ZIMBABWE

MINISTRY OF PRIMARY AND SECONDARY EDUCATION

ADDITIONAL MATHEMATICS SYLLABUS

FORMS 5 - 6

2015 - 2022

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- Representatives from Higher and Tertiary institutions

CONTENTS

1.0 PREAMBLE

1.1 INTRODUCTION

The Form 5 – 6 Additional Mathematics syllabus builds on the Form 3 - 4 Additional Mathematics syllabus and is designed to cater for the needs of post Form 4, mathematically outstanding learners. The teaching and learning that is based on the syllabus provides further opportunities for such learners to enjoy doing and using mathematics and, in the process developing a deeper appreciation and understanding of the nature of mathematics, its pivotal role in Science, Technology, Engineering and Mathematics (STEM) and life in general and hence promoting sustainable development. The intention is to provide a firm basis on which to pursue further studies in mathematics and related areas which are critical for national development and global competitiveness in the 21st century. In addition to providing a firm base, the learning area is also expected to enhance learners' confidence and sense of self fulfilment, collegiality and intellectual honesty, hence contributing to their growth in the acquisition of Unhu/Ubuntu//Vumunhu values.

1.2 RATIONALE

In its socio-economic transformation agenda, Zimbabwe has embarked on an industrialisation development strategy, where high level mathematical knowledge and skills are a prerequisite. To this end, Additional Mathematics learners are expected to emerge with a solid basis for further studies in STEM, and with enhanced mathematical competencies. These include abstract and analytical thinking, logical reasoning, designing algorithms, communicating mathematical information effectively, conjecturing and proving conjectures, modelling life phenomena into mathematical language in order to better understand those phenomena and to solve related problems and applying mathematics in a wide variety of contexts. It is from the pool of individuals with such competencies that some of Zimbabwe's most creative thinkers, innovators, inventors and mathematically literate entrepreneurs are expected to emerge. This is critical for sustainable development.

1.3 SUMMARY OF CONTENT

The Form 5- 6 Additional Mathematics syllabus will cover the theoretical concepts and their applications. This two year learning area consists of Pure Mathematics, Mechanics and Statistics.

1.4 ASSUMPTIONS

The syllabus assumes that the learner:

- has a talent in mathematics
- has a high pass in Mathematics or a pass in either Pure Mathematics or Additional Mathematics at Form 4.
- Is excelling in Pure Mathematics at Form 5

1.5 CROSS- CUTTING ISSUES

The following are some of the cross cutting themes catered for in the teaching and learning of Additional Mathematics:-

- Business and financial literacy
- Disaster and risk management
- Communication
- Team building
- Problem solving
- Environmental issues
- Enterprise skills
- Information Communication and Technology (ICT)
- HIV & AIDS

2.0 PRESENTATION OF SYLLABUS

The Additional Mathematics syllabus is a single document covering Form 5–6. It contains the preamble, aims, objectives, syllabus topics, scope and sequence, competency matrix and assessment procedures. The syllabus also suggests a list of resources to be used during the teaching and learning process.

3.0 AIMS

The syllabus will enable learners to:

3.1 further develop mathematical knowledge and skills in a way that promotes fulfilment and enjoyment and lays a firm foundation for further studies and lifelong learning

3.2 acquire an additional range of mathematical skills, particularly those applicable to other learning areas and various life contexts, including enterprise

3.3 enhance confidence, critical thinking, innovativeness, creativity and problem solving skills for sustainable development

3.4 develop a greater appreciation of the role of mathematics in personal, community and national development in line with Unhu/Ubuntu/ Vumunhu
3.5 further develop an appreciation for and ability to use I.C.T tools in solving problems in mathematical and other contexts
3.6 develop the ability to communicate mathematical ideas and to learn cooperatively

4.0 OBJECTIVES

The learners should be able to:

4.1 use mathematical skills and techniques that are necessary for further studies
4.2 use mathematical models to solve problems in life and for sustainable development
4.3 use I.C.T tools in solving problems in mathematical and other contexts
4.4 demonstrate expertise, perseverance, cooperation and intellectual honesty for personal, community and national development
4.5 interpret mathematical results and their implications in life
4.6 communicate mathematical results and their implications in life
4.7 draw inferences through correct manipulation of data
4.8 conduct research projects including those related to enterprise
4.9 apply relevant mathematical notations and terms in problem solving
4.10 present data through appropriate presentations
4.11 apply mathematical skills in other learning areas
4.12 conduct mathematical proofs

5.0 METHODOLOGY AND TIME ALLOCATION

5.1 Methodology

A constructivist based teaching and learning approach is recommended for the Form 5 – 6 Additional Mathematics Syllabus. The theoretical basis for this approach is that: in a conducive environment with appropriate stimuli, learners' capacity to build on their pre-requisite knowledge and create new mathematical knowledge is enhanced. A conducive environment in this context is one that encourages creativity and originality; a free exchange of ideas and information; inclusivity and respect for each other's views, regardless of personal circumstances (in terms of, for example: gender, appearance, disability and religious beliefs); collaboration and cooperation; intellectual honesty; diligence and persistence; and Unhu/ Ubuntu /Vumunhu. This is particularly important in a learning area like mathematics, given the negative attitudes associated with its teaching and learning.

