THE REPUBLIC OF UGANDA

# Lower Secondary Curriculum



# MATHEMATICS SYLLABUS

NCDC
NATIONAL CURRICULUM DEVELOPMENT CENTRE

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© National Curriculum Development Centre, Uganda, 2019
Published by National Curriculum Development Centre,
P.O. Box 7002, Kampala

**ISBN: 978-9970-00-111-8**

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# FOREWORD

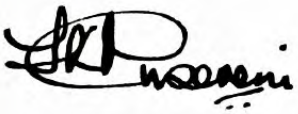
This four-year syllabus for Mathematics is one of the 20 subjects of the Lower Secondary school curriculum. The Lower Secondary syllabus for Mathematics builds upon concepts, skills, attitudes and values developed at primary school level, which provide a firm foundation for further mathematical study.

Mathematics contributes to the development of critical thinking, creativity and problem-solving. The syllabus thus helps the learner to recognise and apply Mathematics to all aspects of his/her life and work. A good grasp of key mathematical concepts is essential for full and rewarding participation in society. The learner needs to be able to calculate, estimate and measure, and interpret and use data, in order to manage his/her day-to-day life and contribute effectively to the workforce. Thus, mathematical literacy is essential to all aspects of national and economic development.

The independent mathematical thinking and problem-solving skills the learner develops are essential in the study of Numbers, Geometry and Measurement, Data and Probability and Patterns and Algebra in the programme of study for all four years in the Lower Secondary cycle.

The teachers of Mathematics are required to shape the learning experiences to meet the needs and interests of all learners. Good learner textbooks, teacher's resource books and the use of guest speakers and practitioners will greatly assist teachers to achieve the objectives.

I therefore endorse this syllabus as the official document for the teaching and learning of Mathematics at the Lower Secondary School level throughout the country.



Hon. Janet K. Museveni
The First Lady and Minister for Education and Sports

# ACKNOWLEDGEMENT

National Curriculum Development Centre (NCDC) would like to express its appreciation to all those who worked tirelessly towards the production of this Lower Secondary Syllabus.

Our gratitude goes to the Ministry of Education and Sports (MoES), for overseeing the development of the syllabus and taking timely decisions whenever necessary. They have worked as a team with NCDC to produce this syllabus. Their decisions have been invaluable in getting this work completed as required. Our thanks also go to our partners in education who provided the necessary guidance.

We would also like to thank the members of the public who made helpful contribution towards shaping this syllabus. Their efforts are invaluable towards having this syllabus implemented in the schools and for improved quality of education in Uganda.

The Centre is indebted to the learners, teachers and consultants from Cambridge Education and Curriculum Foundation UK, who worked with NCDC specialists. Great thanks go to members of Mathematics Working Group who worked tirelessly to put together the necessary facts and guidance in producing this syllabus.

Furthermore, NCDC would like to thank the World Bank for the initial technical and the Government of Uganda for the financial support towards the Lower Secondary Curriculum Review.

Last but not least, NCDC would like to acknowledge all those behind the scenes who formed part of the team that worked hard to finalise the work on this syllabus.





NCDC takes responsibility for any shortcomings that might be identified in this publication and welcomes suggestions for effectively addressing the inadequacies. Such comments and suggestions may be communicated to NCDC through P.O. Box 7002 Kampala or email *admin@ncdc.go.ug* or through our *Contact Us* page on our website at *www.ncdc.go.ug*.

**Grace K. Baguma**
Director,
National Curriculum Development Centre

# INTRODUCTION

The Uganda Vision 2040 aims to transform Uganda into a modern and prosperous country, while the NDP recognises the existing weaknesses in education, including the low efficiency and variable quality at the secondary level. The Sustainable Development Goal 4 advocates for equitable and quality education, while the National Development Plan II focuses on enhancement of human capital development, strengthening mechanisms for quality, effective efficient service delivery and improvement of quality and relevance of skills development. The NRM Manifesto (2016-2021), emphasises continuous assessment examination systems, strengthening soft skills, which promote self-esteem, conscientiousness and a generally positive attitude to work, promoting e-learning and computer literacy in order to enhance learning outcomes. All these are lacking and where they exist, it is at a minimum level.

In alignment with the above, the Education and Sports Sector Strategic plan (2017/20) advocates for delivery of equitable, relevant and quality education for all. The current secondary school curriculum of Uganda, although highly regarded by some, is focused on the needs of a tiny group of academically oriented elites yet the needs of the majority of learners need to be the focus. The Ministry of Education and Sports (MoES), through the National Curriculum Development Centre (NCDC) therefore, undertook a review of the Lower Secondary Curriculum, aimed at providing a learning environment, opportunities, interactions, tasks and instructions that foster deep learning by putting the learner at the centre of the learning experience. This is in line with the aims of secondary education in Uganda, as provided for in the Government White Paper on education (1992) as outlined below:

**The aims of secondary education in Uganda are:**

- Instilling and promoting national unity, an understanding of the social and civic responsibilities;
- Promoting an appreciation and understanding of the cultural heritage of Uganda including its languages;
- Imparting and promoting a sense of self discipline, ethical and spiritual values, personal responsibility and initiative;
- Enabling individuals to acquire and develop knowledge and an understanding of emerging needs of society and the economy;
- Providing up-to-date and comprehensive knowledge in theoretical and practical aspects of innovative production, modern management methods in the field of commerce and industry and their application in the context of socioeconomic development of Uganda;
- Enabling individuals to develop basic scientific, technological, technical, agricultural and commercial skills required for self-employment;
- Enabling individuals to develop personal skills of problem solving, information gathering and interpretation, independent reading and writing, self-improvement through learning and development of social, physical and leader- ship skills such as are obtained through games, sports, societies and clubs;
- Laying the foundation for further education;
- Enabling the individual to apply acquired skills in solving problems of community, and to develop a strong sense of constructive and beneficial belonging to that community;
- Instilling positive attitudes towards productive work and strong respect for the dignity of labour and those who engage in productive labour activities;

# BACKGROUND TO THE CURRICULUM

The review was based on the Education Sector Strategic Plan (ESSP), 2009 – 2018) which set out strategies to improve the quality and relevance of secondary education. The ESSP's sub objective 2.2 was to ensure that "Post-primary students [are] prepared to enter the workforce and higher education". This is also in line with the current strategic plan of 2017-2020. To achieve this objective, one of the ministry's strategies was to revise the curriculum and improve instruction and assessment by eliminating the short comings in the current curriculum.

The review focused on: producing a secondary school graduate who has the competences that are required in the 21st century; promoting values and attitudes; effective learning and acquisition of skills in order to reduce unemployment among school graduates.

The review also aimed at reducing the content overload and contact hours in the classroom so as to create time for: research and project work; talent development and creativity; allowing for emerging fields of knowledge across all subjects and doing away with obsolete information. There was a need to address the social and economic needs of the country like the mining sector, tourism, services provision, science and technology development and to ensure rigorous career guidance programme to expose learners to the related subjects. This will enable learners to make informed choices as they transit and to equip them with knowledge and skills that will enhance their competitiveness in the global value chain.

To meet these requirements, the review are based on:

- The development of a holistic education for personal and national development based on clear shared values
- A commitment to higher standards, deeper understanding and greater opportunities for learners to succeed
- A focus on the key skills that are essential to work, to learning, and to life, and which will promote life-long learning
- An integrated approach that will develop the ability to apply learning in practical situations.

The ESSP further outlines what the review implies:

"This review will necessitate a sweeping revision of the general secondary curriculum, away from strictly academic learning objectives that are thought to prepare students for erudite higher education and towards a set of competencies that serve both those who continue their education after S4 and those who choose to enter the workforce. The new curriculum will enable learners to acquire specific vocational skills that they can use once they enter the world of work. The new curriculum will help learners make informed decisions as citizens and family members, and it will give those who continue with their education, either immediately in S5 or later in life, the learning skills they need to think critically and study efficiently."

# KEY CHANGES IN THE CURRICULUM

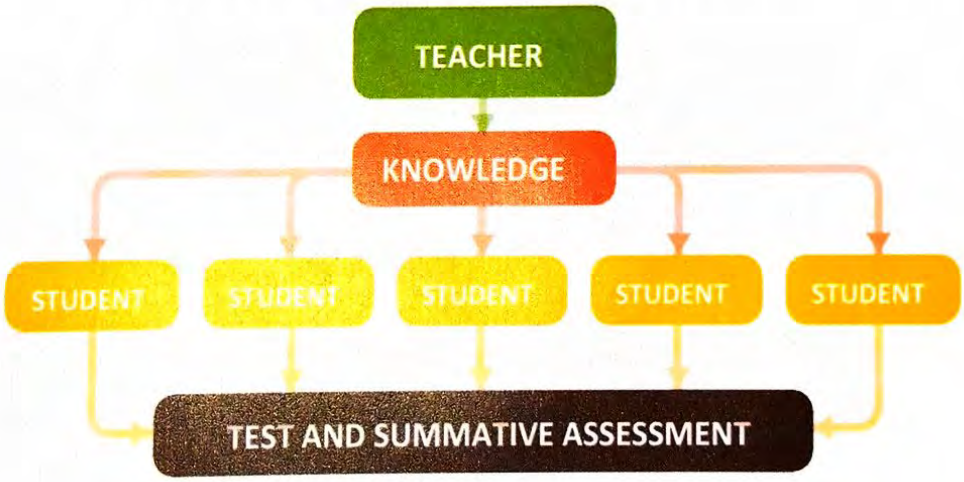
The key change in the curriculum is a move from a knowledge-based curriculum to a competence and skill-based curriculum. It is no longer sufficient to accumulate large amounts of knowledge. Young people need to develop the ability to apply their learning with confidence in a range of situations.

