teacher will go through the units of length, mass and capacity in the form of revision. Learners will attempt questions on conversion of different units. E.g. o A man's stride is 90cm. How many such strides can he make in a distance of 27 dam? o Subtract 2m 6dm 4cm from 9m. o 10dm =_____hm - Through observation from outside the classroom,

		intervals.	representations up to 3 decimal places	learners will practically demonstrate and discover how to find the number of intervals on an open line and a closed line. Then find the general rule - After getting the intervals between poles learners can calculate the distance from the first pole to the last pole on both an open line and a closed line using the measurements of length. And then use the number of intervals to calculate the number of poles or trees alongside the road. - Help learners to solve different problems involving measurements length, mass and capacity, since most of this was done in P.4, learners will not find problems with this. Remind them about the conversion tables.
***Links to other subjects**: Agriculture: the demarcation of land and fencing the cattle grazing area using intervals.*				
***Assessment criteria:** Learners should solve problems involving measurements of length, capacity, and mass and calculate numbers of intervals.*				
***Materials:** Charts, tape measure, manila cards and glue*				

Topic Area: MEASUREMENT		
P.5 MATHEMATICS	**Unit 8:** Solving problems involving time intervals.	**Number of Periods:** 24
Key Unit Competence: To be able to solve real life problems that involve finding time intervals and conversion of units.		

Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
-Explain the various units of time. -State the units used in time measurements. -Describe how to solve mathematical problems involving time. -Explain the meaning of time intervals.	- Convert the measurement of time. - Solve real life problems involving time intervals. - Find the duration of a time interval. - Add and subtract time.	- Show the spirit of hard work. - Be confident and accurate when working out problems involving time. - Show respect to one another. - Show the spirit of punctuality. - Be faithful to your class	- Using clock face, watch and calendar to find time intervals or time taken by an event - Real life problems that involve finding time intervals, and converting units of time (converting hours into minutes and seconds and, converting hours into days and vice versa).	- Learners will be required to list the units of time and then they will convert from one unit to another and vice versa. In groups the teacher will help learners explain the relationship between the units of time i.e. seconds, minutes, hours and days. - In their groups learners will find time intervals for the time taken for an event to take place. E.g. when learners come to school in the morning and then go back in the evening, the time taken is the duration or time interval. So to get the duration, the earliest time is subtracted from the latest

		members.		time. - In groups, learners will solve real life problems under the guidance of the teacher. - In their groups, learners will be given addition and subtractions to brainstorm and find the answers. The teacher will guide them accordingly.
Links to other subjects: *Geography: calculating GMT*				
Assessment criteria: *Learners should solve real life problems that involve finding time intervals and the conversion of units.*				
Materials: *Real clock faces, manila cards, masking tape, markers and scissors.*				

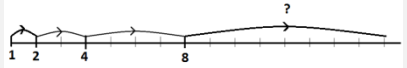
Topic Area: MEASUREMENT		
P.5 MATHEMATICS	**Unit 9:** Money and its financial applications.	**Number of periods:**24
Key Unit Competence: To be able to explain money and its financial applications.		

Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- State the role of money in our lives. - Identify the sources of money. - Explain budgeting and how to set priorities. - State various ways of transferring money. - Explain the importance of saving and borrowing. - Explain that there are different currencies and give examples.	- Explain the reasons for setting priorities while using money. - Describe the sources of money and state the roles of money. - Explain the importance of saving. - Convert currencies in a practical context.	- Appreciate the importance of money in our daily life. - Show concern for saving in daily life. - Be honest, faithful and trust worthy in any situation when you are entrusted with money. - Be confident and accurate when using money. - Appreciate the	- Simple Budgeting: o Sources of money. o Uses of money and role of money in our life. Establishing a budget of what comes in and what goes out o and setting priorities of a family o Budgeting what comes in and what goes out and setting priorities. - Various ways to transfer money: ATM, cheque, cash, money	- In groups, learners will discuss the uses of money as this was covered in P.4. They will perform role-plays and state the uses of money. Then they will make presentations in class and others will learn more from them. - Through examples, the teacher will discuss with the learners the importance of budgeting in the home and why budgeting is done before spending. Then learners should be given tasks in their groups to set priorities when making budgets. They should differentiate between wants and needs as well as understand why budgeting is important so that they don't waste money. - In groups, learners are given

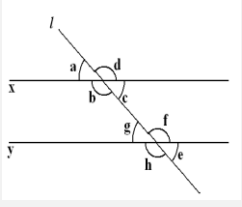
	- Explain the importance of borrowing money. - Describe how money can be transferred from one destination to another.	importance of the various ways money can be transferred.	transfer, and using a mobile phone. - Saving (protecting) and borrowing money (borrowing is not free). - Different currencies and converting currencies in practical contexts.	10,000 Rwf to discuss the different ways they could save this money. On flash card, each group writes the different way they would save and then they make a presentation to the class. - Learners should discuss the importance of borrowing by explaining whether it is free or not. - Learners should know the sources of money and various ways of transferring money. - Set tasks/problems such that learners can convert currencies in practical context (USD money, Euros, Kenyan Shillings, and Ugandan Shillings, into Rwandan Francs and vice verse).
Links to other subject: *Entrepreneurship: budgeting. Economics: saving and borrowing.*				
Assessment criteria: *Learners should explain money and its financial applications.*				
Materials: *Mobile phone, sheet of paper, ATM cards, cheque leaf, coins, and notes (paper money)*				

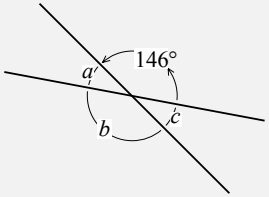
Topic Area: ALGEBRA		
P.5 MATHEMATICS	**Unit 10:** Sequences that include whole numbers, fractions and decimals.	**Number of Periods:**24
Key Unit Competence: To be able to write sequences of whole numbers, fractions and decimals.		