Providing appropriate stimuli has to do with posing relevant challenges that excite learners, and help to make learning Additional Mathematics an enjoyable, fulfilling experience. Such challenges could be posed in the form of problems that encourage learners to create new mathematical ideas in line with the teacher expectations and even beyond. New knowledge acquired in such a manner tends to be deep rooted and meaningful to learners, hence enhancing their ability to apply it within the learning area and in life. Definitely spoon feeding is not and cannot be an appropriate stimulus, as it does not help learners to develop critical thinking, creativity, and the ability to think outside the box, which are critical for self-reliance, national sustainable development and global competitiveness. Thus learners need to be active participants and decision makers in the Additional Mathematics teaching and learning process, with the teacher playing the facilitator's role.
Pre-requisite knowledge and skills refers to what the learners should already know and can do, which can form a strong basis on which to construct the expected new knowledge. Thus the Additional Mathematics teacher needs to carefully analyse the new concepts and principles he/she intends to introduce, identify the relevant pre-requisite knowledge, assess to identify any gaps, and take appropriate steps to fill such gaps.
The following, is a list of teaching and learning approaches that are consistent with, and supportive of the above approach:

5.1.1 Guided discovery
5.1.2 Group work
5.1.3 Interactive e-learning
5.1.4 Problem solving
5.1.5 Discussion
5.1.6 Modelling
5.1.7 Visual tactile

The above suggested methods should be enhanced through the application of multi-sensory (inclusive) approaches.

5.2 Time Allocation

10 periods of 35 minutes each per week should be allocated.
Learners are expected to participate in the following activities:-

- Mathematics Olympiads
- Mathematics and Science exhibitions
- Mathematics seminars
- Mathematical tours to tertiary and other institutions

6.0 TOPICS

The following topics will be covered from Form 5 - 6

6.1 Pure Mathematics

6.1.1 Algebra
6.1.2 Series
6.1.3 Trigonometry
6.1.4 Mathematical Induction
6.1.5 Geometry and Vectors
6.1.6 Calculus

6.2 Mechanics

6.2.1 Particle dynamics
6.2.2 Elasticity
6.2.3 Energy, work and power
6.2.4 Circular motion
6.2.5 Simple harmonic motion

6.3 Statistics

6.3.1 Probability
6.3.2 Random Variables
6.3.3 Sampling and estimation
6.3.4 Statistical inference
6.3.5 Bivariate data

7.0 SCOPE AND SEQUENCE

7.1 PURE MATHEMATICS

TOPIC 1: ALGERBRA

TOPICS	FORM 5	FORM 6
RATIONAL FUNCTIONS	• Partial Fractions • Oblique Asymptotes • Graphs	
MATRICES AND LINEAR SPACES	• Linear equations • Spaces and subspaces	
GROUPS	• Properties • Order of elements • Simple subgroups • LaGrange's theorem • Structure of finite groups • Isomorphism	

TOPIC 2: SERIES

SUBTOPIC	FORM 5	FORM 6
SUMMATION OF SERIES	• Standard results • $(\sum r, \sum r^2, \sum r^3)$ • Method of differences • Sum to infinity	

TOPIC 3: TRIGONOMETRY

SUBTOPIC	FORM 5	FORM 6
HYPERBOLIC FUNCTIONS	• Six hyperbolic functions • Identities • Inverse notation	

TOPIC 4: MATHEMATICAL INDUCTION

SUBTOPIC	FORM 5	FORM 6
MATHEMATICAL INDUCTION	• Proof by induction • Conjecture	

TOPIC 5: GEOMETRY AND VECTORS

SUBTOPIC	FORM 5	FORM 6
POLAR COORDINATES	• Cartesian and polar coordinates • Polar coordinates curves • Area of a sector	
VECTOR GEOMETRY	• Triple scalar product • Cross product • Equations of lines and planes	

TOPIC 6: CALCULUS

SUBTOPIC	FORM 5	FORM 6
POLAR COORDINATES	• Cartesian and polar coordinates • Polar coordinates curves • Area of a sector	
VECTOR GEOMETRY	• Triple scalar product • Cross product • Equations of lines and planes	

7.2 MECHANICS

TOPIC 1: PARTICLE DYNAMICS

SUBTOPIC	FORM 5	FORM 6
KINEMATICS OF MOTION		• Motion in a straight line • Velocity • Acceleration • Displacement - time velocity-time and acceleration-time graphs • Equation of motion for constant linear acceleration • Vertical motion under gravity • Motion and constant velocity
NEWTON'S LAWS OF MOTION		• Newton's laws of motion - Motion caused by a set of forces - Concept of mass and weight • Motion of connected objects
MOTION OF A PROJECTILE		• Projectile • Motion of a projectile

		• Velocity and displacements • Range on horizontal plane • Greatest height • Maximum range • Cartesian equation of a trajectory of a projectile

TOPIC 2: ELASTICITY

SUBTOPIC	FORM 5	FORM 6
ELASTICITY		• Properties of elastic strings and springs • Work done in stretching a string • Elastic potential energy • Mechanical energy • Conservation of mechanical energy

TOPIC 3: ENERGY, WORK AND POWER

SUBTOPIC	FORM 5	FORM 6

ENERGY, WORK AND POWER		• Energy
		  - Gravitational potential
		  - Elastic potential
		  - Kinetic
		• Work
		• Power
		• Principle of energy conservation

TOPIC 4: CIRCULAR MOTION

SUBTOPIC	FORM 5	FORM 6
CIRCULAR MOTION **(Vertical and Horizontal)**		• Angular speed and velocity • Horizontal and vertical circular motion • Acceleration of a particle moving on a circle • Motion in a circle with constant speed • Centripetal force • Relation between angular and linear speed • Conical pendulum • Banked tracks

TOPIC 5: SIMPLE HARMONIC MOTION

SUBTOPIC	FORM 5	FORM 6
SIMPLE HARMONIC MOTION		• Basic equation of simple harmonic motion • Properties of simple harmonic motion

7.3 STATISTICS

TOPIC 1: PROBABILITY

SUBTOPIC	FORM 5	FORM 6
PROBABILITY		• Events - Independent - Mutually exclusive - Exhaustive - Combined • Conditional probability • Tree diagrams • Outcome tables • Venn diagrams • Permutations and combinations