They need to be able to use knowledge creatively. A level of competence is the ability to use knowledge rather than just to acquire it. This requires an active, learner-centred rather than passive, teacher-centred approach.

This approach to teaching and learning is in support of the Sustainable Development Goals (SDG's), otherwise known as the Global Goals. These are a universal call to action to end poverty, protect the planet and ensure that all people enjoy peace and prosperity. The key changes in the curriculum will ensure that Uganda is making good progress towards SDG 4 in particular which aims to ensure equitable quality education and promote lifelong learning opportunities for all.

**The change can be summarised in the following diagrams.**

## THE KNOWLEDGE-BASED CURRICULUM




Knowledge-based teaching was based on transferring knowledge from the teacher to the students. The teacher had knowledge and transferred this knowledge to the students by lecturing, talking, asking them to read the text book or writing notes on the board for the students to copy and learn. Students acquired the knowledge, often without fully understanding it, and were tested at the end of a Topic, term or school course to see if they had remembered it. The knowledge was based mainly on the knowledge in the subjects traditionally taught at university, and little attempt was made to make it relevant to young people's own lives. The whole education system was seen by many people as a preparation for university, but the vast majority of learners never reach university. This curriculum caters for this majority as well as those who later go on to university.

## THE COMPETENCE BASED CURRICULUM




In the competence-based approach, the "student" becomes a "learner". The Learning Outcomes can only be achieved through active engagement in the learning process rather than simply absorbing knowledge given by the teacher.

The teacher needs to build on the learners' own knowledge and experience and create Learning Activities through which learners can explore the meaning of what is being learned and understand how it is applied in practical situations.

Teaching and learning become a two-way process of dialogue between the Teacher and Learners. Learners also learn from each other through discussion. Assessment also becomes a two-way process of formative assessment; not just to give grades but to find out problems the learners may be having and help to solve them.

# THE CURRICULUM

This curriculum focuses on four "Key Learning Outcomes" of: self – assured individuals; responsible and patriotic citizens; lifelong learners; positive contributors to society.
The curriculum emphasises knowledge, application and behavioural change. It is based on a clear set of values which must be imparted to learners during the learning process.

At the heart of every subject there are generic skills that allow development into life-long learners. Besides, there are also cross cutting issues that are embedded across subjects to enable learners understand the connections between the subjects and complexities of life.

## Key Learning Outcomes

This curriculum sets out 'Key Learning Outcomes' that sum up the expectations of the curriculum as a whole, and set out clearly the qualities that young people will develop.

By the end of the educational process, young people will become:

**Self-assured individuals who:**

- demonstrate self- motivation, self-management and self-esteem
- know their own preferences, strengths and limitations
- adjust their behaviour and language appropriately to different social situations
- relate well to a range of personality types

**Responsible and patriotic citizens who:**

- cherish the values promoted in the curriculum
- promote equity, the development of indigenous cultures and languages and appreciate other people's cultures
- apply environmental and health awareness when making decisions for themselves and their community
- are positive in their own identity as individuals and global citizens
- are motivated to contribute to the well-being of themselves, their community and the nation

**Lifelong learners who:**

- can plan, reflect and direct their own learning
- actively seek lifelong learning opportunities for personal and professional development

**Positive contributors to society who:**

- have acquired and can apply the Generic Skills
- demonstrate knowledge and understanding of the emerging needs of society and the economy
- understand how to design, make and critically evaluate products and processes to address needs
- appreciate the physical, biological and technological world and make informed decisions about sustainable development and its impact on people and the environment.

## Values

This curriculum is based on a clear set of values. These values underpin the whole curriculum and the work of schools. They are also the values on which learners need to base their lives as citizens of Uganda. The values are derived from The Uganda National Ethics and Values Policy of 2013. They are:

- Respect for humanity and environment
- Honesty; uphold and defend the truth at all times
- Justice and fairness in dealing with others
- Hard work for self-reliance
- Integrity; moral uprightness and sound character
- Creativity and innovativeness
- Social Responsibility
- Social Harmony
- National Unity
- National Consciousness and patriotism

These values are not taught directly in lessons, nor will they be assessed, but they will inform and shape all teaching and learning.

# Generic Skills

The generic skills lie at the heart of every subject. They are the skills that enable the learner to access and deepen learning across the whole curriculum. They are the same skills that are sought by employers and which will unlock the world of work. They are the skills that allow young people to develop into lifelong learners who can adapt to change and cope with the challenges of life in the 21st Century.

Young people need to be able to think critically and solve problems, both at school and at work. They need to be creative and innovative in their approach to learning and life. They need to be able to communicate well in all forms, co-operate with others and also work independently. They need to be able to use functional mathematics and ICT effectively.

**Critical thinking and problem-solving**

- Plan and carry out investigations
- Sort and analyse information
- Identify problems and ways forward
- Predict outcomes and make reasoned decisions
- Evaluate different solutions

**Creativity and innovation**

- Use imaginations to explore possibilities
- Work with others to generate ideas
- Suggest and develop new solutions
- Try out innovative alternatives
- Look for patterns and make generalisations

**Communication**

- Listen attentively and with comprehension
- Talk confidently and explain ideas/opinions clearly
- Read accurately and fluently
- Write and present coherently
- Use a range of media to communicate ideas

**Co-operation and Self-Directed Learning**

- Work effectively in diverse teams
- Interact effectively with others
- Take responsibility for own learning
- Work independently with persistence
- Manage goals and time

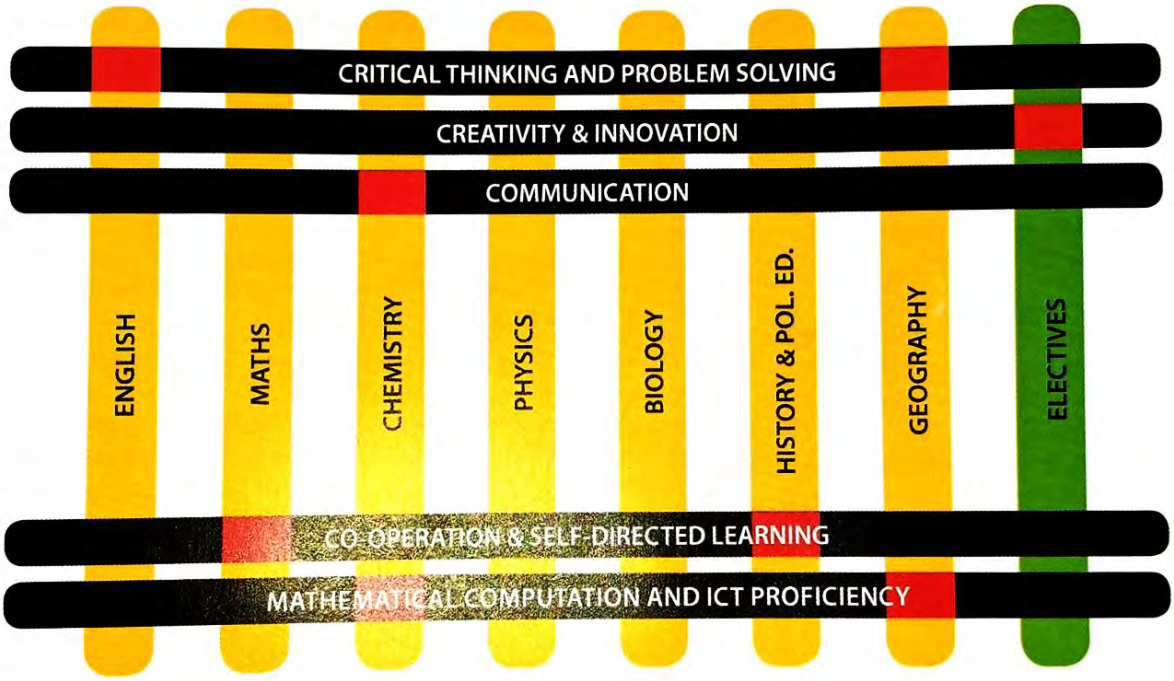
**Mathematical Computation and ICT Proficiency**

- Use numbers and measurements accurately
- Interpret and interrogate mathematical data
- Use mathematics to justify and support decisions
- Use technology to create, manipulate and process information
- Use technology to collaborate, communicate and refine their work

# GENERIC SKILLS WITHIN MATHEMATICS

These skills are not separate subjects in themselves; they are developed within the subjects of the curriculum. They also facilitate learning within those subjects. It is when these generic skills are deployed that learning is most effective. The generic skills are a key part of the new curriculum. They have been built into the syllabuses for each of the subjects, and these subjects provide the context for the skill development. Mathematics provides a rich context for learners to communicate, co-operate, and to think critically about how the world works and to understand the world from a scientific point of view.