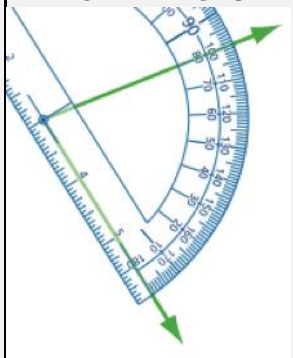
Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Explain how to order whole numbers according to their size in increasing and decreasing order. - Explain sequences of whole numbers, fractions and decimals. - Show the patterns used.	- Explain how sequences are worked out. - Find the missing numbers in the sequence. - Describe how whole numbers are arranged in different patterns.	- Appreciate the importance of orderliness when writing number patterns. - Appreciate the spirit of hard work and self-confidence. - Show respect to one another.	- Forming different number patterns by using charts/flash cards, number cards or fraction cards - Simple sequences that include fractions and decimals (e.g. 0, 1½, 3, 4½, 6, 7½…, or 0, 0.5, 1, 1.5, 2, 2.5…) - Extending number patterns to sequences (e.g. 5, 8, 11, 14, 17),	- In group work, learners will discover the pattern used in sequences which involve fractions (e.g. 0, 1½, 3, 4½, 6, 7½,____, _____). The pattern that should be followed is 1 ½ in increasing order. Let learners practice more numbers on flash cards in their groups. Let them formulate more tasks in groups so that they can deliver a presentation. - In group discussions, learners will discover the pattern in sequences which involve decimals (e.g. 0, 0.5, 1, 1.5, 2, 2.5, ____, ____). The pattern used here is 0.5. Let learners carry out more tasks involving decimals. Learners should discuss more patterns involving decimals. Provide charts/flash cards so that learners undertake more examples so they can better explain the concept. - Learners can use a table to determine the missing numbers in the sequence

			sequences with constant ratios (e.g. 1, 2, 4, 8, 16…), sequences with regularly changing differences (e.g. 1, 3, 6, 10, 15…), sequences where each difference is one greater than the one before (e.g. 1, 3, 7, 15, 31, 63…).	e.g. 2 | 4 | 8 | | 6 | | | | 16 | 32 | 64 | 24 | | 72 | 0 | 40 - In their groups, let learners find the missing numbers so that they are able to extend the sequence and discover the pattern used. The learners should then make posters showing what they have learnt: E.g. 2, 3, 5, 7, _____, _____ - In groups, learners can use a number line or geometric patterns to determine the sequence of numbers. 1  2 
***Links to other subjects*:** *Geography and science: when measuring the temperature of a mountain, we use decreasing order in degrees. The higher you go, the cooler it becomes.*				
Assessment criteria: *Learners should write sequences of whole numbers, fractions and decimals.*				
Materials: *Manila cards, scissors and markers to prepare charts.*				

TOPIC AREA: GEOMETRY		
P.5 MATHEMATICS	**Unit 11:** Drawing and constructing of angles.	**Number of Periods:** 24
Key Unit Competence: To be able to draw and construct different angles.		

Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Explain the concept of parallel, transversal, intersecting and perpendicular lines. - Describe the process of drawing angles and the process of constructing angles using a ruler and a pair of compasses. - Explain how to solve problems involving angles.	- Measure angles using a protractor. - Construct angles using a ruler and a pair of compasses. - Carry out and explain the process of bisection of an angle using a ruler and compass. - Apply the knowledge of constructing angles in solving	- Appreciate the importance and use of lines and angles in daily life and in drawing. - Show respect to one another and show the spirit of tolerance when working with others. - Demonstrate confidence and accuracy in drawing.	- Identify different lines and angles formed on real objects - Angles formed by intersecting lines: opposite angles. - Angles formed by parallel lines under a transversal line: Alternating angles, corresponding angles, co-interior angles, co-exterior angles. - Angle properties	- In groups, leaners observe different materials (boxes, tables, chairs, the wall of the class, windows, etc.) and identify different lines and show angles formed by those lines. Then the teacher leads learners in different activities involving angles. - In their groups, learners will be given tasks of finding missing angles based on parallel lines, transversal lines and perpendicular lines. E.g. If angle a = 30^0, find the rest of other angles. 

	mathematical problems in daily situations. - Find the angle sum of a triangle.		of parallel, intersecting lines and perpendicular lines - Bisection of angles (using folding). - Constructing angles using a pair of compasses and a ruler. - Angle sum of a triangle.	- Through examples, let learners demonstrate that two intersecting straight lines always form two pairs of angles that have the same measure.  E.g. One of those angles is known to be 146°. Let learners figure out the measures of the other angles using a diagram. (Angle a is equal angle c and b=146^0) - Solve addition and subtraction problems to find unknown angles on a diagram in both real world and mathematical problems, by using an equation with a symbol or a letter for the unknown angle measure.

				- Measure angles in whole-number degrees using a protractor. Sketch  angles of a specified measure and help learners set the angle's vertex at the marked centre of the protractor. Line up the base of the protractor along one side of the angle. Read the measurement where the other side of the angle crosses the scale of the protractor. - Help learners construct angles using a ruler and a pair of compasses. E.g. angles like: 900, 450, 300, 600, 150, 1200, 1500, 22.50. Learners should develop the concept of bisecting angles.
Links to other subjects: *Music: stave. Masonry and carpentry: technical drawing.*				
Assessment criteria: *Learners should draw and construct different angles.*				
Materials: *Geometrical instruments, charts and markers.*				

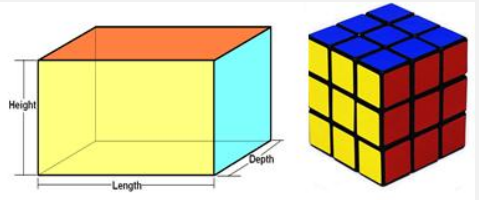
TOPIC AREA: GEOMETRY		
P.5 MATHEMATICS	**Unit 12:** Interpreting and constructing scale drawings.	**Number of Periods: 8**
Key Unit Competence: To be able to interpret and construct scale drawings.		