TOPIC 2: RANDOM VARIABLES

SUBTOPIC	FORM 5	FORM 6
RANDOM VARIABLES (discrete and continuous)		• Probability distributions • Expectation • Variance • Probability density functions (pdf) and cumulative distribution functions (cdf) • Mean, median, mode, standard deviation and percentiles
DISTRIBUTIONS		• Binomial distribution • Poisson distribution • Normal distribution • Standard normal tables • Continuity correction • Linear combinations of normal and Poisson distributions

TOPIC 3: SAMPLING AND ESTIMA-

SUBTOPIC	FORM 5	FORM 6
SAMPLING TECHNIQUES AND ESTIMATION		• Probability sampling techniques • Non-probability sampling techniques • Estimation of population parameters • Central limit theorem • Confidence intervals

TOPIC4: STATISTICAL INFERENCE

SUBTOPIC	FORM 5	FORM 6
HYPOTHESIS TESTING		• Null hypothesis • Alternative hypothesis • Test statistics • Significance level • Hypothesis test (1-tail and 2-tail) • Type 1 and type 2 errors • z- tests • t – tests • chi-squared tests

TOPIC 5: BIVARIATE DATA

SUBTOPIC	FORM 5	FORM 6
HYPOTHESIS TESTING		• Null hypothesis • Alternative hypothesis • Test statistics • Significance level • Hypothesis test (1-tail and 2-tail) • Type 1 and type 2 errors • z- tests • t – tests • chi-squared tests

8.0 COMPETENCY MATRIX

FORM FIVE (5)

PURE MATHEMATICS

TOPIC 1: ALGEBRA

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT **(Attitudes, Skills and Knowledge)**	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
RATIONAL FUNCTIONS	• express rational functions in partial fractions • determine key features of rational function graphs, including oblique asymptotes in cases where degree of numerator and denominator are at most two	• Partial Fractions • Oblique Asymptotes • Graphs	• Expressing rational functions in partial fractions • Exploring and determining key features of rational function graphs, including oblique asymptotes in cases where degree of numerator and denominator are at most two	• ICT tools • Relevant texts • Geo-board • Braille materials • Talking books

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	• sketch graphs of rational functions • solve problems involving rational functions		• Sketching graphs of rational functions, including the determination of oblique asymptotes • Solving problems involving rational functions	
MATRICES AND LINEAR SPACES	• define the systems of linear equations • determine consistency or inconsistency of systems of linear equations • interpret geometrically the consistency or inconsistency of systems of linear equations • relate to singularity the corresponding square matrix of a system of linear equations • solve linear equations of consistent systems • solve problems involving	• Linear equations • Spaces and subspaces	• Discussing the systems of linear equations • Discussing and determining the consistency or inconsistency of systems of linear equations • Interpreting geometrically the consistency or inconsistency of systems of linear equations • Relating to singularity the corresponding square matrix of a system of linear equations • Solving linear equations of consistent systems • Solving problems involving systems of linear equations	• ICT tools • Relevant texts • Environment • Braille materials • Talking books

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	systems of linear equations • define a linear space and a sub-space • solve problems involving linear spaces and sub-spaces		• Discussing properties of linear spaces and sub-spaces • Solving problems involving linear spaces and sub-spaces	
GROUPS	• define a group • determine whether or not a given structure is a group • define the order of the group and elements of a group • define a subgroup • determine whether or not a given structure is a sub group in simple cases • state the LaGrange's theorem • apply the LaGrange's theorem concerning the order	• Properties • Order of elements • Simple subgroups • LaGrange's theorem • Structure of finite groups • Isomorphism	• Discussing groups and determining whether or not a given structure is a group • Determining the order of a group and the order of elements of a group • Discussing subgroups and determining whether or not a given structure is a subgroup in simple cases • Discussing and applying the LaGrange's theorem concerning	• ICT tools • Relevant texts • Braille materials • Talking books

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	of a subgroup of a finite group • define a cyclic group • demonstrate familiarity with the structure of a finite group up to order 7 • define isomorphism between groups • determine whether or not given finite groups are isomorphic • solve problems involving groups		the order of a subgroup of a finite group • Discussing and finding examples of cyclic groups • Exploring properties of structures of finite groups up to order 7 • Discussing and determining whether or not given finite groups are isomorphic • Solving problems involving groups	

TOPIC 2: SERIES

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
SUMMATION OF SERIES	• use the standard results to find related sums • derive the method of differences • find the sum of finite series using method of differences • determine the sum to infinity of a convergent series by considering the sum to n terms • solve problems involving series	• Standard results $(\sum r, \sum r^2, \sum r^3)$ • Method of differences • Sum to infinity	• Finding related sums using the standard results • Exploring and deriving the method of differences • Using method of differences to find the sum of finite series • Computing the sum to infinity of a convergent series by considering the sum to n terms • Solving problems involving series • Representing life phenomena using mathematical models involving series and exploring their applications in life	• ICT tools • Relevant texts • Braille materials • Talking books

TOPIC 3: TRIGONOMETRY

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
HYPERBOLIC FUNCTIONS	• define the six hyperbolic functions in terms of exponentials • sketch the graphs of hyperbolic functions • derive identities involving hyperbolic functions • use hyperbolic identities in solving problems • denote the principal values of the inverse hyperbolic relations using the inverse notations • derive hyperbolic expressions in terms of logarithms • use hyperbolic expressions in terms of logarithms to solve problems	• Six hyperbolic functions • Identities • Inverse notation	• Discussing the six hyperbolic functions in terms of exponentials • Sketching the graphs of hyperbolic functions • Deriving and using identities involving hyperbolic functions to solve problems • Using the inverse notations to denote the principal values of the inverse hyperbolic relations • Deriving and using hyperbolic expressions in terms of logarithms to solve problems • Solving problems involving hyperbolic functions • Representing life phenomena using mathematical models involving series and exploring	• ICT tools • Relevant texts • Environment • Resource persons Braille materials • Talking books