The Subjects also provide the contexts for progression within the skills. The same skill definitions apply to all year groups, and skills progression is provided by the increasing complexity of the subject matter within each Subject. For example, within 'critical thinking', learners begin thinking critically about the relatively simple subject matter in Senior 1 and then progress to thinking about the much more complex matters in Senior 4. Thus the progression is in the increasing complexity of the matters being thought about.




## Cross-cutting Issues

There are some issues that young people need to learn about, but which are not confined to one Subject. These are the 'cross-cutting Issues' and they need to be studied across the subjects. These issues develop learners' understanding of theconnections between the subjects, and so of the complexities of life.

**The Cross-cutting Issues identified in the curriculum are:**

- Environmental awareness
- Health awareness
- Life skills
- Mixed abilities and involvement
- Socio-economic challenges
- Citizenship and patriotism

These have been built into the syllabuses of each subject. The way in which they operate within the subject is very similar to the generic skills.

**(For details on cross-cutting issues, refer to the Curriculum Framework document, page 11).**

## ICT Integration

ICT is embedded as a learning/teaching tool. ICT integration framework is summarised below and cuts across all the subjects on the curriculum.

| CATEGORY OF A TASK IN THE SYLLABUS | ICT APPLICATION (HOW ICT WILL BE INTEGRATED FOR THE TASK CATEGORY) |
|---|---|
| Field works | Use of cameras to take photos and record videos |
| Presentations in class | Use presentation application |
| Key words and meanings | Use online dictionary or search online |
| Drawing/graphics | Use publishing software, Word processor |
| Role play, narrations | Use audio and video recordings |
| Demonstrations | Use audio and video recordings and simulations |
| Locating and putting marks on an area | Use digital/online mapping |
| Present findings in graphic and written format | Use desktop publishing software or word processor |
| Showing data charts | Use spreadsheet software |
| Group discussions | Mind-mapping software |
| Search for extra reading materials | Download files on internet or by sharing |
| Writing equations and formulas | Use equation editors |
| Carrying out academic research | Using the Internet and other academic applications like "Encarta", "Britannica" etc. |
| Sharing or learning with people across the world | Forming learning networks, formation of blogs, social media, emails etc. |

# THE MATHEMATICS SYLLABUS

Mathematics is a compulsory subject from Senior 1 to 4

## Time allocation

| MATHEMATICS | SENIOR 1 & 2 | SENIOR 3 & 4 |
|---|---|---|
| | 5 periods a week | 5 periods a week |

## Rationale

Mathematics forms a key element of every learner's education. The Mathematics programme of study emphasises the essential mathematical skills that all citizens need for full and effective participation in civil, social and economic life. The programme of study focuses primarily on the needs of the majority of learners, some of who may cease formal schooling before the end of Senior Four. It will allow these learners to take a wide range of formal or informal workplace opportunities, or to proceed to other post-Senior 4 programmes.

Prior to the reform, Mathematics, throughout the Lower Secondary years was strongly geared towards the needs of the small minority of learners who might eventually go on to study Mathematics at Advanced Level and beyond. The Mathematics programme in the reformed curriculum takes care of special learning needs. It is designed to ensure that the majority of learners will leave school with a worthwhile, relevant qualification in the Mathematics that they will actually use in everyday life and work. In their daily life, knowingly or unknowingly, every human being uses and applies mathematical concepts in a wide range of contexts. Numeracy skills are essential to every aspect of both work and daily life. Mathematics has evolved across all cultures over the years, and it is still developing.

The study of Mathematics develops the learners' reasoning and logical thinking skills, and its applications cut across all Learning Areas. During the learning process, the beauty of Mathematics and its value in a wide range of contexts are recognised by the learner.

The Lower Secondary Mathematics programme of study focuses on developing mathematical understanding, logical reasoning, problem solving and analytical thought. The concepts, understandings and skills acquired will help learners to solve familiar and unfamiliar problems, giving them the flexibility they need to meet new situations as they arise. The learners will be confident with the Mathematics that they use in their day-to-day activities in the home, in the work place, in the community, and in society. They will also be ready to participate in civil life, using their mathematical skills to make informed decisions based on a sound understanding of facts, figures and opinions.

The skills and understandings that the learners acquire will be helpful throughout their lives. They will provide the essential mathematical tools required for a wide range of career paths including many of those in the fields of engineering, science or technology.

# Teaching and Learning Mathematics

The thrust of the new syllabuses is experiential and towards deeper understanding. The focus in Mathematics is on the development of understanding through mathematical enquiry and rational thought.

The syllabus provides learners with a wide range of contexts in which to develop this understanding, and these contexts are designed to engage the interest of the learner and to provide opportunities to build life-related knowledge, experience and skills. Teachers are encouraged to go beyond the textbooks and provide as many meaningful contexts as possible. The generic skills have been integrated throughout the curriculum and can only be acquired through active approaches.

The role of the teacher is to build on learners' existing knowledge and experience and to extend that by posing problems to the learners. This makes them think about their own ideas and experiences as well as adding new knowledge and skills to it.

Learners need to interact with real situations inside and outside the classroom. They need to look at pictures or diagrams, examine statistics, or read texts from a range of sources. They need to find out knowledge and ideas for themselves. They should then be expected to express these in their own words, not those of the teacher, and so demonstrate that they have understood what they have learnt.

In this approach, learners are encouraged to:

- Be responsible for their own learning
- Think for themselves and form their own ideas and opinions
- Become critical thinkers, ready to face new challenges and situations for themselves

Mathematics is divided into four themes that run throughout the four years of study. The following are the themes: Numbers Geometry and Measures, Data and probability and patterns and Algebra.

# THE MATHEMATICS PROGRAMME PLANNER

The Mathematics syllabus is arranged in themes and topics that cover the four years of the Lower Secondary Curriculum. The recommended number of periods for each topic is indicated in Programme Planner and also in the detailed syllabus.

| SENIOR 1 | THEME | TOPIC | DURATION (NUMBER OF PERIODS) |
|---|---|---|---|
| Term 1 | Numbers | 1. Number Bases | 15 |
| | Numbers | 2. Working with Integers | 15 |
| | Numbers | 3. Fractions, Percentages and Decimals | 15 |
| | Numbers | 4. Rectangular Cartesian Coordinates in 2- Dimensions | 15 |
| Term 2 | Geometry and Measures | 5. Geometric Constructions Skills | 12 |
| | Patterns and Algebra | 6. Sequence and patterns | 12 |
| | Geometry and Measures | 7. Bearings | 12 |
| | Geometry and Measures | 8. General and angle properties of geometric figures | 12 |
| | Data and Probability | 9. Data collection and presentation | 12 |
| Term 3 | Geometry and Measures | 10: Reflection | 12 |
| | Patterns and Algebra | 11. Equation of lines and curves | 12 |
| | Patterns and Algebra | 12: Algebra 1 | 12 |
| | Geometry and Measures | 13: Business arithmetic | 12 |
| | Geometry and Measures | 14: Time and time tables | 12 |
| | | **Total** | **180** |

| SENIOR 2 | THEME | TOPIC | DURATION (NUMBER OF PERIODS |
|---|---|---|---|
| Term 1 | Patterns and Algebra | 1. Mappings and relations | 15 |
| | Patterns and Algebra | 2. Vectors and translation | 15 |
| | Data and Probability | 3. Graphs | 15 |
| | Numbers | 4. Numerical concept 1: (indices and logarithms) | 15 |
| Term 2 | Patterns and Algebra | 5. Inequalities and regions | 12 |
| | Patterns and Algebra | 6. Algebra 2: | 12 |
| | Geometry and Measures | 7. Similarities and enlargement | 14 |
| | Geometry and Measures | 8. Circle | 10 |
| | Geometry and Measures | 9. Rotation | 12 |
| Term 3 | Geometry and Measures | 10. Length and area properties of two-dimensional geometrical figures. | 15 |
| | Geometry and Measures | 11. Nets, areas and volumes of solids | 15 |
| | Numbers | 12. Numerical concept 2 (indices, logarithms and surds) | 15 |
| | Data and Probability | 13. Set theory | 15 |
| | | **Total** | 180 |

| SENIOR 3 | THEME | TOPIC | DURATION (NUMBER OF PERIODS |
|---|---|---|---|
| Term 1 | Patterns and Algebra | 1. Equation of a straight line | 15 |
| | Geometry and Measures | 2. Trigonometry 1 | 15 |
| | Data and Probability | 3. Data collection /display | 15 |
| | Geometry and Measures | 4. Vectors | 15 |
| Term 2 | Data and Probability | 5. Ratios and proportions | 12 |
| | Geometry and Measures | 6. Business mathematics | 12 |
| | Geometry and Measures | 7. Trigonometry 2 | 12 |
| | Data and Probability | 8. Matrices | 12 |
| | Geometry and Measures | 9. Matrix transformations | 12 |

| SENIOR 3 | | TOPIC | DURATION (NUMBER OF PERIODS) |
|---|---|---|---|
| Term 3 | Patterns and Algebra | 10. Simultaneous equations | 15 |
| | Data and Probability | 11. Probability | 15 |
| | Patterns and Algebra | 12. Quadratic equations | 15 |
| | Geometry and Measures | 13. Circle properties | 15 |
| | | **Total** | 180 |

| SENIOR 4 | | TOPIC | DURATION (NUMBER OF PERIODS) |
|---|---|---|---|
| Term 1 | Patterns and Algebra | 1. Composite functions | 20 |
| | Patterns and Algebra | 2. Equations and inequalities | 20 |
| | Patterns and Algebra | 3. Linear – programming | 20 |
| Term 2 | Patterns and Algebra | 4. Loci | 20 |
| | Geometry and Measures | 5. Lines and planes in three dimensions | 20 |
| Term 3 | All | Revision | |
| | | **Total** | 100 |