Learning Objectives			Content	Learning Activities
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Explain the concept of scale drawing. - Use of scale drawing in solving mathematical problems involving measurement. - Explain how to find the actual distance on the ground. - Explain how to find the scale of drawings and maps.	- Calculate the scale of a map. - Calculate the actual distance on the ground. - Find the distance represented on a map. - Solve problems involving scale drawings. - Convert between measurements of length in order to get the same unit when finding scale.	- Appreciate the importance of scale drawing in daily life. - Show respect to one another in discussions. - Be confident and accurate when calculating scales.	- Finding scale: Establishing the scale of a real object to be drawn on a sheet of paper - Concept of scale through examples of actual distances/sizes and the distance/size on a map (e.g. given the real size of a car, or of an airplane, we need scale drawings to represent it on a piece of paper, etc.) - Calculation, interpretation and construction of scale drawings (actual distance/size of an	- Learners should be asked to measure the perimeter of their classroom or the floor of the classroom and then use drawings to represent what has been measured. Through explanations, learners can discover that the distances they have measured cannot fit on the piece of paper. The only way to accurately fit the drawing on the piece of paper is to use a scale. - Through examples, learners will discover that a scale is written without measurement unit . E.g. In real-life, the length of a

			object, scale of drawings or maps) - Mathematical problems involving scale drawings.	small car may measure 250cm. However, the length of a copy or print paper that you could use to draw this car is a little bit less than 10cm. Since 250/10 = 25, you will need about 25 sheets of copy paper to draw the length of the actual size of the car. In order to use just one sheet, you could then use 1cm on your drawing to represent 25cm on the real- object. You can write this situation as 1:25 or 1/25 or 1 to 25.
Links to other subjects: *English: writing and speaking skills. Geography: scales on a map.*				
Assessment criteria: *Learners should solve problems involving interpretation and construction of scale drawings.*				
Materials: *Charts, textbooks, tape measures, and maps.*				

TOPIC AREA: GEOMETRY		
P.5 MATHEMATICS	**Unit 13:** Calculating circumference of a circle and volume of cuboids and cubes.	**Number of Periods:** 16
Key Unit Competence: To be able to calculate circumference of a circle and volume of cuboids and cubes.		

Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Explain the concept of circumference. - Describe the process of finding the circumference of a circle. - Establish the relationships between cubes and cuboids. - Explain how to find the volume of cubes or cuboids.	- Practically explain the value of pi (through measuring lengths of the perimeter/circumference of a circle). - Solve mathematical problems related to finding the circumference of a circle. - Solve mathematical problems related to the finding the volume of cuboids and cubes.	- Appreciate the importance of circumference in daily life. - Promote teamwork spirit, cooperation, mutual respect, and tolerance in discussions. - Appreciate the importance	- Measuring the circumference of a circle - Finding the number pi (π) - Calculating the circumference of a circle. - Cube and cuboids. - Properties of cubes and cuboids - Nets of cubes and cuboids.	- Outside the classroom, learners should work in groups and measure the distance around a roundabout, which is the circumference of that roundabout.  - Help learners develop the concept of pi (π). Use different examples to find that π = C/D (circumference/diameter) - Using charts, manila cards or paper squares, learners should discover and explain the concept of diameter and pi. - Using charts, manila cards and boxes,

		of volume in daily life.	- Calculating the volume of cubes and cuboids.	learners should discover and explain the concept of the volume of cuboids and cubes.  - In groups, learners can be given different tasks such as: o Finding one dimension of a cuboid given its volume and the other dimensions. o Finding the length of one edge of a cube given its volume. o Finding the height of a cuboid given its volume and base area. o Finding the area of a face of a cuboid given its volume and one dimension. o Solving word problems involving volume of a cube/cuboid.
Links to other Subjects: *Social studies and geography: circumference of the earth.*				
Assessment criteria: *Learners should calculate the circumference of a circle and the volume of cuboids and cubes.*				
Materials: *Metre ruler, rope, sticks, paper squares, manila cards, charts, and markers.*				

Topic Area: STATISTICS AND ELEMENTARY PROBABILITY		
P.5 MATHEMATICS	**Unit 14:** Statistics.	**Number of Periods:** 24
Key Unit Competence: To collect data, represent and interpret it in order to answer a question or explore a hypothesis.		

Learning Objectives			Content	Learning Activities
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Distinguish between continuous and discrete data. - Explain that bar charts should have gaps between the bars. - Explain that line graphs represent data over time.	- Decide on what data to collect to answer a question. - Collect data and record it in a table. - Represent data in a bar chart. - Interpret representations of data to draw conclusions.	- Appreciate that data can be used to answer questions or explore hypotheses and that the representation of data should aid interpretation. - Adopt a systematic and organised approach to dealing with data.	- Devise a question or hypothesis that requires data for its resolution. - Collect quantitative data distinguishing whether it is discrete or continuous. - Record data in tables and represent as a bar chart. - Interpret bar charts and line	- In groups devise a question to investigate a characteristic of the children in the class e.g. height (continuous), number of brothers and sisters (discrete), shoe size (discrete), distance to school (continuous), time taken to get to school (continuous), etc. Collect the data, summarize it in a table and represent as a bar chart. Make a poster showing what has been learnt. - In pairs interpret bar charts and line graphs and draw conclusions.

			graphs to draw a conclusion.	
Links to other subjects: *Economics, geography, science, etc.: any subject which needs to handle data.*				
Assessment criteria: *Can collect data, represent and interpret it in order to answer a question or explore a hypothesis.*				
Materials: *Tape measures, rulers, digital technology (e.g. calculators, spreadsheets), and data from other subjects.*				

Topic Area: STATISTICS AND ELEMENTARY PROBABILITY				
P.5 MATHEMATICS	**Unit 15:** Probability.			**Number of Periods: 8**
Key unit Competency: Conduct experiments to decide how likely something is to happen.				
Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Explain that random events have different likelihoods of occurring and recognize associated vocabulary.	- Conduct experiments and record outcomes systematically. - Use the vocabulary of likelihood to compare events.	- Appreciate that random events cannot be predicted. - Take care to record experiments accurately.	- Vocabulary of chance (impossible, certain, equally likely, evens chance, unlikely, likely etc.). - Conduct experiments to decide how likely something is to happen. - Representing the outcomes of a die tossed many times.	- Warm up debate activity: for example, discuss the role of tossing a coin by the referee before starting a football match. - In pairs toss a coin 20 times and record the outcomes i.e. HTHH etc. Count the total number of heads and tails. Collate the class results. What are the chances of getting a head? Does the coin know what happened on the last throw? - In pairs toss a dice 48 times and record the outcomes i.e. 4, 3, 6, 6 etc. Count the total number of each score and make a table and bar chart.

