MINISTRY OF PRIMARY AND SECONDARY EDUCATION

Mechanical Mathematics Syllabus

FORM 5 - 6

Curriculum Development Unit

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HARARE

2016

Acknowledgements

The Ministry of Primary and Secondary Education wishes to acknowledge the following for their valued contribution in the production of this syllabus:

- National panelists for form 5 - 6 Mechanical Mathematics
- Representatives of the following organisations:
  - Zimbabwe School Examinations Council (ZIMSEC)
  - United Nations International Children's Emergency Fund (UNICEF)
  - United Nations Educational Scientific and Cultural Organisation (UNESCO)
  - Ministry of Higher and Tertiary Education, Science and Technology Development

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1.0 Preamble

1.1 Introduction

In developing the Mechanical Mathematics syllabus, attention was paid to the need to further the learners' understanding of concepts for future studies and career development. This syllabus seeks to provide a sound treatment of Mechanical Mathematics as a learning area whose laws and principles are used as models in indigenous knowledge systems and technology. In this learning area, a holistic approach is highly recommended whereby learners are expected to show expertise, intelligence and innovativeness in the spirit of Unhu/Ubuntu/Vumunhu in their conduct.

The intention is to provide wider opportunities for learners who wish to acquire competences in scientifically and technologically based areas required for the national human capital development needs and enterprising activities in the 21st century. In learning Mechanical Mathematics, learners should be helped to acquire a variety of skills, knowledge and processes, and develop positive attitude towards the learning area. These will enhance the ability to investigate and interpret numerical and spatial relationships as well as patterns that exist in Mathematics and in the world in general. The syllabus also caters for learners with diverse needs to experience Mechanical Mathematics as relevant and worthwhile. It also desires to produce a learner with the ability to communicate mathematical ideas and information effectively.

1.2 Rationale

In line with socio-economic transformation, Zimbabwe has embarked on industrialisation reforms and hence the need to cultivate self-reliance under which high Mechanical Mathematics skills are required. The thrust is to provide wider opportunities for the learners who desire to undertake technologically and industrially related scientific research areas and careers such as architecture and engineering. Moreso, the learning area is anchored on developing wholesome learners who have the ability to add value and improve indigenous inventions. In this regard, Mechanical Mathematics provides a sound grounding for development and improvement of the learner's intellectual competencies in logical reasoning, spatial visualisation, analytical and innovative thinking. This learning area enables learners to develop skills such as accuracy, research and analytical competencies essential for life and sustainable development.

1.3 Summary of Content

The Form 5 - 6 Mechanical Mathematics syllabus will cover the theoretical concepts and their application. This two year learning area consists of dynamics, static mechanics and natural laws of motion.

1.4 Assumptions

It is assumed that the learner

- has passed at least one of the following at form 4:
  - Mathematics
  - Pure Mathematics
  - Additional Mathematics
- has ability and interest in Mathematics

1.5 Cross Cutting Themes

The following are some of the cross cutting themes in Mechanical Mathematics:-

- Problem solving
- Disaster and risk management
- ICT
- Communication and team building
- Environmental issues
- Business and financial literacy
- Gender
- Inclusivity
- Enterprise skills

2.0 Presentation of Syllabus

The Mechanical Mathematics syllabus is a single document covering forms 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 acquire Mechanical Mathematics skills which help them to apply Mathematics in industry and technology
3.2 understand the nature of Mechanical Mathematics and its relationship to Science, Technology, Engineering and Mathematics (STEM)
3.3 engage, persevere, collaborate and show intellectual honesty in performing tasks in Mechanical Mathematics, in the spirit of Unhu/Ubuntu/Vumunhu
3.4 apply Mechanical Mathematics concepts and techniques in other learning areas
3.5 acquire enterprising skills through modelling, research and project based learning
3.6 develop critical thinking, innovativeness, creativity and problem solving skills for sustainable development
3.7 develop their ability to formulate problems mathematically, interpret a mathematical solution in the context of the original problem, and understand the limitations of mathematical models

4.0 Objectives

The learners should be able to:

4.1 apply relevant Mechanical Mathematics symbols, definitions, terms and use them appropriately in problem solving

4.2 use appropriate skills and techniques that are necessary in other learning areas and for further studies

4.3 construct and use appropriate Mechanical Mathematics models in solving problems in life

4.4 communicate Mechanical Mathematics ideas and information

4.5 apply Mechanical Mathematics techniques to solve problems in an ethical manner

4.6 use estimation procedures to acceptable degree of accuracy

4.7 present data through appropriate representations

4.8 draw inferences through correct manipulation of data

4.9 use I.C.T tools to solve Mechanical Mathematics problems

5.0 Methodology and Time Allocation

5.1 Methodology

It is recommended that teachers use teaching techniques in which Mechanical Mathematics is seen as a learning area which arouse an interest and confidence in tackling problems both in familiar and unfamiliar contexts. The teaching and learning of Mechanical Mathematics must be learner centred and practically oriented. Multi-sensory approaches should also be applied during teaching and learning of Mechanical Mathematics. The following are some of the suggested methods:

- Problem solving
- Modelling
- Group work
- Guided discovery
- Demonstration and illustration
- Experimentation
- Interactive e-learning
- Self-activity/ Independent learning
- Exposition
- Visual tactile
- Research
- Expert guest presentation

5.2 Time Allocation

Ten periods of 40 minutes each per week should be allocated.

Learners are expected to participate in the following activities:-

- Mechanical Mathematics Olympiads
- Mechanical Mathematics and Science exhibitions
- Mechanical Mathematics seminars
- Mechanical Mathematical tours
- School on the shop floor (exposure to industrial processes)

6.0 Topics

The following topics will be covered from Form 5 to 6

6.1. Vectors
6.2. Forces and equilibrium
6.3. Kinematics of motion in a straight line
6.4. Newton's Laws of motion
6.5. Motion of a projectile
6.6. Momentum and impulse
6.7. Centre of mass
6.8. Elasticity
6.9. Energy, Work and Power
6.10. Circular Motion
6.11. Linear motion under a variable force
6.12. Simple harmonic motion

7.0 SCOPE AND SEQUENCE

TOPIC	FORM 5	FORM 6
Vectors	• Vector representation • Properties of vectors • Basic operations • Magnitude of vectors • Triangle law for vectors • Cartesian unit vectors • Resolution • Resultant vector • Vector equation of the line • Vector equation of the path of a moving particle • Position vector of the point of intersection of two lines • Moment of a force • Resultant moment	
Forces and Equilibrium	• Definition of force • Types of forces • Representation of force by vectors • Resultants and components • Composition and Resolutions • Equilibrium of a particle • Equilibrium of a rigid body under coplanar forces • Friction	

Kinematics of motion in a straight line	• Motion in a straight line • Velocity • Acceleration • Displacement - time and velocity 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	

Momentum and Impulse	• Momentum • Impulse • Relation between momentum and impulse	

	• Impulse forces • Collision • Conservation of linear momentum	
Centre of mass		• Centre of gravity • Centre of mass • Centre of mass of a uniform lamina • Centre of mass of a compound lamina • Suspended bodies • Sliding and toppling bodies
Elasticity		• Properties of elastic strings and springs • Work done in stretching a string • Elastic potential energy • Mechanical energy • Conservation of mechanical energy
Energy, Work and Power		• Energy ➢ Gravitational potential ➢ Elastic potential ➢ Kinetic • Work • Power • Principle of energy conservation
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 • Relation between angular and linear

		speed • Conical pendulum • Banked tracks
Linear motion under a variable force		• Motion in a straight line with acceleration that varies with time • Velocity as a function of displacement • Variable motion in the x-y plane • First order differential equations with separable variables • Newton's second law of motion (variable force)
Simple harmonic motion		• Basic equation of simple harmonic motion • Properties of simple harmonic motion • Simple pendulum