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	• solve problems involving hyperbolic functions		their applications in life	

TOPIC 5: MATHEMATICAL INDUCTION

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
MATHEMATICAL INDUCTION	• describe the process of mathematical induction • prove by mathematical induction to establish a given result • use the strategy of conducting limited trials to formulate a conjecture and proving it by the method of induction	• Proof by induction • Conjecture	• Discussing the processes of mathematical induction • Proving by mathematical induction to establish given results • Conducting limited trials to formulate conjecture and proving it by the method of induction	• ICT Tools • Relevant Texts • Braille materials • Talking books

TOPIC 6: GEOMETRY AND VECTORS

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
POLAR COORDINATES	• explain the relationship between Cartesian and polar coordinates for $r \geq 0$ • convert equations of curves from Cartesian to polar and vice versa • sketch simple polar curves for $0 \leq \theta < 2\pi$ or $-\pi < \theta \leq \pi$, showing significant features such as symmetry, the form of the curve at the pole and least/greatest values of r	• Cartesian and polar coordinates • Polar coordinates curves • Area of a sector	• Discussing the appropriateness of using Cartesian or polar coordinates • Converting equations of curves from Cartesian to polar and vice versa • Sketching simple polar curves for $0 \leq \theta < 2\pi$ or $-\pi < \theta \leq \pi$, showing significant features such as symmetry, the form of the curve at the pole and least/greatest values of r	• ICT Tools • Relevant Texts • Braille materials • Talking books

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	• derive the formula $\frac{1}{2}\int_{\alpha}^{\beta} r^2 \, \mathbf{d}\theta$ for the area of a sector in simple cases • use the formula $\frac{1}{2}\int_{\alpha}^{\beta} r^2 \, \mathbf{d}\theta$ for the area of a sector in simple cases • solve problems involving polar coordinates		• Deriving and using the formula $\frac{1}{2}\int_{\alpha}^{\beta} r^2 \, \mathbf{d}\theta$ for the area of a sector in simple cases • Solving problems involving polar coordinates • Representing life phenomena using mathematical models involving polar coordinates and exploring their applications in life	
VECTOR GEOMETRY	• determine the vector product of two given vectors • calculate the triple scalar product of given vectors • interpret the triple scalar product and cross product in geometrical terms • solve problems concerning distances, angles and intersections using equations of lines and planes.	• Triple scalar product • Cross product • Equations of lines and planes	• Calculating the vector product of two given vectors • Computing the triple scalar product of given vectors • Discussing the triple scalar and cross product in geometrical terms • Solving problems concerning distances, angles and intersections using equations of lines and planes.	• ICT Tools • Relevant Texts • Environment • Braille materials • Talking books

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
			• Representing life phenomena using mathematical models involving vector geometry and exploring their applications in life	

TOPIC 7: CALCULUS

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
DIFFERENTIATION AND INTEGRATION	• derive an expression for $\frac{d^2y}{dx^2}$ in cases where the relation between x and y is defined implicitly or parametrically • deduce the relationship between the sign of $\frac{d^2y}{dx^2}$ and	• Higher order differentiation • Concavity • Reduction formulae • Arc lengths • Surface areas of revolution • Differentiation and Integration of inverse trigonometric	• Deriving an expression for $\frac{d^2y}{dx^2}$ in cases where the relation between x and $y$is defined implicitly or parametrically • Exploring and deducing the relationship between the sign of	• ICT Tools • Relevant Texts • Braille materials • Talking books

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	concavity • determine the points of inflexion using $\frac{d^2y}{dx^2}$ • derive the derivatives of inverse trigonometric and hyperbolic functions • apply the derivatives of inverse trigonometric and hyperbolic functions in problem solving • find definite or indefinite integrals using appropriate trigonometric or hyperbolic substitution • integrate rational functions by means of decomposition into partial fractions • derive reduction formulae for the evaluation of definite integrals in simple cases • find definite integrals using	functions and hyperbolic functions	$\frac{d^2y}{dx^2}$ and concavity • Finding points of inflexion using $\frac{d^2y}{dx^2}$ • Exploring and deriving the derivatives of inverse trigonometric and hyperbolic functions • Applying the derivatives of inverse trigonometric and hyperbolic functions in problem solving • Finding definite or indefinite integrals using appropriate trigonometric or hyperbolic substitution • Integrating rational functions by means of decomposition into partial fractions • Exploring and deriving reduction formulae for the evaluation of definite integrals in simple cases • Finding definite integrals using	

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	reduction formula • find arc lengths for curves with equations in Cartesian coordinates including use of a parameter or in polar form • find the area of surface of revolution when an arc is rotated about one of the coordinate axes, given that the equation of the curve containing the arc is in Cartesian or parametric form • solve problems involving differentiation and integration		reduction formula • Finding arc lengths for curves with equations in Cartesian coordinates including use of a parameter or in polar form • Determining the area of surface of revolution when an arc is rotated about one of the coordinate axes, given that the equation of the curve containing the arc is in Cartesian or parametric form • Solving problems involving differentiation and integration • Representing life phenomena using mathematical models involving differentiation and integration and exploring their applications in life	
DIFFERENTIAL EQUATIONS	• find the general solution of a first order linear differential equation by means of an	• First order differential equations • Second order differential	• Determining general solutions of first order linear differential equations by means of integrating	• ICT Tools • Relevant Texts