				Collate the class results and make a bar chart. In groups discuss: What are the chances of getting a particular score? Is getting a particular score more of less likely than getting a head when you throw a dice. Is getting an even score on a dice as likely as getting an odd score? Etc. - In pairs toss a bottle top twenty times and record the outcomes. Collate the class results. Does the bottle top behave in the same way as the coin? If not, why not?
***Links to other subjects**: Science subjects where random events are important*				
***Assessment criteria:** Assess the likelihood of an event happening and use the language of chance.*				
***Materials**: Bottle tops, coins, dice (improvise by using wooden cubes and label the sides as required).*				

5.2. Mathematics for primary six

5.2.1. Key competencies at the end of primary six

At the end of primary six, learners should be able to:

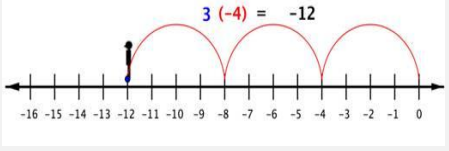
- Read, write, compare and calculate whole numbers beyond 1,000,000, multiply and divide integers, use powers and indices, LCM and GCF when solving problems.
- Convert between the units of volume, capacity and mass, work out simple interest and solve problems involving savings.
- Calculate speed, distance and time.
- Solve simple problems involving proportions, ratios, percentages, mixtures, fractions and decimals.
- Calculate area enclosed by a circle, surface area of cuboids and the volume of a cylinder.
- Extend methods for collecting data, representing and interpreting it in order to answer a question or explore a hypothesis.
- Form and solve simple algebraic equations and inequalities.
- Explain the concept of probability by ordering events in terms of likelihood (impossible, equally likely, certain).
- Use bearings and compass points and understand the relationship between them, use the angle sum of a triangle to determine the interior angles of regular polygons.
- Construct polygons using a protractor, a ruler and a pair of compasses and design nets to make cuboids and prisms.

5.2.2. Mathematics units for primary six

Topic Area: NUMBERS AND OPERATIONS		
P.6 MATHEMATICS	**Unit 1:** Reading, writing and comparing whole numbers beyond 1 000 000.	**Number of Periods:** 18
Key Unit Competence: To be able read, write and compare whole numbers beyond 1 000 000.		

Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Identify the place values of digits beyond 1,000,000 - Read written numerals correctly in figures or in words. - Explain the concept of adding a 7 digit number by a 7 digit number which involves carrying. - Explain the concept of subtracting larger numbers with borrowing.	- Compare numbers using >, <, = - Calculate numbers involving addition, subtraction, multiplication and division. - Explain how rounding of numbers is done. - Solve problems involving	- Appreciate the importance of accuracy in reading and writing numbers and assessing how big they are. - Learners should respect others when they are in a group.	- Forming numbers beyond 1,000,000 by using number cards or given digits, reading and writing the formed numbers - Read and write numbers beyond 1 000 000 in words. - Read and write numbers beyond 1 000 000 in figures. - Place value and comparing numbers: o Place value of numbers up to 7	- Each learner in a group gets a little slip of paper with his or her own large number. The learners arrange themselves in order, and read their numbers out loud. - Dictation: learners write in words or in figures any given number beyond 1,000,000 from the teacher's dictation. - Matching game: learners match large numbers (beyond 1,000,000) written as numerals and

- Explain the concept of multiplying larger numbers. - Explain the concept of dividing a 7 digit number by a 3 digit number. - Describe the steps taken when rounding off numbers.	addition, subtraction, multiplication and division.		digits. ○ Comparing numbers using <, > or = - Addition and subtraction of whole numbers using wooden vertical abacus. - Multiplying numbers beyond 1,000,000. - Dividing numbers beyond 1,000,000 (with a remainder or without a remainder). - Solving problems using calculation strategies. - Rounding to the nearest (tens, hundreds, thousands, etc.).	as words. - Using different digits in a group, learners make 2 numbers of 7 digits and arrange them from the largest to the smallest number and vice versa. This activity can be done using flash cards or cutouts. - Through observation while in groups, learners perform calculations in addition, multiplication, subtraction and division of given large numbers using flash cards. - In groups, learners round off given numbers to the nearest tens, hundreds, thousands etc.
Links to other subjects: *English: Contribution to the practice of spoken and written of English language.*				
Assessment criteria: *Learners should read, write and compare whole numbers beyond 1,000,000.*				
Materials: *Manila cards or slips of paper, scissors to make cut outs of numbers, markers to write numbers that can be seen from the back of the room.*				

Topic Area: NUMBERS AND OPERATIONS				
P.6 MATHEMATICS	**Unit 2:** Multiplication and division of integers.			**Number of Periods:** 8
Key Unit Competence: To be able to multiply and divide integers.				
Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Describe the steps taken when multiplying and dividing integers. - Show and explain the concept of integers to solve problems.	- Apply the concepts of multiplication and division to solve problems involving integers. - Carry out multiplication and division of integers. - Explain how integers change in multiplication and division.	- Appreciate the importance of accuracy in multiplication and division of integers. - Respect each other's contribution when working in groups. - Acknowledge the importance of co-operation.	- Multiplying integers using counters - Multiplication of integers. - Division of integers. - Solving problems involving multiplication and division of integers.	- Learners in their groups do multiplication and division of integers. E.g.  - In groups, learners solve problems involving multiplication and division of integers.
Links to other subjects: *Entrepreneurship: introduction of negative numbers in the context of buying and selling (loss , benefit).*				
Assessment criteria: *Learners should multiply and divide positive integers, negative integers, positive and negative integers.*				
Materials: *Charts should be displayed in class, scissors, markers and masking tape.*				

Topic Area: NUMBERS AND OPERATIONS		
P.6 MATHEMATICS	**Unit 3:** Powers and indices, LCM and GCF.	**Number of Periods:** 16

Key Unit Competence: To be able to use powers and indices, and apply the Lowest Common Multiple (LCM) and the Greatest Common Factor (GCF) when solving problems.

Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- State and explain the law of indices involving multiplication and division. - Identify the ways of working out problems involving the LCM in a practical context. - Explain the terms “base” and “exponent”.	- Apply the law of indices in multiplication and division. - Apply LCM and GCF in solving problems. - Calculate the LCM and the GCF of numbers.	- Learners should respect each other when they are working in groups. - Acknowledge the importance of working together. - Confidence and accuracy should be reflected among the learners.	- Definition of "base" and "exponent". - Multiplication and division of indices. - LCM and GCF. - Factors of a whole number - Solving problems involving LCM and GCF.	- Through group work, learners work out numbers involving multiplication and division of indices on flash cards. - Learners discover the law of indices in multiplication or division from a given situation. - In their groups, learners find the LCM and the GCF of given numbers. - Working in groups, learners solve problems involving LCM and GCF.