8.0 COMPETENCY MATRIX

8.1 FORM (5) FIVE

TOPIC 1: VECTORS

SUB TOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
Vectors	• represent vectors using vector notations • describe vector properties • carry out vector operations • calculate the magnitude of a vector • use unit vectors, position vectors and displacement vectors to solve problems • resolve vectors • find the - resultant vectors -vector equation of a line -vector equation of the path of a moving particle • determine the point of intersection of two vectors • solve problems involving moment of a force • solve problems involving vectors	• Vector representation • Properties of vectors • Basic operations • Magnitude of vectors • Triangle law of vectors • Cartesian unit vectors • Resolution • Resultant vectors • Vector equation of the line • Vector equation of the path of a moving particle • Moment of a force • Resultant moment • Position vector of the point of intersection of two lines	• Representing vectors using vector notations • Discussing vector properties • Carrying out vector operations • Computing the magnitude of a vector • Applying unit vectors, position vectors and displacement vectors in solving problems • Resolving vectors • Calculating the resultant vectors, vector equation of a line and vector equation of the path of a moving particle • Calculating the resultant moment of a force	• ICT tools • Relevant text • Geo-board • Environment • Braille material and equipment • Talking books

SUB TOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
			• Finding the point of intersection of two vectors • Modelling life situation involving vectors to solve problems	

TOPIC 2: FORCES AND EQUILIBRIUM

SUB TOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT(Attitudes, skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
Forces and Equilibrium	• define force • identify the forces acting in a given situation • represent forces by vectors • find resultants and components of vectors • use resultants and components of vectors to formulate equations • represent a contact force between two surfaces by two components, the normal and frictional forces • calculate friction • solve problems involving the equilibrium of a single rigid body under the action of coplanar forces	• Definition of force • Types of forces • Representation of force by vectors • Resultants and components • Composition and Resolutions • Equilibrium of a particle • Equilibrium of a rigid body under coplanar forces • Friction	• Defining force • Sketching and labelling of forces on a plane • Identifying forces acting on a body in equilibrium • Calculating friction • Calculating resultant forces • Representing life phenomena using mathematical models involving forces in equilibrium and exploring their applications in life	• ICT tools • Geo-board • Environment • Relevant texts • Braille material and equipment • Talking books

TOPIC 3: KINEMATICS OF MOTION IN A STRAIGHT LINE

SUB TOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT(Attitudes, skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
Kinematics of motion in a straight line	• define distance(x) displacement(s), speed, velocity(v) and acceleration(a) • use differentiation and integration with respect to time to solve problems concerning displacement, velocity and acceleration • sketch the graphs of: ➢ (x-t) ➢ (s-t) ➢ (v-t) ➢ (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	• Motion in a straight line • Velocity • Acceleration • Displacement - time and velocity time graphs • Equation of motion for constant linear acceleration • Vertical motion under gravity • Motion and constant velocity	• Discussing distance(x) displacement(s), speed, velocity(v) and acceleration(a) • Sketching the graphs of: ➢ (x-t) ➢ (s-t) ➢ (v-t) ➢ (a-t) • 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	• ICT tools • Geo-board • Environment • Relevant texts • Braille material and equipment • Talking books

			their applications in life	

TOPIC 4: NEWTON'S LAWS OF MOTION

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 solve problems involving 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	• 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 solve problems involving 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	• ICT tools, • Relevant texts • Braille material and equipment • Talking books • Environment

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT(Attitudes, skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
			pulley or peg • Modelling the motion of a body moving vertically or on an inclined plane as motion with constant acceleration	

TOPIC 5: MOTION OF A PROJECTILE

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT(Attitudes, skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
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 direction of the velocity of a particle at a given time • find the range on the horizontal plane and height reached • derive formulae for greatest height and maximum range • derive the Cartesian	• 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 of a particle at a given time • Finding the range on the horizontal plane and height reached • Deriving formulae for	• ICT tools, • Relevant texts • Environment • Braille material and equipment • Talking books

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT(Attitudes, skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	equation of a trajectory of a projectile • solve problems using the Cartesian equation of a trajectory of a projectile		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 6: MOMENTUM AND IMPULSE