**The syllabus details for all subjects are set out in three columns:**

| LEARNING OUTCOMES | SUGGESTED LEARNING ACTIVITIES | SAMPLE ASSESSMENT STRATEGIES |
|---|---|---|
| The knowledge, understanding or skills expected to be learned by the end of the topic | The sort of learning activities that include the generic skills and that will help learners achieve the Learning Outcomes. | Opportunities for assessment within the learning |

Teachers should base their lesson plans on the Learning Outcomes using the Suggested Learning Activities as a guide. These are not the only possible learning activities, and teachers are encouraged to extend these and devise their own that are appropriate to the needs of their class.

# DETAILED SYLLABUS FOR MATHEMATICS

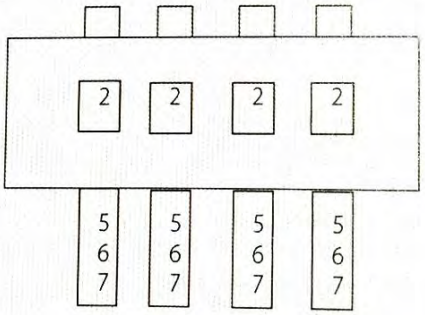
## SENIOR 1: TERM 1

## THEME: NUMBERS

### TOPIC 1: NUMBER BASES

15 PERIODS

**Competency: The** learner uses decimal place value to develop understanding of numbers written in other bases.

| LEARNING OUTCOMES | SUGGESTED LEARNING ACTIVITIES | SAMPLE ASSESSMENT STRATEGY |
|---|---|---|
| The learner should be able to:<br>• identify numbers in any base using abacus. (k)<br>• convert numbers from one base to another. (u)<br>• manipulate numbers in different bases with respect to all four operations. (u s)<br>• identify place value in different bases. (u) | • Playing number games, for example matching numbers in base two with numbers in base ten e.g. 1111 base two is matched to 15 base ten.<br>• Imagine living in cartoon world where people have just eight digits rather than ten – what would their arithmetic be like?<br>• Design counters in different number bases using strips threaded through card:<br>• Prepare strips numbered 0 to 9, thread through card so a single number on each number is displayed, use to make different numbers. Change the length of the strips to investigate different number bases (e.g. 2222 in base 8).<br> | • Observe learners in their groups trying to identify place values of various number bases using abacus and converting numbers from one base to another.<br>• Observe individual learners in their groups whether they are cooperative, whether they collaborate with their colleagues.<br>• Let individual learners explain how they have identified the place values and converted numbers from one base to another e.g. How do you find $p$ and $q$ if $10020_{\text{base } p} = 87_{\text{base } q}$?<br>• Complete the addition/multiplication table for different number bases. |

## SENIOR 1: TERM 1

## THEME: NUMBERS

## TOPIC 2: WORKING WITH INTEGERS

**15 PERIODS**

**Competency:** The learner carries out calculations with positive and negative integers.

| LEARNING OUTCOMES | SUGGESTED LEARNING ACTIVITIES | SAMPLE ASSESSMENT STRATEGY |
|---|---|---|
| The learner should be able to:<br>a) identify, read and write natural numbers as numerals and words in million, billion and trillion. (u s)<br>b) differentiate between natural numbers and whole numbers/ integers. (u)<br>c) identify directed numbers. (k)<br>d) use directed numbers (limited to integers) in real life situations. (u s)<br>e) use the hierarchy of operations to carry out the four mathematical operations on integers. (u)<br>f) identify even, odd, prime and composite numbers. (k u)<br>g) find the prime factorisation of any number. (k u s)<br>h) relate common factors with HCF and multiples with LCM. (k u)<br>i) work out and use divisibility tests of some numbers. (k, u, s, v/a) | • Order numbers and locate them on a number line<br>• Use directed number in context e.g. temperature, height above and below sea level, floors in a building<br>• Investigate multiples on a 1-100 square and notice that the digital root (i.e. the sum of the digits) of multiples of three is always a multiple of three, and for multiples of nine the digital root is a multiple of nine. Determine how to distinguish other multiples (e.g. 2 (even numbers), 5, 10).<br>• Investigate the factors of numbers 1 to 30 – Which numbers have just two factors? Which numbers have an odd number of factors?<br>• Use exactly four 4s to make as many whole number answers between 1 and 100 e.g. $(4+4\times4) \div 4 = (4+16) \div 4 = 5$,<br>• recording the calculations correctly<br>• Determine the prime factorisation of any integer | • Observe learners as they discuss in groups how they can read and write natural numbers in words and differentiate between natural and whole numbers.<br>• Observe the interaction of learners within their groups<br>• Nambi has four number cards:<br>She can arrange the cards to form different numbers. For example, she can form the number 3407<br>[3] [4] [0] [7]<br>What is the greatest even number Nambi can form using all four of her number cards?<br>What is the least odd number she can form using all four of her number cards?<br>• How many hundreds are there in one million?<br>• What are the prime factors of 942 and 357? Hence find the HCF of 942 and 357, and the LCM. |

## SENIOR 1: TERM 1
## THEME: NUMBERS

## TOPIC 3: FRACTIONS, PERCENTAGES AND DECIMALS

15 PERIODS

**Competency:** The learner understands and uses fractions, decimals and percentages.

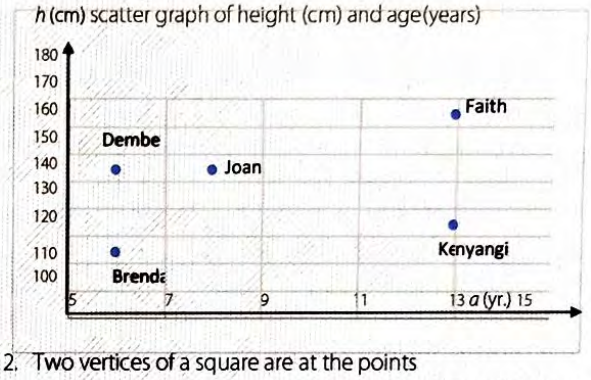
| LEARNING OUTCOMES | SUGGESTED LEARNING ACTIVITIES | SAMPLE ASSESSMENT STRATEGY |
|---|---|---|
| The learner should be able to:<br>a) describe different types of fractions. (k)<br>b) convert improper fractions to mixed numbers and vice versa. (k, s)<br>c) work out problems from real life situations. (u, s)<br>d) add, subtract, divide and Multiplies Decimals. (u, s)<br>e) converts fractions to decimals and vice versa. (u, s)<br>f) identifies and classifies decimals into terminating, non-terminating and recurring decimals. (u)<br>g) converts recurring decimals into fractions. (u, s)<br>h) converts fractions and decimals into percentages and vice versa. (u s)<br>i) calculates a percentage of a given quantity. (s)<br>j) works out real-life problems involving percentages. (u, s, v/a) | • Fold paper strips to model fractions and use to determine equivalent fractions including decimals<br>• Order and locate fractions on a number line<br>• Understand decimals as fractions with powers of ten as a denominator (tenths, hundredths etc.)<br>• Understand percentages as fractions with 100 as the denominator<br>• Play games matching fractions, percentage and decimals<br>• Identify percentages in every day contexts<br>• Use a calculator to investigate fraction-decimal equivalence – which fractions produce terminating decimals and which fractions produce recurring decimals?<br>• Developing strategies for converting decimals to fractions<br>• Solve problems that involve fractions, percentages and decimals | • Let the learners explain to the group members how Moses would carry out the activity below<br>• Observe the learners as they give the explanation. Look out for, whether the learners can listen to one another, whether they collaborate, cooperate, learn from one another, each can contribute to the explanation.<br>a) Moses has the following cards.<br>[3] [4] [0] [7]<br>He also has a card with a decimal point.<br>[.]<br>What is the least number Moses can form using all five of his cards?<br>b) How many 0.01s are there in:<br>a) 1 b) 0.1 c) 10 d) 30<br>c) Rose achieved a score of 21 out of 25 in a mathematics test, and a score of 31 out of 40 in a physics test. Did she do better in mathematics or in physics? Justify your answer. |