Links to other subjects: *Physics: the flashing of lights at different intervals, when they light together at the same time*

Assessment criteria: *Learners should use powers and indices, and LCM and GCF when solving problems.*

Materials: *Manila cards, scissors and masking tape.*

Topic Area: FRACTIONS, DECIMALS AND PROPORTIONAL REASONING		
P.6 MATHEMATICS	**Unit 4:** Operations on fractions.	**Number of Periods:** 16
Key Unit Competence: To be able to apply fractions in daily life situations and solve related problems.		

Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Explain how to multiply and divide fractions. - Describe how to calculate problems involving fractions.	- Multiply and divide fractions. - Calculate word problems involving fractions. - Explain the steps taken when working out word problems involving fractions.	- Appreciate the importance of fractions in daily life situations. - Confidence and accuracy should be exhibited among learners across different tasks.	- Multiplication and division of fractions. - Application of multiplication of fractions by whole a number - Solve problems involving multiplication and division fractions.	- In groups learners multiply and divide given fractions. - Through group discussion, learners apply multiplication and division of fractions to solve given real life situations.

Links to other subjects: *Geography: representation of scales on maps.*

Assessment criteria: *Learners should apply fractions in daily life situations and solve related problems.*

Materials: *Manila cards, scissors, markers and masking tape.*

Topic Area: FRACTIONS, DECIMALS AND PROPORTIONAL REASONING		
P.6 MATHEMATICS	**Unit 5:** Rounding and conversion of decimals fractions/numbers.	**Number of Periods:** 16

Key Unit Competence: To be able to round off decimals, convert fractions to decimals and vice versa, matching fractions and decimals.

Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Explain how to round off decimal fractions. - Describe the various steps taken when rounding off numbers. - Illustrate and explain how to match fractions and decimals.	- Convert fractions to decimals and vice versa. - Explain how to round off numbers. - Apply the knowledge acquired to match fractions and decimals. - Carry out various calculations on rounding numbers.	- Confidence and accuracy should be exhibited among learners in groups. - Self-control should be emphasized in groups such that a learner-centered approach is practiced.	- Round off decimal numbers to the nearest (tenths, hundredths, etc.). - Conversion of fractions to decimals and vice versa. - Solving problems involving rounding and conversion.	- Learners in groups, round off given decimal numbers. - Through observation in groups learners convert fractions to decimals and vice versa from given situations. - In pairs, learners match fractions to decimals. - In groups, learners solve problems involving rounding and conversion.

Links to other subjects: *Geography: to consider the number of people per square km in halves you round off.*

Assessment criteria: *A written tasks on each of the following (i) rounding decimals (ii) matching decimals to fractions (iii) converting decimals to fractions and vice versa should be given to learners.*

Materials: *Manila cards, scissors, markers and masking tape.*

Topic Area: FRACTIONS AND PROPORTIONAL REASONING		
P.6 MATHEMATICS	**Unit 6:** Ratios, proportions, percentages and mixtures.	**Number of Periods: 40**
Key Unit Competence: To be able to work out ratios, proportions, percentages and mixtures.		

Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Explain the meaning and the role of percentages. - Identify the relationship between ratios and proportions. - Explain the concept of mixtures. - Describe different ways of working out mixtures.	- Apply percentages, ratios, proportions and mixtures in solving mathematical problems. - Convert percentages to decimals and vice versa.	- Acknowledge the importance of percentages ratios, mixtures and proportions in daily life situations. - Respect one another when working in groups and welcome other's ideas.	- Percentages: ○ Conversion of percentages to decimals to fractions and vice versa. ○ Comparing quantities as percentages. ○ Increase or decrease a given number by a given percentage. - Ratios. - Inverse/indirect proportions. - Mixtures:	- In groups, learners express percentages as decimals and vice versa. Percentages as fractions and vice versa. - In pairs, learners compare percentages as quantities, and calculate percentage increase and decrease. Learners calculate proportions. - In groups, learners solve mathematical problems involving ratios, percentages, inverse proportions, or mixtures that reflect real life situations.

			○ Average price of the mixture. ○ The quantity of one type of the mixture. ○ The price of one type of the mixture and both quantities of the mixture. - Solving of word problems involving ratios, percentages, mixtures and inverse proportions.	
Links to other subjects: *Geography and economics: use the study of percentages.*				
Assessment criteria: *Learners should work out ratios, proportions, percentages and mixtures.*				
Materials: *Manila cards, masking tape, scissors and markers.*				

Topic Area: MEASUREMENT		
P.6 MATHEMATICS	**Unit 7:** Relationship between volume, capacity and mass.	**Number of Periods: 8**
Key Unit Competence: To be able to convert units of volume, capacity and mass.		

Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- State units of length, capacity and mass in solving problems. - Explain the relationship between volume, capacity and mass in the case of water.	- Show the relationship between volume, capacity and mass using a table. - Convert between units of volume, capacity and mass. - Solve problems involving the relationship between volume, capacity and mass measurements.	- Show respect to one another when working in groups. - Show the spirit of tolerance when you are with your friends in a group.	- Relationship between units of volume, capacity and mass. - Conversion between units of volume, capacity and mass.	- In groups, by measuring one litre of water using a beam balance, learners should compare its mass with 1 kilogram of any object and discover that 1l = 1kg. From the idea of volume, using different containers they can deduce that 1dm3 = 1l = 1kg and then 1cm3 = 1ml = 1g. - Learners convert between the units of volume, capacity and mass using a table showing the relationship between those units. - Learners solve mathematical problems involving volume, capacity and mass.