SUB TOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
Momentum and Impulse	• define linear momentum • calculate momentum • define impulse • calculate impulse • describe conservation of linear momentum • solve problems involving conservation of linear momentum	• Momentum • Impulse • Relation between momentum and impulse • Impulse forces • Collision • Conservation of linear momentum	• Discussing linear momentum • Calculating momentum • Discussing impulse • Calculating impulse • Describing conservation of linear momentum • Solving problems involving conservation	• ICT tools • Relevant texts • Environment • Braille material and equipment • Talking books

SUB TOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
			of linear momentum • Discussing the relationship between momentum and impulse • Representing life phenomena using mathematical models involving momentum and impulse and exploring their applications in life	

8.2 FORM (6) SIX

TOPIC 7: CENTRE OF MASS

SUB TOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
Centre of mass	• define centre of gravity • define centre of mass • determine the position of the centre of mass of the following uniform laminas: ➢ straight rod ➢ circular hoop ➢ rectangular disc ➢ circular disc ➢ solid or hollow cylinder ➢ solid or hollow sphere ➢ triangular • determine the position of centre of mass of a compound lamina • solve problems involving uniform laminas • solve problems involving compound laminas	• Centre of gravity • Centre of mass • Centre of mass of a uniform lamina • Centre of mass of compound lamina • Suspended bodies • Sliding and toppling bodies	• Discussing centre of gravity • Discussing centre of mass • Determining the position of the centre of mass of the following uniform laminas: ➢ straight rod ➢ circular hoop ➢ rectangular disc ➢ circular disc ➢ solid or hollow cylinder ➢ solid or hollow sphere ➢ triangular • determining the position of centre of mass of a compound	• ICT tools • Relevant texts • Environment • Braille material and equipment • Talking books

SUB TOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	• solve problems involving a body suspended from a point and the toppling or sliding of a body on an inclined plane		lamina • Solving problems involving uniform and compound laminas • Solving problems involving a body suspended from a point and the toppling or sliding of a body on an inclined plane • Representing life phenomena using mathematical models involving centre of mass and exploring their applications in life	

TOPIC 8: ELASTICITY

SUB TOPIC	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	• Properties of elastic strings and springs • Work done in stretching a string	• Discussing elasticity in strings and springs • Explaining Hooke's law • Calculating modulus of	• ICT tools • Relevant texts • Environment • Braille material

SUB TOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	elasticity • solve problems involving forces due to elastic strings or springs including those where consideration of work and energy are needed	• Elastic potential energy • Mechanical energy • Conservation of mechanical energy	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	and equipment • Talking books

TOPIC 9: ENERGY, WORK AND POWER

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT(Attitudes, skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
Energy, Work and Power	• explain the concepts of gravitational, elastic and kinetic potential energy • solve problems using the principle of energy conservation • describe the concept of work done by a force	• Energy ➢ Gravitational potential ➢ Elastic potential ➢ Kinetic • Work • Power	• Discussing concepts of gravitational, elastic and kinetic potential energy • Conducting experiments to demonstrate conservation of energy	• ICT tools • Relevant texts • Environment • Braille material and equipment • Talking books

SUBTOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT(Attitudes, skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	• calculate work done by a constant force when its point of application undergoes a displacement • define power • calculate power • solve problems involving energy, work and power	• Principle of energy conservation	such as falling objects • Calculating power • Solving problems involving energy, work and power • Representing life phenomena using mathematical models involving energy, work and power and exploring their applications in life	

TOPIC 10: CIRCULAR MOTION (Vertical and Horizontal)

SUB TOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
Circular motion (Vertical and Horizontal)	• 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	• Angular speed and velocity • Horizontal and vertical circular motion • Acceleration of a particle moving on a circle • Motion in a circle with	• 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	• ICT tools • Relevant texts • Environment • Simple pendulum • Braille material and equipment

SUB TOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
	• 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 • 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 the tension in the string and angular speed in a conical pendulum • solve problems involving banked tracks.	constant speed • Relation between angular and linear speed • Conical pendulum • Banked tracks	• 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 and vertical circle with constant speed • Discussing the relationship between angular and linear speed • Computing the tension in the string and angular speed in conical pendulum • Representing life phenomena using mathematical models involving circular motion and exploring their applications in life	• Talking books