## SENIOR 1: TERM 1

## THEME: NUMBERS

## TOPIC 4: RECTANGULAR CARTESIAN COORDINATES IN 2 DIMENSIONS — 15 PERIODS

**Competency:** The learner plots and interprets points in a range of contexts.

| LEARNING OUTCOMES | SUGGESTED LEARNING ACTIVITIES | SAMPLE ASSESSMENT STRATEGY |
|---|---|---|
| The learner should be able to:<br>a) draw and label the Cartesian plane. (k, s)<br>b) identify the x-- and y-axis. (k)<br>c) read and plot points on the Cartesian plane/coordinate grid. (k, s)<br>d) complete shapes on a coordinate grid. (k, u, s)<br>e) choose and uses appropriate scale for a bi-variate data set. (u, s, v/a) | • In pairs, play four in a line on a coordinate grid, recording the plotted points<br>• Draw shapes on a coordinate grid given the coordinates of one or more<br>• Collect data (e.g. height and head circumference) from your class and plot a scatter graph | Observe learners as they try to do the below activities, look out for their cooperation in the process of getting solutions for the below question, sharing of information.<br>1. The heights and ages of five girls have been plotted on the scatter graph.<br>a) Who is the tallest and how tall is she?<br>b) Who is the same age in years as Dembe?<br>c) How much taller is Faith than Joan?<br><br><br>2. Two vertices of a square are at the points (2, 1) and (6, 3). What are the coordinates of the other two vertices of the square?<br>There are three possible answers. Find all three. Vertices |

## SENIOR 1: TERM 2

## THEME: GEOMETRY AND MEASURES

## TOPIC 5: GEOMETRIC CONSTRUCTION SKILLS

12 PERIODS

**Competency:** The learner uses the angle properties of lines and shapes to solve problems.

| LEARNING OUTCOMES | SUGGESTED LEARNING ACTIVITIES | SAMPLE ASSESSMENT STRATEGY |
|---|---|---|
| The learner should be able to:<br>a) draw perpendicular and parallel lines. (k, s)<br>b) construct perpendiculars, angle bisectors, mediators and parallel lines. (u, s)<br>c) use a pair of compasses and a ruler to construct special angles. ($60_0$, $45_0$) (u, s)<br>d) describe a locus. (u)<br>e) relate parallel lines, perpendicular bisector, angle bisector, straight line and a circle as loci. (k, u)<br>f) draw polygons. (u)<br>g) measure lengths and angles. (s)<br>h) construct geometrical figures such as triangle, square, rectangle, rhombus, parallelogram. (u, s, v/a) | • Learners should identify perpendicular and parallel lines in the environment<br>• Outside learners use strings and markers to create various loci e.g. equidistant from a fixed point (circle); equidistant from two fixed points (perpendicular bisector); equidistant from a line (parallel lines); equidistant from a fixed point and a line (parabola); the sum of the distance from two fixed points is a constant (ellipse)<br>• Construct various polygons and geometric designs using geometric equipment | • Observe learners as they select the correct instruments to use. Observe their interaction attitude towards what they are supposed to do.<br>Can they differentiate drawing from constructing?<br>• Let the learners explain or describe the procedure for constructing angles.<br>• In your exercise book, construct the following angles by using a pair of compasses, ruler and pencil only.<br>a) $30_0$ f) $15_0$<br>b) $45_0$ g) $105_0$<br>c) $60_0$ h) $135_0$<br>d) $75_0$ i) $180_0$<br>e) $90_0$ j) $22.5_0$<br>a) Accurately construct a square<br>b) Accurately construct a regular hexagon |

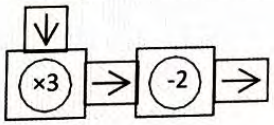
## SENIOR 1: TERM 2

## THEME: PATTERNS AND ALGEBRA

## TOPIC 6: SEQUENCE AND PATTERNS

**12 PERIODS**

**Competency:** The learners explore number patterns and sequences.

| LEARNING OUTCOMES | SUGGESTED LEARNING ACTIVITIES | SAMPLE ASSESSMENT STRATEGY |
|---|---|---|
| The learner should be able to:<br>a) recognise and generate number patterns. (k, u)<br>b) explain how to generate a sequence. (u)<br>c) use number machines to generate a sequence. (k, s)<br>d) describe a general rule when a pattern is given. (k, u, s)<br>e) determine terms in a sequence. (u, s) | • How many different ways can you continue the sequence that begins 2, 4, …? Explain how each sequence is generated<br>• Make a 1 to 100 number square.<br>a) Shade in all the multiples of 3 on the number square.<br>b) Describe the pattern you have shaded on the number square.<br>c) Sulai wants to shade some multiples to make a pattern of vertical lines. Which set of multiples could he use? Find as many different sets as you can.<br>d) 3, 6 and 9 are the 1st, 2nd and 3rd multiples of 3.<br>i) Which position in the multiples of 3 is 93?<br>ii) Which position in the multiples of 3 is $3n$?<br>• Put the numbers 1, 2, 3, 4, 5... into this number machine to generate a sequence.<br><br>a) Write down the first five members of the sequence.<br>b What is the formula for the $n_{th}$ term in the sequence?<br>Sharon wants to shade some multiples on a 1 to 100 square to make a pattern of horizontal lines. Can she do this? Explain your answer.<br>• Draw a double machine that could be used to generate the sequence 5, 8, 11, 14, 17…. | • Observe learners in groups as they draw two different double machines that could be used to generate two different sequences, each with '3' as its first outcome number.<br>• Observe the following; collaboration, harmony amongst the members of the groups, willingness to do the activity<br>• Write a formula for the $n_{th}$ term in a sequence starting<br>$1, \frac{1}{4}, \frac{1}{9}, \frac{1}{16}, \frac{1}{25}$ |

## SENIOR 1: TERM 2

## THEME: GEOMETRY AND MEASURES

12 PERIOD

### TOPIC 7: BEARINGS

**Competency:** The learner uses compass points, bearings and scale drawings.

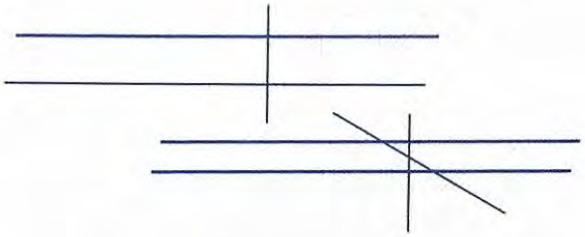
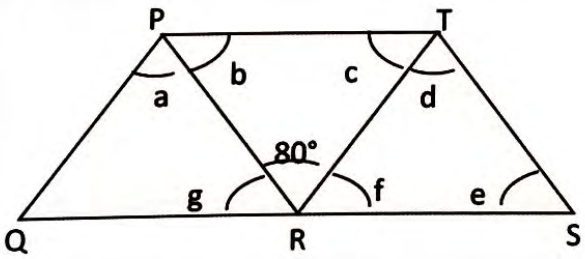
| LEARNING OUTCOMES | SUGGESTED LEARNING ACTIVITIES | SAMPLE ASSESSMENT STRATEGY |
|---|---|---|
| The learner should be able to:<br>a) know the compass points. (k)<br>b) describe the direction of a place from a given point using compass points. (u s)<br>c) describe the bearing of a place from a given point. (k s)<br>d) apply bearings in real life situations. (u s)<br>e) choose and uses an appropriate scale to make an accurate drawing. (k u)<br>f) differentiate between a sketch and a scale drawing. (u, v) | • Match compass points with bearings<br>• Create a scale drawing of the classroom or school<br>• Alex is facing North. He turns clockwise to face West. What angle has he turned through?<br>• Henry's school is 4km away from his home, on a bearing of 070°. The market is 1km away from the school on a bearing of 250°. The hospital is 6km away from the market, on a bearing of 310°. What is the bearing of the hospital from Henry's home?<br>• Make a scale drawing to find the distance and bearing of the hospital from Henry's home. Remember to state the scale you use on your drawing, and give your answer to a sensible degree of accuracy. | • Let the learners in groups, discuss and explain how they will accomplish the following task:<br>*Two Ships leave Port Bell at the same time. One ship sails 80km on a bearing of 0300 to position A. The other ship sails 160km on a bearing of 1100 to position B.*<br>*Use a scale drawing to find:*<br>*a) the distance AB*<br>*c) the bearing of B from A*<br>• During the process of accomplishing the task, observe the communication skills of individual learners, creativity, respect for one another, sharing of information amongst themselves and other values and skills. |