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	integrating factor • define a 'complementary function' and a 'particular integral' in the context of linear differential equations • use a given substitution to reduce a first order differential equation to linear form or to a form in which variables are separable • find the complimentary function of a first or second order linear differential equation with constant coefficients • determine a particular integral for a first or second order linear differential equation in the case where $ax + b$ or ae^{bx} or $acos\,(px) + bsin(px)$ is a suitable form.	equations • Complementary function • General and Particular integrals • Substitution • Particular solution	factors • Discussing complementary functions and particular integrals in the context of linear differential equations • Applying given substitutions to reduce first order differential equations to linear form or to forms in which variables are separable • Finding complimentary functions of first or second order linear differential equations with constant coefficients • Determining particular integrals for first or second order linear differential equations in the case where $ax + b$ or ae^{bx} or $acos\,(px) + bsin\,(px)$ is a suitable form. • Finding appropriate coefficients of	• Braille materials • Talking books

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	• find the appropriate coefficient (s) of a first or second order differential equation given a suitable form of a particular integral • find a particular solution to a differential equation using initial conditions • interpret particular solutions in the context of problems modelled by differential equations • solve problems involving differential equations		first or second order differential equations given suitable forms of particular integrals • Determining particular solutions to differential equations using initial conditions • Interpreting particular solutions in the context of problems modelled by differential equations • Solving problems involving differential equations • Representing life phenomena using mathematical models involving differential equations and exploring their applications in life	

FORM SIX (6)

MECHANICS

TOPIC 1: PARTICLE DYNAMICS

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
KINEMATICS OF MOTION	• use differentiation and integration with respect to time to solve problems concerning displacement, velocity and acceleration • sketch the graphs of: (x-t), (s-	• Motion in a straight line • Velocity • Acceleration • Displacement - time velocity-time and acceleration-time graphs	• Discussing distance(x) displacement(s), speed, velocity(v) and acceleration(a) • Solving problems concerning displacement, velocity and acceleration using differentiation	• ICT tools • Geo-board • Environment • Relevant texts • Braille materials • Talking books

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	t), (v-t) and (a-t) • interpret the (x-t), (s-t), (v-t) and (a-t) graphs • derive the equations of motion of a particle with constant acceleration in a straight line • use the equations of motion of a particle with constant acceleration in a straight line to solve kinematics problems • solve problems involving kinematics of motion in a straight line including vertical motion under gravity	• Equation of motion for constant linear acceleration • Vertical motion under gravity • Motion and constant velocity	and integration • Sketching (x-t), (s-t), (v-t) and (a-t) graphs • Interpreting the (x-t), (s-t), (v-t) and (a-t) graphs • Deriving the equations of motion of a particle with constant acceleration in a straight line • Solving kinematics problems • Representing life phenomena using mathematical models involving kinematics of motion in a straight line and exploring their applications in life	

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
NEWTON'S LAWS OF MOTION	• state Newton's laws of motion • apply Newton's laws of motion to the linear motion of a body of constant mass moving under the action of constant forces • solve problems using the relationship between mass and weight • solve problems involving the motion of two particles, connected by a light inextensible string which may pass over a fixed, smooth, light pulley or peg • model the motion of the body moving vertically or on an inclined plane as motion with constant acceleration • solve problems involving	• Newton's laws of motion • Motion caused by a set of forces • Concept of mass and weight • Motion of connected objects	• Discussing the Newton's laws of motion • Applying Newton's laws of motion to the linear motion of a body of constant mass moving under the action of constant forces • Solving problems using the relationship between mass and weight • Solving problems involving the motion of two particles, connected by a light inextensible string which may pass over a fixed, smooth, light pulley or peg • Solving problems involving Newton's laws of motion • Modelling the motion of a body moving vertically or on an inclined plane as motion with	• ICT tools • Geo-board • Environment • Relevant texts • Braille materials • Talking books

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	Newton's laws of motion		constant acceleration • Representing life phenomena using mathematical models involving Newton's laws of motion and exploring their applications in life	
MOTION OF A PROJECTILE	• model the motion of a projectile as a particle moving with constant acceleration • solve problems on the motion of projectiles using horizontal and vertical equations of motion • find the magnitude and the	• Projectile - Motion of a projectile - Velocity and displacements • Range on horizontal plane • Greatest height • Maximum range • Cartesian equation of a trajectory of a projectile	• Modelling the motion of a projectile as a particle moving with constant acceleration • Applying horizontal and vertical equations of motion in solving problems on the motion of projectiles • Calculating the magnitude and the direction of the velocity at a	• ICT tools • Geo-board • Environment • Relevant texts • Braille materials • Talking books

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	direction of the velocity at a given time or position • find the range on the horizontal plane and height reached • derive formulae for greatest height and maximum range • derive the Cartesian equation of a trajectory of a projectile • solve problems using the Cartesian equation of a trajectory of a projectile		given time or position • Finding the range on the horizontal plane and height reached • Deriving formulae for greatest height and maximum range • Deriving the Cartesian equation of a trajectory of a projectile • Solving problems using Cartesian equation of a trajectory of a projectile	

TOPIC 2: ELASTICITY

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
ELASTICITY	• define elasticity in strings and springs • explain Hooke's law • calculate modulus of elasticity • solve problems involving forces due to elastic strings or springs including those where consideration of work and energy are needed	• Properties of elastic strings and springs • Work done in stretching a string • Elastic potential energy • Mechanical energy • Conservation of mechanical energy	• Discussing elasticity in strings and springs • Explaining Hooke's law • Conducting experiments to verify Hooke's law • Calculating modulus of elasticity • Solving problems involving forces due to elastic strings or springs including those where consideration of work and energy are needed • Representing life phenomena using mathematical models involving elasticity and exploring their applications in life	• ICT tools • Relevant texts • Environment • Braille materials • Talking books