TOPIC 11: LINEAR MOTION UNDER A VARIABLE FORCE

SUB TOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
Linear motion under a variable force	• use differentiation to obtain velocity and acceleration • express displacement as a function of time • express velocity as a function of displacement • express acceleration as a function of velocity • solve problems which can be modelled by the linear motion of a particle moving under the action of variable force by setting up appropriate differential equations	• Motion in a straight line with acceleration that varies with time • Velocity as a function of displacement • Variable motion in the x-y plane • First order differential equations with separable variables • Newton's second law of motion (variable force)	• Applying differentiation to obtain velocity and acceleration • Expressing displacement as a function of time • Expressing velocity as a function of displacement • Expressing acceleration as a function of velocity • Solving problems which can be modelled by the linear motion of a particle moving under the action of variable force by setting up appropriate differential equations	• ICT tools • Relevant texts • Environment • Braille material and equipment • Talking books

TOPIC 12: SIMPLE HARMONIC MOTION

SUB TOPIC	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 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 • Simple pendulum	• Discussing simple harmonic motion • Solving problems using standard simple harmonic motion formula • Setting up 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	• ICT tools • Relevant texts • Environment • Pendulum • Braille material and equipment • Talking books

SUB TOPIC	LEARNING OBJECTIVES Learners should be able to:	CONTENT (Attitudes, Skills and Knowledge)	SUGGESTED NOTES AND ACTIVITIES	SUGGESTED RESOURCES
			phenomena using mathematical models involving simple harmonic motion and exploring their applications in life	

9.0 Assessment

9.1 Assessment Objectives

The assessment will test candidate's ability to:-

- recall and use Mechanical Mathematics facts, concepts and techniques
- interpret and use Mechanical Mathematics data, symbols and terminology
- sketch and interpret graphs accurately
- formulate appropriate Mechanical Mathematics models for given life situations
- evaluate Mechanical Mathematics 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
- recognise the appropriate Mechanical Mathematics procedure for a given situation
- formulate problems into Mechanical Mathematics terms, select and apply appropriate techniques of solutions
- conduct research project related to Mechanical Mathematics
- construct Mechanical Mathematics arguments through appropriate use of precise statements, logical deduction and inference and by the manipulation of mathematical expressions

9.2 Scheme of Assessment

Forms 5 - 6 Mechanical 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, project and profiling 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 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. These can be set at school, 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 test per term
- 1 Project in four terms

Detailed Continuous Assessment Tasks Table

Term	Number of Topic Tasks	Number of Written Tests	Number of End Of Term Tests	Project	Total
2	1	2	1	1	
3	1	2	1		
4	1	2	1		

5	1	2	1		
Weighting	25%	25%	25%	25%	100%
Actual Weight	7.5%	7.5%	7.5%	7.5%	30%

Specification Grid for Continuous Assessment

Component Skills	**Topic Tasks**	**Written Tests**	**End of Term**	**Project**
Skill 1 Knowledge & Comprehensive	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	**7.5%**	**7.5%**	**7.5%**	**7.5%**

b. Summative Assessment

The examination will consist of 2 papers: paper 1 and paper 2, each to be written in 3 hours

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

	Paper 1	**Paper 2**	**Total**
Weighting	**35%**	**35%**	**70%**
Type of Paper	Approximately 15 Short answer structured questions, where candidates answer all questions	8 structured questions where candidates answer any 5 , and each question carrying 20 marks	
Marks	**100**	**100**	**200**

Specification Grid for Summative Assessment

	Paper 1	**Paper 2**	**Total**	**Weighting**
Skill 1 Knowledge & Comprehension	50%	30%	80%	28%
Skill 2 Application & Analysis	40%	50%	90%	31,5%
Skill 3 Synthesis & Evaluation	10%	20%	30%	10,5%
Total	**100%**	**100%**	**200%**	

Weighting	**35%**	**35%**		**70%**

9.3 ASSESSMENT MODEL

Learners will be assessed using both continuous and summative assessments.