## SENIOR 1: TERM 2

## THEME: GEOMETRY AND MEASURES

## TOPIC 8: GENERAL AND ANGLE PROPERTIES OF GEOMETRIC FIGURES — 12 PERIODS

**Competency:** The learner uses the angle properties of lines and shapes to solve problems.

| LEARNING OUTCOMES | SUGGESTED LEARNING ACTIVITIES | SAMPLE ASSESSMENT STRATEGY |
|---|---|---|
| The learner should be able to:<br>a) identify different angles. (k)<br>b) solve problems involving angles at a point on a straight line, angles on a transversal and parallel lines. (k u s)<br>c. know and use the angle sum of a triangle. (k u)<br>d) state and uses angle properties of polygons when solving problems. (u s) | • Identify acute, obtuse and reflex angles.<br>• Draw a pair of parallel lines and a transversal (see the diagram). Identify alternate, corresponding and supplementary angles<br><br>• Add another transversal to determine the angle sum of a triangle<br>• Cut out three identical isosceles triangles from scrap card. Arrange them to form a trapezium PQST.<br>R is the midpoint of the line QS.<br>PQ = PR = TR = TS.<br><br>Note: the drawing is not accurate.<br>a) Explain why PQ = PR<br>b) Find two more lines that are equal to PQ and PR.<br>c) Find the values of the labelled angles a, b, c, d, e, f, g<br>• Find the angle sum of polygons by considering the minimum number of triangles within a polygon. Hence find the interior and exterior angles of regular polygons. | • Observe the learners as they carry out the following tasks<br>• Through what angle do you turn in each of these cases?<br>*You are facing North and you turn:*<br>*clockwise to face SE*<br>*anti-clockwise to face SE*<br>*You are facing NW and you turn to face SE*<br>• How many sides does each regular polygon have, if the exterior angle is 72o; 24o; 60o; 45o; 40o?<br>• Three interior angles of a pentagon are 110o, 100o, and 120o respectively. The fourth and the fifth angles are 3xo and 2xo. Find their values.<br>• Observe their collaboration, respect for one another and attitude towards the task. |

## SENIOR 1: TERM 2

## THEME: DATA AND PROBABILITY

### TOPIC 9: DATA COLLECTION AND PRESENTATION

12 PERIODS

**Competency:** The learners collects and presents different sorts of data.

| LEARNING OUTCOMES | SUGGESTED LEARNING ACTIVITIES | SAMPLE ASSESSMENT STRATEGY |
|---|---|---|
| The learner should be able to:<br>a) understand the differences between types of data. (k u)<br>b) collect and represents simple data from the local environment using tally chart, bar chart (bars do not touch), pie chart and line graph. (k, u, s, v/a) | • Distinguish between qualitative and quantitative data<br>• Distinguish between discrete and continuous data<br>• Explore different ways of representing data – recognising possible limitations<br>• Collect data for a purpose e.g. to solve a problem, to confirm or refute a hypothesis<br>• Interpret representations of data | • Observe students completing the task below.<br>*Students Mukasa and Aminah disagreed about the size of their classmates' feet.*<br>*Mukasa said: "Most learners in Senior 1 have feet that are 15 centimetres long."*<br>*Aminah said: "No, most of them have feet that are shorter than that."*<br>*They measured the lengths of 30 learners' feet and recorded them:*<br>21, 18, 21, 16, 15, 19, 17, 15, 16, 20, 22, 17, 22, 22, 16, 16, 15, 18<br>a) Make a tally chart to sort the data.<br>b) Represent the data in a suitable way.<br>c) Who was correct? Explain your answer. |

## SENIOR 1: TERM 3

## THEME: GEOMETRY AND MEASURES

### TOPIC 10: REFLECTION

10 PERIODS

**Competency:** The learner reflects shapes in a range of contexts and identify lines of symmetry.

| LEARNING OUTCOMES | SUGGESTED LEARNING ACTIVITIES | SAMPLE ASSESSMENT STRATEGY |
|---|---|---|
| The learner should be able to:<br>a) identify lines of symmetry for different figures. (k)<br>b) reflect shapes and objects. (u s)<br>c) apply reflection in the Cartesian plane. (u, s) | • Identify all the lines of symmetry in the letters of the alphabet written as capital letters, repeat for numbers<br>• Use a mirror to reflect objects in a given line of symmetry<br>• Investigate what happens to the coordinates of the image when an object is drawn on a coordinate grid and reflected in each axis and the lines y=x and y=-x | • In groups, learners should carry out the task below; Observe them as they do the task. Is there harmony in the groups? Is each learner's attitude towards the activity positive? How are they communicating to each other? Are they learning from each other? Look at their presentations.<br>• Let each group explain to the other groups how they have carried out the task.<br>**Task:** Plot the points A (1, 2), B (-1, 1) and C (-4, 3) on a Cartesian plane. Join up the points to create the object. After a reflection the image has points A' (2, 1), B' (1, -1) and C' (3, -4)<br>a) Find the equation of the line of reflection. |

## SENIOR 1: TERM 3

## THEME: PATTERNS AND ALGEBRA

### TOPIC 11: EQUATIONS OF LINES

**12 PERIODS**

**Competency:** The learner understands and uses linear equations and their graphs.

| LEARNING OUTCOMES | SUGGESTED LEARNING ACTIVITIES | SAMPLE ASSESSMENT STRATEGY |
|---|---|---|
| The learner should be able to:<br>a) form linear equations with given points. (k, s)<br>b) draw the graph of a line given its equation. (u, s) | • In pairs, play four in a line on a coordinate grid, recording the plotted points. Determine the equation for each set of points that form a straight line.<br>• Investigate the properties of the equation of a straight line y= mx+c, by plotting the graphs using different values of m and c<br>• How do you get parallel lines? How do you make the line steeper? | • Observe students while they work in groups on the following tasks.<br>• Create a triangle using three straight lines. Give their equations.<br>• A parallelogram has two sides defined by the lines x=0 and y=2x. Give the equations for two more straight lines to complete the parallelogram.<br>• Find the equation of at least five straight lines that pass through the point (1, 1). |

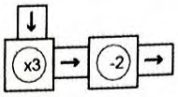
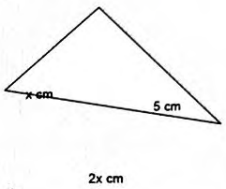
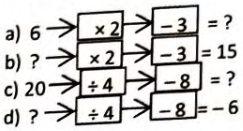
**SENIOR 1: TERM 3**

## THEME: GEOMETRY AND MEASURES

**12 PERIOD**

## TOPIC 12: ALGEBRA 1

**Competency:** The learner forms and uses simple algebraic expressions.

| LEARNING OUTCOMES | SUGGESTED LEARNING ACTIVITIES | SAMPLE ASSESSMENT STRATEGY |
|---|---|---|
| The learner should be able to:<br>a) use letters to represent numbers. (u)<br>b) write statements in algebraic form. (u)<br>c) simplify algebraic expressions. (u s)<br>d) evaluate algebraic expressions by substituting numerical values. (u s)<br>e) manipulate simple algebraic equations in one variable and solve them. (u, s, v/a) | • Use number machines and write the equivalent algebraic expressions e.g.<br><br><br>*when x is put into this machine the output is 3x-2*<br>• Thirty books are bought for sh. 10 800. Some cost UGX 400 each and the others UGX 300 each. How many books of each value are bought?<br>• In groups, draw a triangle and label as shown.<br>*The perimeter of the triangle is 26cm. Work out the value of x in the triangle*<br><br> | • As they discuss, observe participation in each group, presentations, methods used.<br>• Find the missing input and output numbers in these double number machines:<br><br><br>• Solve the following equations<br>a) $3p - 2 = 8$<br>b) $2x + 1 = 3x - 2$<br>• Yusuf thinks of a number, *b*. He adds 6. He multiplies the sum by 4. He subtracts twice the original number. His result is 32.<br>a) Construct an equation to represent Yusuf's work<br>b) Solve the equation to find Yusuf's original number. |

## SENIOR 1: TERM 3

## THEME: PATTERNS AND ALGEBRA

## TOPIC 11: EQUATIONS OF LINES

**12 PERIODS**

**Competency:** The learner understands and uses linear equations and their graphs.

| LEARNING OUTCOMES | SUGGESTED LEARNING ACTIVITIES | SAMPLE ASSESSMENT STRATEGY |
|---|---|---|
| The learner should be able to:<br>a) form linear equations with given points. (k, s)<br>b) draw the graph of a line given its equation. (u, s) | • In pairs, play four in a line on a coordinate grid, recording the plotted points. Determine the equation for each set of points that form a straight line.<br>• Investigate the properties of the equation of a straight line y= mx+c, by plotting the graphs using different values of m and c<br>• How do you get parallel lines? How do you make the line steeper? | • Observe students while they work in groups on the following tasks.<br>• Create a triangle using three straight lines. Give their equations.<br>• A parallelogram has two sides defined by the lines x=0 and y=2x. Give the equations for two more straight lines to complete the parallelogram.<br>• Find the equation of at least five straight lines that pass through the point (1, 1). |

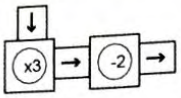
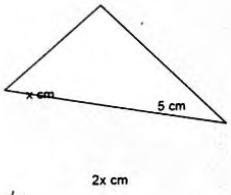
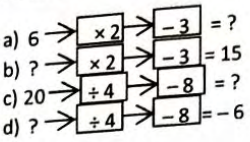
SENIOR 1: TERM 3