Links to other subjects: *Chemistry: comparison of liquids and solids.*

Assessment criteria: *Learners should convert between the units of volume, capacity and mass.*

Materials: *Manila cared, scissors, glue and markers.*

Topic Area: MEASUREMENTS				
P.6 MATHEMATICS	**Unit 8:** Speed, distance and time.			**Number of Periods:** 24
Key Unit Competence: To be able to calculate speed, distance and time, solve problems that relate to different time zones and convert speed from km/hr to m/sec and vice versa.				
Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Explain the relationship between a 12 hour clock and a 24 hour clock. - Define speed, distance and time. - Identify different units of speed, distance and time. - Explain what determines time zones.	- Convert from km/hr to m/sec and vice versa. - Solve problems that relate to different time zones. - Solve simple problems involving the calculation of speed, distance and time in real life situations.	- Appreciate the importance of time in daily life situations. - Show concern towards respecting one another in group activities and welcoming group ideas. - Appreciate the relationship between speed, distance and time to understand the notion of time management.	- Conversion from 12-hr clock to 24-hr clock and vice versa. - Mathematics problems that relate to different time zones (e.g. Rwanda and America). - Speed, distance and time. - Speed and the time taken by a moving body to cover a certain distance - Conversion of speed from km/hr	- Through the analysis of records from running activities during a competition, learners should discuss the time taken by individuals to cover a certain distance and then deduce the concept of units of speed (m/s or km/hr). This activity should be extended to high speed moving bodies. - In groups, learners carry out calculations on speed, distance and time. - Through group activities or individual work, learners can calculate time zones of different places/countries. - In groups, learners solve

			to m/sec and vice versa. - Moving bodies and problems related to speed, distance and time.	problems involving speed distance and time and also compute speed, distance and time of moving bodies (a body following another, bodies moving towards each other, etc.).
Links to other subjects: *Geography: time zones. Physics: motion.*				
Assessment criteria: *Calculate speed, distance and time, solve problems that relate to different time zones and convert speed from km/hr to m/sec and vice versa.*				
Materials: *Manila cards, masking tape, scissors and markers.*				

Topic Area: MEASUREMENTS		
P.6 MATHEMATICS	**Unit 9:** Simple interest and problems involving saving.	**Number of Periods:** 24
Key Unit Competence: To be able to work out simple interest and solve problems involving saving.		

Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Define different terms such as simple interest, rates, principle and time. - Explain the importance of saving.	- Solve problems involving savings. - Solve problems involving the calculation of simple interest.	- Appreciate the importance of saving in daily life. - Appreciate the importance of simple interest in daily life situations. - Show confidence when working out problems involving simple interest.	- Calculation of simple interest, rates, principle and time. - Problems involving simple interest, rates, principle and time. - Different ways of saving and how saving can be done - Savings: saving money in the bank, or putting it in the investments. - Problems involving savings and simple interest.	- In groups, learners should discuss how saving can be done in case they are given money (e.g. 20,000 Frw). On flash cards or manila cards, each group writes different ways of saving and then makes a presentation in class. - In groups, learners solve problems involving simple interest, rates, principle and time.

Links to other subjects*: *Economics (*Use basic number skills to solve problems involving simple interest)***
Assessment criteria: *Learners should work out simple interest and solve problems involving saving.*
Materials: *Manila cards, masking tape, scissors and markers.*

TOPIC AREA: ALGEBRA		
P.6 MATHEMATICS	**Unit 10:** Equivalent expressions and number sequences.	**Number of Periods: 16**

Key Unit Competence: To be able to write sequences of whole numbers, fractions and decimals.

Learning Objectives			Content	Learning Activities
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Give examples of algebraic expressions and equivalent expressions. - Explain how to find the rule for determining the nth term in a linear sequence.	- Perform operations on algebraic expressions and explain why 2 expressions are equivalent. - Calculate the nth term in a linear sequence. - Find the missing number in a linear sequence	- Appreciate the importance of orderliness in finding out different terms of a linear sequence and extend it to real life situations. - Show concern towards the faithfulness to the group members.	- Algebraic expressions. - Equivalent expressions. E.g. 3(n – 2) +n + 5 = 4n -1 - Examples of linear sequences or number sequences with the general term. E.g. 3, 7, 11, ___, 4n – 1 - Finding the missing number or nth term in a linear sequence/number	- In groups, learners can give examples of algebraic expressions and carryout operations to find the equivalent. E.g. 3(n – 2) +n + 5 = 4n -1 - In groups, learners can find 4 missing consecutive numbers in a given linear sequence (e.g. 3, 7, 11, 15,...), and then attempt to verify that the last or general term/rule for the above sequence is 4n – 1. For example, this can be done by determining the 20th, 21st , 30th numbers. Learners can substitute the numbers 20, 21,

	following a particular rule.		sequence. - Finding the general term/rule of a linear sequence.	30 in the general term to get the asked term. - Using different examples of number sequences, learners in groups can discuss and determine the general term or rule. E.g. 2, 4, 6, 8, ... the generalized rule here is 2n or, 4, 7, 10, 13… the generalized rule here is 3n + 1. - Let learners develop more patterns and discover the rules which can be used.
***Links to other subjects**: Economics: saving. Entrepreneurship: investing.*				
***Assessment criteria:** Learners should be able to complete the sequence of numbers or determine a rule for finding any term*				
***Materials:** Charts, flash cards markers and scissors.*				

Topic Area: ALGEBRA		
P.6 MATHEMATICS	**Unit 11:** Solving simple algebraic equations and inequalities.	**Number of Periods:** 16
Key Unit Competence: To be able to form and solve simple algebraic equations and inequalities.		

Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Give examples of simple algebraic equations or inequalities with one unknown. - Describe the process of solving simple algebraic equations or inequalities.	- Solve word problems involving simple algebraic equations with one unknown. - Solve simple algebraic inequalities with one unknown.	- Appreciate the importance of algebraic equations and inequalities in solving word problems.	- Like terms and unlike terms of algebraic expressions, and substitutions. - Simple algebraic equations with one unknown. - Simple algebraic inequalities with one unknown. - Problems involving simple algebraic equations or inequalities with one unknown.	- In groups, learners will use beam balances (simple arm balance) to show equilibrium or disequilibrium of weights in order to have ideas of equality (equation) and inequality. Through this activity learners should understand the meaning of an equal sign, by comparing the right hand side and the left hand side of the beam balance. - Guided by the teacher, learners use 2 different numbers to make the sum of 10 (e.g. x + y =10). Then learners can be asked to fix one variable so they can discover that when one variable is fixed, the equation of 1 unknown has only

				one unique solution (e.g. x + 2 = 10). The same activity can be done for inequalities, and learners should be helped to discover that for inequalities there are many answers (solution set). - Individually or in groups, learners can perform tasks of solving inequalities of one unknown and represent the solution set on a number line by showing the right interval of solution set. - In groups, learners can be given mathematical word problems to solve by using algebraic methods (forming an equation/inequality and then solving it).
Links to other subjects**:** *Chemistry in the unit balancing chemical equations. Also, in physics and economics.*				
Assessment criteria: *Learners should form and solve simple algebraic equations and inequalities.*				
Materials: *Simple arm balances and some standard masses or ones prepared by the teacher.*				

TOPIC AREA: GEOMETRY		
P.6 MATHEMATICS	**Unit 12:** Regular polygons and bearings.	**Number of Periods:** 16
Key Unit Competence: To be able to use bearings and compass points and understand the relationship between them. To use the angle sum of a triangle to determine the interior angles of regular polygons.		