TOPIC 3: ENERGY WORK

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
CIRCULAR MOTION **(Vertical and Horizontal)**	• derive the formula for speed, velocity and acceleration of a particle moving in a circle • explain the concept of angular speed for a particle moving in a circle with constant speed • distinguish between horizontal and vertical motion • calculate angular speed for a particle moving in a circle with constant speed • calculate acceleration of a particle moving in a circle with constant speed • solve problems which can be modelled as the motion of a particle moving in a horizontal circle with constant speed	• Angular speed and velocity • Horizontal and vertical circular motion • Acceleration of a particle moving on a circle • Motion in a circle with constant speed • Centripetal force • Relation between angular and linear speed • Conical pendulum • Banked tracks	• Exploring and deriving the formula for speed, velocity and acceleration of a particle moving in a circle • Discussing the concept of angular speed for a particle moving in a circle with constant speed • Distinguishing between the concepts of horizontal and vertical motion in a circle • Computing angular speed for a particle moving in a circle with constant speed • Calculating acceleration of a particle moving in a circle with constant speed • Solving problems which can be modelled as the motion of a particle moving in a horizontal	• ICT tools • Relevant texts • Environment • Simple pendulum • Braille materials • Talking books

TOPIC 4: CIRCULAR MOTION

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
CIRCULAR MOTION **(Vertical and Horizontal)**	• derive the formula for speed, velocity and acceleration of a particle moving in a circle • explain the concept of angular speed for a particle moving in a circle with constant speed • distinguish between horizontal and vertical motion • calculate angular speed for a particle moving in a circle with constant speed • calculate acceleration of a particle moving in a circle with constant speed • solve problems which can be modelled as the motion of a particle moving in a horizontal circle with constant speed	• Angular speed and velocity • Horizontal and vertical circular motion • Acceleration of a particle moving on a circle • Motion in a circle with constant speed • Centripetal force • Relation between angular and linear speed • Conical pendulum • Banked tracks	• Exploring and deriving the formula for speed, velocity and acceleration of a particle moving in a circle • Discussing the concept of angular speed for a particle moving in a circle with constant speed • Distinguishing between the concepts of horizontal and vertical motion in a circle • Computing angular speed for a particle moving in a circle with constant speed • Calculating acceleration of a particle moving in a circle with constant speed • Solving problems which can be modelled as the motion of a particle moving in a horizontal	• ICT tools • Relevant texts • Environment • Simple pendulum • Braille materials • Talking books

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	• solve problems which can be modelled as the motion of a particle moving in a vertical circle with constant speed • find the relationship between angular and linear speed • calculate tension in a string and angular speed in a conical pendulum • solve problems involving banked tracks. • solve problems which can be modelled as the motion of a particle moving in a horizontal circle with constant speed using Newton's second law		and vertical circle with constant speed • Discussing the relationship between angular and linear speed • Computing tension in a string and angular speed in a conical pendulum • Representing life phenomena using mathematical models involving circular motion and exploring their applications in life	

TOPIC 5: SIMPLE HARMINIC MOTION

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
SIMPLE HARMONIC MOTION	• define simple harmonic motion • solve problems using the standard simple harmonic motion formula • formulate differential equations of motion in problems leading to simple harmonic motion • solve differential equations involving simple harmonic motion to obtain the period and amplitude of the motion	• Basic equation of simple harmonic motion • Properties of simple harmonic motion	• Discussing simple harmonic motion • Conducting experiments to demonstrate simple harmonic motion using a pendulum • Solving problems using the standard simple harmonic motion formula • Formulating differential equations of motion in problems leading to simple harmonic motion • Solving differential equations involving simple harmonic motion to obtain the period and amplitude of the motion • Representing life phenomena using mathematical models involving simple harmonic motion and exploring their applications in	• ICT tools • Relevant texts • Environment • Pendulum • Braille materials • Talking books

STATISTICS

TOPIC 1: PROBABILITY

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
PROBABILITY	• define probability key terms • calculate probabilities of events • solve problems involving conditional probability • use tree diagrams, Venn diagrams and outcome tables to solve problems • use the notations n!, ${}^{n}\mathrm{P}r$ and $\binom{n}{r}$ • define permutations and combinations • solve problems involving permutations and combinations	• Events - Independent - Mutually exclusive - Exhaustive - Combined • Conditional probability • Tree diagrams • Outcome tables • Venn diagrams • Permutations and combinations	• Discussing the importance of probability in life • Computing probabilities of a variety of events • Applying conditional probability concepts in solving problems • Solving problems using tree diagrams, Venn diagrams and outcome tables • Carrying out experiments involving probability • Using the notations n!, ${}^{n}\mathrm{P}r$ and $\binom{n}{r}$ • Explaining the meanings of permutations and combinations • Solving problems involving permutations and combinations	• ICT tools • Relevant texts • Braille materials • Talking books

TOPIC 2: RANDOM VARIABLES

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
RANDOM VARIABLES (discrete and continuous)	• define a random variable • construct a probability distribution table • define expectation • use the probability density functions and cumulative distribution functions to calculate probabilities • calculate mean, mode, median, standard deviation, variance and percentiles • use integration to calculate cumulative distribution function from probability density function • use differentiation to calculate probability density function from cumulative distribution function	• Probability distributions • Expectation • Variance • Probability density functions (pdf) and cumulative distribution functions (cdf) • Mean, median, mode, standard deviation and percentiles	• Discussing examples of random variables • Constructing probability distribution tables • Calculating mean, mode, median, standard deviation, variance and percentiles • Solving problems involving mean, variance and standard deviation • Discussing the difference between a discrete random variable and a continuous random variable • Discussing the significance of probability density function and cumulative distribution function of a continuous random variable • Computing probabilities using both pdf and cdf	• ICT tools • Relevant texts • Braille materials • Talking books