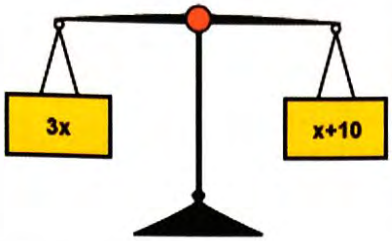
# THEME: GEOMETRY AND MEASURES

12 PERIOD

## TOPIC 12: ALGEBRA 1

**Competency:** The learner forms and uses simple algebraic expressions.

| LEARNING OUTCOMES | SUGGESTED LEARNING ACTIVITIES | SAMPLE ASSESSMENT STRATEGY |
|---|---|---|
| The learner should be able to:<br>a) use letters to represent numbers. (u)<br>b) write statements in algebraic form. (u)<br>c) simplify algebraic expressions. (u s)<br>d) evaluate algebraic expressions by substituting numerical values. (u s)<br>e) manipulate simple algebraic equations in one variable and solve them. (u, s, v/a) | • Use number machines and write the equivalent algebraic expressions e.g.<br><br><br>*when x is put into this machine the output is 3x-2*<br>• Thirty books are bought for sh. 10 800. Some cost UGX 400 each and the others UGX 300 each. How many books of each value are bought?<br>• In groups, draw a triangle and label as shown.<br>*The perimeter of the triangle is 26cm. Work out the value of x in the triangle*<br><br> | • As they discuss, observe participation in each group, presentations, methods used.<br>• Find the missing input and output numbers in these double number machines:<br><br><br>• Solve the following equations<br>a) $3p - 2 = 8$<br>b) $2x + 1 = 3x - 2$<br>• Yusuf thinks of a number, *b*. He adds 6. He multiplies the sum by 4. He subtracts twice the original number. His result is 32.<br>a) Construct an equation to represent Yusuf's work<br>b) Solve the equation to find Yusuf's original number. |

| LEARNING OUTCOMES | SUGGESTED LEARNING ACTIVITIES | SAMPLE ASSESSMENT STRATEGY |
|---|---|---|
| | • Think of a number puzzle<br>• Understand the need to do the same thing to both sides of an equation when solving. The image of a balance can help.<br><br> | |

## SENIOR 1: TERM 3

## THEME: GEOMETRY AND MEASURES

### TOPIC 13: BUSINESS ARITHMETIC — 12 PERIODS

**Competency:** The learner understands and applies Business arithmetic.

| LEARNING OUTCOMES | SUGGESTED LEARNING ACTIVITIES | SAMPLE ASSESSMENT STRATEGY |
|---|---|---|
| The learner should be able to:<br>a) describe and calculate profit (includes all expenses incurred), loss, commission, interest, insurance and discount. (u, s)<br>b) express profit or loss as a percentage. (u)<br>c) solve simple interest problems. (k, s, v/a) | • Learners write their own definitions of, and how to calculate profit, loss, commission, interest, insurance and discount.<br>• Discuss the causes of losses, why insurance is needed etc.<br>• Let the learners set up imaginary shops in the classroom. Let the learners set the cost and selling prices. Learners can calculate the profit for each item sold.<br>• When shopping which is the best saving: two for the price of one, one third off, pay 20% tax and then have a discount of 50%, have a discount of 50% and then pay 20% tax?<br>• A shop has a sale, 25% off all prices. I buy a pair of shoes for sh. 60 000. What was the price of the shoes before the sale? | • Observe learners whether they are doing the work as instructed (integrity), are they willing to do the work? (positive attitude towards work). How is their presentation of the work? Are they creative and innovative?<br>a) In a School there are 100 students, each of whom is given 3 litres of milk per week. If a half-litre pack costs UGX 1500, find the monthly milk bill (use 1 month = 4 weeks)<br>b) A trader marked the prices of his goods 20% above the cost price and allowed a discount of 10% to the customers on the marked price. If Okot paid sh. 54 000 for a shirt, what was the marked price of the shirt? What was its cost price? |

## SENIOR 1: TERM 3 THEME:

## GEOMETRY AND MEASURES

### TOPIC 14: TIME AND TIME

12 PERIOD

**Competency:** The learner understands and uses time.

**TABLES**

| LEARNING OUTCOMES | SUGGESTED LEARNING ACTIVITIES | SAMPLE ASSESSMENT STRATEGY |
|---|---|---|
| The learner should be able to:<br>a) identify and use units of time. (k u s)<br>b) use and interpret different representations of time. (u s)<br>c) apply the understanding of time in a range of relevant real-life contexts. (u, s, v/a) | • Look at the S1 school timetable. How much time do learners spend in school? How much time is spent in lessons? What is the total time spent on each subject?<br>• Use bus timetables to determine as much information as possible<br>• Plan a journey and draw up a detailed itinerary using the 24-hour clock<br>• Use a calendar to determine how many months of the year start on the same day of the week. Is this the same in every year?<br>• How old are you in seconds (use a calculator)? If you had a celebration every million seconds, what would the date of your next celebration be? | <table><tr><th>BUS STATION</th><th>ARRIVE</th><th>DEPART</th></tr><tr><td>Soroti</td><td></td><td>20:30</td></tr><tr><td>Kumi</td><td>22:00</td><td>22:15</td></tr><tr><td>Mbale</td><td>23:30</td><td>24:00</td></tr><tr><td>Iganga</td><td>01:30</td><td>01:45</td></tr><tr><td>Jinja</td><td>02:05</td><td>02:55</td></tr><tr><td>Kampala</td><td>04:00</td><td></td></tr></table><br>• Look at the bus timetable.<br>a) Where does the bus start?<br>b) Where does it travel to?<br>c) How long does the whole journey take from start to finish? Give your answer in hours.<br>d) The bus travels for half the total journey time. Which should be the nearest station?<br>e) Rona lives in Kumi. She wants to travel to Mbale. It takes 40 minutes to walk from Rona's house to the Kumi bus station. What is the latest time that Rona should leave her house?<br>f) Give the time on the 12-hour clock when the bus will arrive at Mbale.<br>g) What is the total time the bus spends at the bus stations on its journey? Give your answer in hours and minutes.<br>h) Musa wants to travel from Jinja to Kumi. Can he use this bus for his journey? Explain your answer. |

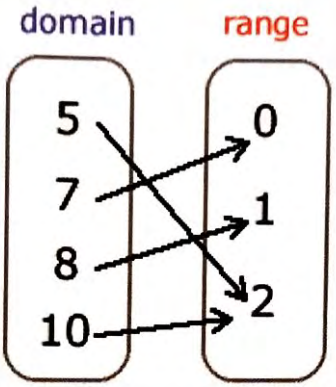
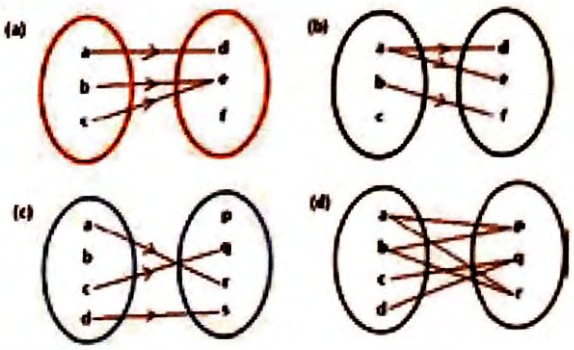
## SENIOR 2: TERM 1

## THEME: PATTERNS AND ALGEBRA

## TOPIC 1: MAPPINGS AND RELATIONS

**15 PERIODS**

**Competency:** The learner understands and uses arrow diagrams/mappings to represent relations and functions.

| LEARNING OUTCOMES | SUGGESTED LEARNING ACTIVITIES | SAMPLE ASSESSMENT STRATEGY |
|---|---|---|
| The learner should be able to:<br>a) Use arrow diagrams/mappings to represent relations and functions. (k u)<br>b) identify domain and range of a mapping (k u)<br>c) describe and distinguish between function and non-function mapping (u s) | <br>• Investigate situations where one set can be related to another and draw the mapping diagrams<br>• Determine the features that make a mapping a function | • Observe the learners in their groups as they complete the task below. Find out the learners' attitude towards the group work, are learners communicating effectively? Are they learning from one another? Are they creative and critical?<br>• Do these mapping diagrams represent functions? – give reasons for your answers.<br> |

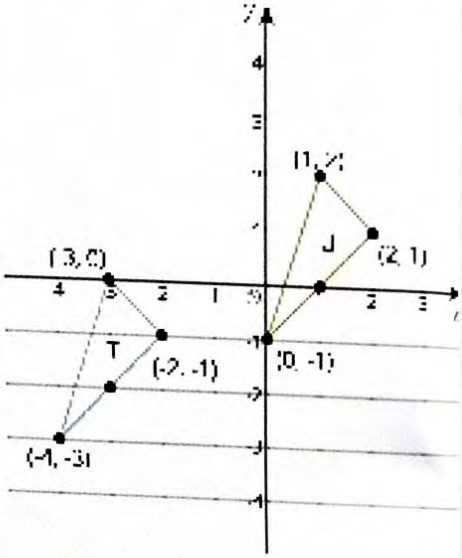
## SENIOR 2: TERM 1

## THEME: PATTERNS AND ALGEBRA

## TOPIC 2: VECTORS AND TRANSLATION

15 PERIODS

**Competency:** The learner understands the nature of vector, manipulate and represent them in order to define translation.