Learning Objectives			**Content**	**Learning Activities**
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Define a regular polygon. - Name and identify regular polygons. - Give the formulae used to calculate the perimeter and area of a regular polygon. - Explain that directions can be specified using compass points and bearings and express the relationship between them.	- Derive the interior angle of a regular polygon. - Use angle properties of regular polygons to decide whether or not they can tile the plane. - Find the sum of interior/exterior angles of a regular	- Work systematically when investigating mathematical challenges involving regular polygons. - Appreciate the importance of regular polygons in every life activities. - Show concern for patience, mutual respect, tolerance, teamwork spirit and curiosity in	- Definition of a polygon. - Examples of regular polygons (equilateral triangles, square, pentagon, hexagon, etc.). - Elements of regular polygons: o Interior angles and their sum o Exterior	- In groups investigate what is the angle sum of any polygon? Hint: an angle sum of a triangle is 180o. What is the least number of triangles you can divide a polygon into? - In groups investigate the size of the interior angle of any regular (same length and same angle) polygon (equilateral triangle is 60o; square is 90o). - In groups use regular polygons cards to investigate which ones can be used to tile the plane (e.g. squares, equilateral triangles and hexagons do) and use interior angles to check (could be done with IT). - Individually, if the sum of all the

- Explain that bearings are measured in degrees, measured clockwise from North and written with three digits. - Understand and use the angle sum of a triangle to determine the angle sum of a polygon.	polygon using the angle sum of a triangle. - Calculate the length of the side, apothem, perimeter and areas of regular polygons. - Use bearings to define direction.	the solving and discussing mathematics problems involving regular polygons. - Appreciate the relevance of bearings in daily life (e.g. bearings are used by aircraft pilots and in tiling patterns in the built environment).	angles and their sum ○ Investigating the sum of interior and exterior angles of a regular polygon ○ Side and apothem ○ Perimeter ○ Area - Bearings and compass points. - Exploring the concept of tiling/ construction.	angles of regular polygons is given, find the number of sides. - In groups, construct given regular polygons and state their properties. - In pairs, calculate the perimeter and areas of regular polygons. - As a class recall compass points (N, E, S, W) relative to the school – what if you want to travel part way between these points (NW etc.) Establish the need for an alternative measure – bearings. Make a table of bearings and compass points. - In pairs use a map of the local area and draw a line from home to school. Measure the bearing. What is the bearing from school to home? Do this for other locations.
***Links to other subjects*:** *Geography map reading. Art: polygons and tiling.*				
Assessment criteria: *Use bearings and compass points for directions. Use the angle sum of a triangle to determine the interior angles of regular polygons.*				
Materials: *Maps of the local area (one between two), protractor, sheets of polygons (not necessarily regular), sheets of regular polygons, polygon cards, technology (interactive multimedia content, internet, etc.).*				

TOPIC AREA: GEOMETRY		
P.6 MATHEMATICS	**Unit 13:** Construction of polygons and nets for cuboids and prisms.	**Number of Periods: 24**

Key Unit Competence: To be able to construct polygons using a protractor, a ruler and a pair of compasses. Design nets to make cuboids and prisms.

Learning Objectives			Content	Learning Activities
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Show how to construct polygons with given properties using a protractor, a ruler and a pair of compasses. - Demonstrate how a 2D shape can be folded to make a 3D solid and name the 2D shape used. - Show that the net of a solid is not unique.	- Construct polygons using a protractor, a ruler and a pair of compasses. - Explore different strategies for constructing polygons with given properties. - Design nets to make cuboids and prisms.	- Appreciate that there are likely to be a number of different successful approaches to accurately constructing a polygon or designing a net.	- Construct polygons using a protractor, a ruler and a pair of compasses. - Finding perimeter of regular polygons - Design nets to make cuboids, cubes and prisms.	- In groups, consider different ways of constructing a right angle using a ruler and pair of compasses - construct squares and rectangles accurately. - In groups, devise strategies for accurately constructing polygons given their properties and make a poster of different polygons. - Practical (possibly demonstration) what is the flat shape (net) that folds

				up to make a box (cuboid)? Pairs sketch what they think is correct and then explore different ways of doing this. - In groups, investigate (using six squares and masking tape) how many nets are there for a cube? Groups then record their findings on squared paper. - In pairs, design accurate nets for cuboids and prisms – check they work by cutting out and making the solid.
Links to other subjects: *Art: shapes. Architecture: 2D representations of 3D.*				
Assessment criteria: *Able to construct polygons using a protractor, ruler and a pair of compasses. Design nets to make cuboids and prisms.*				
Materials: *Geometric instruments, scissors, plain paper, manila cards, empty boxes, squares made from card (six per group), masking tape, and squared paper.*				

<table>
<tr><th colspan="4">TOPIC AREA: GEOMETRY</th></tr>
<tr><td>P.6 MATHEMATICS</td><td colspan="2">Unit 14: Area bounded by a circle, surface area of cuboids and volume of a cylinder.</td><td>Number of Periods: 16</td></tr>
<tr><td colspan="4">Key Unit Competence: To be able to calculate the area enclosed by a circle, the surface area of cuboids and the volume of a cylinder.</td></tr>
<tr><td colspan="3">Learning Objectives</td><td rowspan="2">Content</td><td rowspan="2">Learning Activities</td></tr>
<tr><td>Knowledge and understanding</td><td>Skills</td><td>Attitudes and values</td></tr>
<tr><td>- State the formula for finding the area bounded by a circle and explain how it can be derived from the circumference of a circle.
- Explain the surface area of a cuboid as the area of its net.
- State the volume of a cylinder and explain the meaning of each letter.</td><td>- Calculate the area bounded by a circle.
- Use the net of a cuboid to determine its surface area.
- Calculate the volume of a cylinder.
- Select appropriate units when</td><td>- Appreciate the difference between area, surface area and volume and the importance of using the correct units.</td><td>- Estimating the area bounded by a circle using a squared paper
- Exploring the area bounded by a circle using the concept of circumference and radius
- Area bounded by a circle.
- Surface area of a cuboid.</td><td>- In groups, each learner can draw a circle on squared paper using an exact number of square edged lengths as the radius and ensuring the centre is at the vertex. Estimate the area enclosed by the circle by counting squares. Tabulate the results.
<table><tr><td>Radius(r)</td><td>r^2</td><td>Area</td></tr><tr><td>-</td><td>-</td><td>-</td></tr><tr><td>-</td><td>-</td><td>-</td></tr></table>Discuss the relationship.
- Practical – draw a circle on white paper and cut out the disk. Cut the disk into 12 segments and arrange to approximate a parallelogram – link its dimensions to the circumference and radius and hence</td></tr>
</table>