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	• solve problems involving probability density function		• Solving problems involving pdf and cdf	
DISTRIBUTIONS	• Outline the characteristics of Binomial, Poisson and Normal distributions • calculate the mean, variance and standard deviation of each distribution • calculate probabilities for the distributions • explain the characteristics of a normal distribution curve • standardize a random variable • use the standard normal tables to obtain probabilities • approximate the binomial using the normal distribution	• Binomial distribution • Poisson distribution • Normal distribution • Standard normal tables • Continuity correction • Linear combinations of normal and Poisson distributions	• Discussing the characteristics of Binomial, Poisson and Normal distributions • Computing the mean, variance and standard deviation of each distribution • Calculating probabilities using the probability density functions of the distributions • Discussing the characteristics of a normal distribution curve, giving life examples • Standardizing random variables • Obtaining probabilities using standard normal tables • Using the normal distribution model to approximate the	• ICT tools • Relevant texts • Environment • Braille materials • Talking books

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	where *n* is large enough to ensure that $np > 5$ and $nq > 5$ and apply continuity correction • use the normal distribution as a model to solve problems • use the following facts to solve problems: - E(aX±b) = aE(X) ± b and Var(aX±b) = a^2Var(X) - E(aX±bY) = aE(X)±bE(Y) - Var(aX±bY) = a^2Var(X)+ b^2Var(Y) for independent X and Y • use the results that: - If X has a normal distribution, then so does aX + b - If X and Y have independent normal distributions, then aX + bY has a normal		binomial distribution • Using the normal distribution as a model to solve problems • Discussing examples of linear combinations • Calculating probabilities, mean and variance of a sum of two or more independent variables for Poisson or normal distribution • Solving problems involving linear combinations and their applications in life • Solving problems involving distributions • Representing life phenomena using mathematical models involving distributions and exploring their applications in life	

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	distribution - If X and Y have independent Poisson distributions, then X + Y has a Poisson distribution • solve problems involving the distributions			

TOPIC 3: SAMPLING AND ESTIMATIONS

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
SAMPLING TECHNIQUES AND ESTIMATION	• distinguish between a sample and a population • distinguish between probability sampling techniques and non-probability sampling techniques • apply the sampling methods to identify representative samples • calculate sample mean, variance and standard deviation • find the unbiased estimates of population parameters • state the Central Limit Theorem • recognize that the sample mean can be regarded as a random variable	• Probability sampling techniques • Non-probability sampling techniques • Estimation of population parameters • Central limit theorem • Confidence intervals	• Discussing the difference between a sample and a population, probability sampling and non-probability sampling techniques • Identifying and discussing situations in which probability and non-probability sampling methods are used • Carrying out sampling in a practical situation • Computing sample mean, variance and standard deviation • Determining the unbiased estimates of population parameters • Deriving the Central Limit Theorem • Explaining how the sample mean can be regarded as a random variable	• ICT tools • Relevant texts • Environment • Braille materials • Talking books

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	• use the Central Limit Theorem in solving problems • identify the implications of the Central Limit Theorem on small and large samples • determine a confidence interval for a population mean in cases where the population is normally distributed with known variance or where a large sample with unknown variance is used • determine a confidence interval for a population mean in cases where the population is normally distributed with unknown variance where a small sample is used • determine from a large sample an approximate confidence interval for a population proportion		• Solving problems using the Central Limit Theorem • Discussing the implications of the Central Limit Theorem • Calculating confidence intervals for population mean in cases where the population is normally distributed with known variance or where a large sample with unknown variance is used • Computing confidence intervals for population mean in cases where the population is normally distributed with unknown variance where a small sample is used • Determining from a large sample an approximate confidence interval for a population proportion • Solving problems involving sampling and estimation • Conducting fieldwork	

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	• solve problems involving sampling and estimation		investigations involving sampling and estimation	

TOPIC 4: STATISTICAL INFERENCE

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
HYPOTHESIS TESTING	• formulate hypotheses • distinguish between a type 1 and a type 2 error • compute probabilities of making type 1 and type 2 errors • apply a hypothesis test in the context of a single observation from a population which has binomial distribution using either the binomial distribution or the normal approximation to the binomial distribution • apply a hypothesis test concerning population mean using a sample drawn from a normal distribution of known variance using the normal distribution	• Null hypothesis • Alternative hypothesis • Test statistics • Significance level • Hypothesis test (1-tail and 2-tail) • Type 1 and type 2 errors • z- tests • t – tests • chi-squared tests	• Discussing hypothesis testing in research • Calculating probabilities of making type 1 and type 2 errors • Applying hypothesis tests in the context of a single observation from a population which has binomial distribution using either the binomial distribution or the normal approximation to the binomial distribution • Discussing the characteristics of a t and chi-squared distribution • Formulating and applying hypothesis tests concerning population mean using a small sample drawn from a normal distribution of unknown variance using a t – test	• ICT tools • Relevant texts • Environment • Braille materials • Talking books

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	• describe the characteristics of a t and chi-squared distribution • apply a hypothesis test concerning population mean using a small sample drawn from a normal distribution of unknown variance using a t – test • use a chi-squared test to test for independence in a contingency table • use a chi-squared test to carry out the goodness of fit analysis • solve problems using an appropriate test		• using chi-squared tests to test for independence in a contingency table • applying chi-squared tests to carry out the goodness of fit analysis • Solving problems involving hypothesis tests • Conducting research projects involving hypothesis tests	