| LEARNING OUTCOMES | SUGGESTED LEARNING ACTIVITIES | SAMPLE ASSESSMENT STRATEGY |
|---|---|---|
| The learner should be able to:<br>a) define translation with a vector. (k u s)<br>b) identify scalars and vectors. (k u)<br>c) use vector notation. (k s)<br>d) represent vectors both single and combined geometrically. (u s) | • Distinguish scalars (magnitude only) and vectors (magnitude and direction), Investigate moving objects plotted on a coordinate grid without changing their orientation – use a vector (a ) to define the translation where a represents movement parallel to the x-axis and b represents movement parallel to the $y_b$-axis.<br>• Investigate how to 'undo' a translation; the effect of performing more than one translation – draw diagrams to illustrate findings.<br>• Isabirye wants to swim directly across a river. The river flows at a speed of 1.5 metres per second. Isabirye can swim at a speed of 2.5 metres per second. Use a scale drawing to find out:<br>*a) At what angle to the river bank should Isabirye face in order to swim directly across the river?*<br>*b) What will his velocity be?* | • In groups, let the learners discuss the following task. Observe them as they discuss the task. Assess the learners on the core values and generic skills.<br>• What is the vector that translates T to U?<br>• What is the vector that translates U to T?<br> |

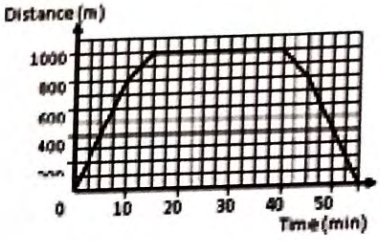
## SENIOR 2: TERM 1

## THEME: DATA AND PROBABILITY

## TOPIC 3: GRAPHS

**15 PERIODS**

**Competency:** The learner should plots, interprets and uses graphs to solve problems.

<table>
<tr><th>LEARNING OUTCOMES</th><th>SUGGESTED LEARNING ACTIVITIES</th><th>SAMPLE ASSESSMENT STRATEGY</th></tr>
<tr>
<td>The learner should be able to:<br>• tabulate values from given relations. (u)<br>• plot and draw lines through given points. (u, s)<br>• choose and uses appropriate scales. (u, s)<br>• draw, read and interpret the graph (e.g. Distance-Time and Speed-Time Graphs to estimate distance, speed and time). (u, s, v/a)</td>
<td>• Generate graphs for real life situations e.g. conversion graphs for currency and temperature (°C and °F), distance time graphs for journeys e.g. for the bus journey from Soroti to Kampala
<table>
<tr><th>BUS STATION</th><th>DISTANCE (KM)</th><th>ARRIVE</th><th>DEPART</th></tr>
<tr><td>Soroti</td><td></td><td></td><td>20:30</td></tr>
<tr><td>Kumi</td><td>50</td><td>22:00</td><td>22:15</td></tr>
<tr><td>Mbale</td><td>56</td><td>23:30</td><td>24:00</td></tr>
<tr><td>Iganga</td><td>107</td><td>01:30</td><td>01:45</td></tr>
<tr><td>Jinja</td><td>39</td><td>02:05</td><td>02:55</td></tr>
<tr><td>Kampala</td><td>84</td><td>0400</td><td></td></tr>
</table>
</td>
<td>• Let the learners carry out the following task in groups. Observe them as they discuss the activity. Assess the learners on the core values and generic skills.<br>• Atim visited her friend. The distance/time graph shows her journey.<br>

a) How far did Atim walk to reach her friend's house?<br>b) How long did Atim stay at the house?<br>c) How long did it take Atim to walk back from her friend's house?<br>d) Draw the speed-time graph for Atim's journey</td>
</tr>
</table>

## SENIOR 2: TERM1

## THEME: NUMBERS

15 PERIODS

## TOPIC 4: NUMERICAL CONCEPT 1 (INDICES)

**Competency:** The learner understands and uses indices and standard form.

| LEARNING OUTCOMES | SUGGESTED LEARNING ACTIVITIES | SAMPLE ASSESSMENT STRATEGY |
|---|---|---|
| The learner should be able to:<br>a) give approximate answers to calculations. (u, s)<br>b) write numbers to a given number of significant figures. (u, s)<br>c) differentiate between significant figures and decimal places. (u,s)<br>d) express numbers in standard form. (u)<br>e) Identify base number and index (k)<br>f) state and apply the laws of indices in calculations. (k, u, s)<br>g) use a calculator to find powers and roots. (k u s) | • Take a long strip of paper and successively fold in half. Complete the table below.<br><br>NUMBER OF FOLDS / NUMBER OF PARTS / IN INDEX FORM<br>0 / 1 /<br>1 / 2 /<br>2 / 4 / $2^2$<br>3 / /<br><br>• Use a calculator to explore how indices work, establishing general rules for multiplying and dividing numbers written in index form: $n^a \times n^b$ and $n^a \div n^b$<br>Investigate how to 'undo' powers e.g.<br>$4^2 = 16, \sqrt{16} = 16^{\frac{1}{2}} = 4$<br>$2^3 = 8, \sqrt[3]{8} = 8^{\frac{1}{3}} = 2$<br>• Watch the video 'powers of ten' to introduce powers of ten and standard form. How many particles in the universe? How far is it from the Earth to the moon? To the sun?<br>• Investigate numbers that can't be written exactly on a calculator e.g. thirds, sevenths, pi<br>• Investigate the difference between significant figures, decimal places and rounding to a given level of accuracy e.g. to the nearest hundred. | • In groups, let the learners discuss the following task and observe them as they discuss the activity. Assess the learners on the core values and generic skills.<br>a. In 2013 the National Social Security Fund had assets of about UGX 3.4 trillion.<br>a) How many millions are there in 3.4 trillion?<br>b) How many ten thousand are there in 3.4 trillion?<br>b. Akumu said, "$5^3 = 5 \times 3 = 15$."<br>Burango said, "$5^3 = 5 \times 5 \times 5 = 225$."<br>Who was correct? Justify your answer.<br>c. The population census of 1969 found that the population of Uganda was 9 500 000. The population census of 2011 found that it was 32 900 000.<br>Tushabe said,<br>"The population rose by 23 400 000."<br>Mariam said,<br>"The population rose by $2.34 \times 10^7$."<br>Who was correct? Justify your answer. |

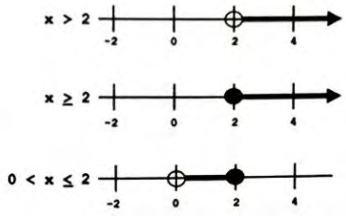
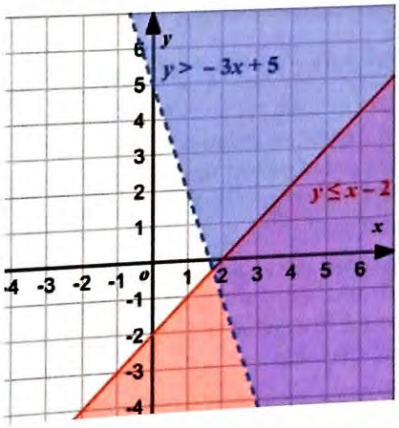
## SENIOR 2: TERM 2

## THEME: PATTERNS AND ALGEBRA

## TOPIC 5: INEQUALITIES AND REGIONS

**12 PERIODS**

**Competency:** The learner represents and solves problems involving inequalities.

| LEARNING OUTCOMES | SUGGESTED LEARNING ACTIVITIES | SAMPLE ASSESSMENT STRATEGY |
|---|---|---|
| The learner should be able to:<br>a) identify and use inequality symbols. (k s)<br>b) illustrate inequalities on the number lines. (u s)<br>c) solve linear inequalities in one unknown. (u s)<br>d) represent linear inequalities graphically. (k u s)<br>e) form simple linear inequalities for regions on a graph. (u s) | • Match inequalities on a number line with their algebraic representation<br><br><br>• Solve linear inequalities and represent the solution on a number line.<br>• Define regions on a coordinate graph using linear inequalities<br><br><br>• Play foxes and chickens – where chickens are positioned on a coordinate grid and inequalities are used as fences to protect the chickens from foxes | • Observe the learners in their groups as they carry out the activity below. Find out the learners' attitude towards the group work, integrity, are they doing the work in harmony?<br>• During the process of the description, are learners communicating effectively? are they learning from one another? are they creative?<br>• Solve the linear inequalities and represent the solutions on a number line<br>$2x+7<x+10$<br>$2x+7<x+10$<br>• Use inequalities to define a square region that has (1, 1) at its centre. |