	calculating are and volume.		- Using the net of a cuboid to determine its surface area - Exploring the volume of a cylinder - Volume of a cylinder.	establish a formula. - In groups find the surface area of a box by dismantling (disassembling) it into its net. - In groups consider how the volume of a cylinder might be found (link with cuboid – area of one face multiplied by height).
Links to other Subjects: *Science, art, and geography: subjects in which area and volume may be needed.*				
Assessment criteria: *Calculate the area bounded by a circle, the surface area of cuboids and the volume of a cylinder.*				
Materials*: Pairs of compasses, scissors, squared paper, and boxes.*				

<table>
<tr><td colspan="4">Topic Area: STATISTICS AND ELEMENTARY PROBABILITY</td></tr>
<tr><td>P.6 MATHEMATICS</td><td colspan="2">Unit 15: Statistics.</td><td>Number of Periods: 16</td></tr>
<tr><td colspan="4">Key Unit Competence: To be able to extend methods for collecting data, representing and interpreting it in order to answer a question or explore a hypothesis.</td></tr>
<tr><td colspan="3">Learning Objectives</td><td rowspan="2">Content</td><td rowspan="2">Learning Activities</td></tr>
<tr><td>Knowledge and understanding</td><td>Skills</td><td>Attitudes and values</td></tr>
<tr><td>- Explain when it is appropriate to use a tally and how to obtain frequency from the tally.
- Explain how to use pie charts to represent proportions.
- Interpret line graphs as representation of data.</td><td>- Devise a question or hypothesis that requires data for its resolution.
- Decide what data to collect to answer a question.
- Collect data using a table and tally.
- Represent data in a bar chart or</td><td>- Appreciate the power of data to answer questions and adopt a systematic and organised approach to dealing with data.</td><td>- Collect data, summarize it in a table to investigate a question
- Explore a hypothesis using a tally to complete a frequency table.
- Represent data using a bar chart or simple pie</td><td>- In groups conduct an experiment to investigate whether it is easier to get certain outcomes when two coins are tossed rather than other outcomes. Toss the coins 60 times. Use a tally to collect the data.
<table>
<tr><td>No. of heads</td><td>Tally</td><td>Frequency</td></tr>
<tr><td>0</td><td></td><td></td></tr>
<tr><td>1</td><td></td><td></td></tr>
<tr><td>2</td><td></td><td></td></tr>
<tr><td colspan="2">Total frequency</td><td>60</td></tr>
</table>
- Represent as a bar chart and a pie chart. Answer the question and compare the representations. Make a</td></tr>
</table>

	pie chart where the total frequency is a factor of 360^0. - Interpret representations of data to draw conclusions.		chart. - Interpret bar charts and pie charts to draw a conclusion.	poster - In pairs, use data presented in bar charts and pie charts to make comparisons and draw conclusions.
Links to other subjects: *Economics, geography, science, physical education and sport etc.: any subject that needs to handle data.*				
Assessment criteria: *Can use tally charts to collect data and pie charts to represent and interpret data in order to answer a question or explore a hypothesis.*				
Materials: *Coins, calculators, spreadsheets and data from other subjects.*				

Topic Area: STATISTICS AND ELEMENTARY PROBABILITY		
P.6 MATHEMATICS	**Unit 16:** Probability.	**Number of Periods: 8**
Key Unit Competence: To be able to order events in terms of likelihood (impossible, equally likely, certain).		

Learning Objectives			Content	Learning Activities
Knowledge and understanding	**Skills**	**Attitudes and values**		
- Explain that random events have different chances to occur and illustrate each terminology related to probability.	- Use the language of chance and associate it with events - Use likelihood to compare and order events.	- Appreciate that random events cannot be predicted.	- Vocabulary of chance – impossible, certain, equally likely, events chance, unlikely, likely etc. and associated ordering. - Determining the likelihood of events - Use data to decide how likely something is to happen.	- As a class play Bingo! Learners are asked to write down their choice of six numbers between 1 and 12. Teacher throws two dice and tells the class the total. Learners strike out the number if it is in their list. Continue until the first learner has struck out all their numbers – that learner should call out, "Bingo!" Play the game several times. Are some numbers easier to get than others? Discuss possible reasons why – use the language of chance. - In groups discuss the likelihood of different events e.g. getting a head when you toss a coin; that it will rain in Kigali this year;

				that a woman will give birth to a boy; that the sun will rise tomorrow; getting a six when you throw a dice; getting a total of 1 when you throw two dice; that my teacher will become the president; that I was born yesterday; etc. Associate with the vocabulary of chance and place in order of likelihood. Learners then make up their own statements.
Links to other subjects: *Science: and any subjects where random events are important.*				
Assessment criteria: *To be able to order events in terms of likelihood (impossible, equally likely, certain).*				
Materials*: Dice (improvise by using wooden cubes and label the sides as required), and cards with events.*				

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APPENDICE: SUBJECTS AND WEEKLY TIME ALLOCATION FOR UPPER PRIMARY (P4 - P6)

The table below shows the subjects to be taught in upper primary.

Subjects in Primary 4-6	**Number of periods (1 period = 40 min.)**		
	P4	**P5**	**P6**
Kinyarwanda	8	8	8
English	8	8	8
French	4	4	4
Mathematics	8	8	8
Social and Religious Studies	6	6	6
Sciences and Elementary Technologies	6	6	6
Creative Arts: Music, Fine Art and Craft	2	2	2
Physical Education and Sport	2	2	2
Co-curriculum activities	4	4	4
Total (number of periods per week)	**(48)**	**(48)**	**(48)**
Total number of contact hours per week	**32**	**32**	**32**
Total number of contact hours per year (39 weeks)	**1248**		