TOPIC 5: BIVARIATE DATA

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
BIVARIATE DATA	• plot scatter diagrams • draw lines of best fit • find the equations of regression lines • calculate Pearson`s product moment correlation coefficient (r) • compute the coefficient of determination (r^2) • solve problems involving regression and correlation	• Scatter diagrams • Regression lines • Least squares • Pearson`s Product moment correlation (r) • Coefficient of determination (r^2)	• Plotting and interpreting scatter diagrams • Drawing lines of best fit • Finding the equations of regression lines • Computing Pearson`s product moment correlation coefficient (r) • Interpreting the value of Pearson`s product moment correlation coefficient • Discussing the significance of coefficient of determination • Solving problems involving regression and correlation • Conducting investigations involving linear relationships • Representing life phenomena using mathematical models involving bivariate data and exploring their applications in life	• ICT tools • Relevant texts • Environment • Geo-board • Braille materials • Talking books

9.0 ASSESSMENT

9.1 Assessment Objectives

The assessment will test candidate's ability to:-

9.1.1 use mathematical symbols, terms and definitions appropriately
9.1.2 sketch graphs accurately
9.1.3 use appropriate formulae, algorithms and strategies to solve problems in familiar and less familiar contexts
9.1.4 solve problems in Pure Mathematics, Mechanics and Statistics systematically
9.1.5 apply mathematical reasoning and communicate mathematical ideas clearly
9.1.6 conduct mathematical proofs rigorously
9.1.7 make effective use of a variety of ICT tools in solving problems
9.1.8 construct and use appropriate mathematical models for a given life situation
9.1.9 conduct research projects including those related to enterprise
9.1.10 draw inferences through correct manipulation of data.
9.1.11 use data correctly to predict trends for planning and decision making purposes
9.1.12 construct mathematical arguments through appropriate use of precise statements, logical deduction and inference and by the manipulation of mathematical expressions
9.1.13 evaluate mathematical models including an appreciation of the assumptions made and interpret, justify and present the result from a mathematical analysis in a form relevant to the original problem

9.2 Scheme of Assessment

Forms 5 to 6 Additional Mathematics assessment will be based on 30% Continuous Assessment and 70% Summative Assessment.The syllabus' scheme of assessment is grounded in the principle of equalisation of opportunities hence, does not condone direct or indirect discrimination of learners. Arrangements, accommodations and modifications must be visible in both Continuous and Summative Assessments to enable candidates with special needs to access assessments and receive accurate performance measurement of their abilities. Access arrangements must neither give these candidates an undue advantage over others nor compromise the standards being assessed.
Candidates who are unable to access the assessments of any component or part of component due to disability (transitory or permanent) may be eligible to receive an award based on the assessment they would have taken.
NB For further details on arrangements, accommodations and modifications refer to the assessment procedure booklet.

a) Continuous Assessment

Continuous Assessment for Form 5 – 6 will consists of topic tasks, written tests, end of term examinations and projects to measure soft skills.

i) Topic Tasks

These are activities that teachers use in their day to day teaching. These should include practical activities, assignments and group work activities.

ii) Written Tests

These are tests set by the teacher to assess the concepts and skills covered during a given period of up to a month. The tests should consist of short structured questions as well as long structured questions.

iii) End of term examinations

These are comprehensive tests of the whole term's or year's work and can be set at school or district or provincial level.

iv) Project

This should be done from term two to term five.

Summary of Continuous Assessment Tasks

From term two to five, candidates are expected to have done the following recorded tasks:

- 1 topic task per term
- 2 written tests per term
- 1 end of term examination per term

Term	Number of Topic Tasks	Number of Written Tests	Number of End Of Term Examination	Project	Total
2	1	2	1	1	
3	1	2	1		
4	1	2	1		
5	1	2	1		
Actual Weight	3%	8%	9%	10%	30%

Specification Grid for Continuous Assessment

Component Skills	Topic Tasks	Written Tests	End of Term	Project
Skill 1 Knowledge& Comprehension	50%	50%	50%	20%
Skill 2 Application& Analysis	40%	40%	40%	40%
Skill 3 Synthesis& Evaluation	10%	10%	10%	40%
Total	100%	100%	100%	100%
Actual weighting	3%	8%	9%	10%

b. Summative Assessment

The examination will consist of 2 papers: Paper 1 and Paper 2.

Paper	Type of Paper and Topics	Marks	Duration
1	Pure Mathematics 1 - 10	120	3 hours
2	Mechanics 1 – 5 Statistics 1 – 6	120	3 hours

Paper 1(120 marks)

Pure Mathematics– this is a paper containing about 14 compulsory questions chosen from topics 1 – 6.

Paper 2 (120 marks)

Mechanics and Statistics – this is a paper containing about 14 compulsory questions chosen from topics 1 – 5 of the mechanics section and topics 1 – 5 of the Statistics section.

Detailed Summative Assessment Table

The table below shows the information on types of papers to be offered and their weighting.

	P1	P2	Total
Weighting	**50%**	**50%**	**100%**
Actual weighting	**35%**	**35%**	**70%**
Type of Paper	**PURE MATHEMATICS** **Section A (60 Marks)** About 10 compulsory short questions **Section B (60 Marks)** 5 compulsory long questions	**MECHANICS AND STATISTICS** **Section A** **MECHANICS-(60 Marks)** About 7 compulsory questions **Section B** **STATISTICS- (60 Marks)** about 7 compulsory questions	
Marks	**120**	**120**	

Specification Grid for Summative Assessment

	P1	**P2**	**Total**
Skill 1 Knowledge & Comprehension	50%	36%	86%
Skill 2 Application & Analysis	40%	36%	76%
Skill 3 Synthesis & Evaluation	10%	28%	38%
Total	**100%**	**100%**	**200%**
Weighting	**35%**	**35%**	**70%**

9.3 Assessment Model

Learners will be assessed using both Continuous and Summative Assessments.