ZIMBABWE

MINISTRY OF PRIMARY AND SECONDARY EDUCATION

CURRICULUM DEVELOPMENT AND TECHNICAL SERVICES

MATHEMATICS

SECONDARY SCHOOL LEVEL

FORMS 1-4

2015-2022

TEACHER'S GUIDE

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1.0 ORGANISATION OF THE GUIDE

In developing the Mathematics Teachers' Guide, attention was paid to the need to further the teachers' understanding and interpretation of the national syllabus. This teachers' guide was created to guide you the teacher as you embark on teaching of Mathematics from form 1-4 in the new curriculum. The teachers' guide provides progression from one level to another and also to link the developmental stages of learners and their learning abilities to relevant competencies and methodologies. This Teachers' Guide will be divided into two sections;

Part A: critical documents
Part B: curriculum delivery.

2.0 PART A: CRITICAL DOCUMENTS

Introduction

The critical documents assist you the teacher in delivering Mathematics effectively and guide learners in handling this new learning area.

You should have access the following Critical Documents:

- Curriculum Framework
- National Syllabus
- School syllabus
- Schemes of Work/Scheme Cum Plan
- Lesson Plan
- Records

Rationale

It is imperative that learners acquire necessary mathematical knowledge, skills and develop a positive attitude. This will enable learners to be creative thinkers, problem solvers and communicators with values of unhu/vumunhu/Ubuntu such as discipline, integrity and honesty. The knowledge of mathematics enables learners to develop mathematical skills such as accuracy, research, logical and analytical competencies essential for sustainable development in life. The importance of mathematics can be under pinned in inclusivity and human dignity and is a universal language that cuts across all boundaries and unifies diverse cultures. Mathematics plays a pivotal role in careers such as enterprise, education, medicine, agriculture, meteorology and engineering.
This teachers' guide promotes innovativeness confidence and self-actualisation. It is designed to cover Mathematics at Ordinary Level. The guide assists you as a teacher in planning your work.

Objective

This Guide was developed for the teacher to understand the importance and use of the critical documents in the new curriculum delivery.

UNIT 1

CURRICULUM FOR PRIMARY AND SECONDARY EDUCATION 2015-2022

Introduction

This is a policy document that outlines underpinning principles, national philosophy, learning areas, the description and expectations of MOPSE at policy level. It prescribes what the government expects you to deliver as you go about your duties. The document outlines the issue of skill-based approaches in every learning area. The document also clearly explains the aspiration of the Ministry of Primary and Secondary Education, which is to enable all learners to develop their capacities as successful learners confident individual, responsible citizen and effective contributors to Zimbabwe.

Objectives

- interpret the national syllabuses and translate them into meaningful and functional school syllabuses, schemes
  of work and record books
- prepare relevant daily teaching notes
- appreciate and understand the need to keep and maintain useful, comprehensive and up to date class records
- make and use relevant teaching and learning materials in the delivery of your lessons
- acquire and use effective teaching techniques suitable for the subject and level of learners
- acquire and demonstrate skills of setting reliable and valid test/ examination questions
- cope with specific problem areas in language teaching
- design appropriate strategies for problem solving
- manage your class effectively
- be resourceful
- guide learners to study effectively on their own
- objectively evaluate your own teaching and the learners' progress

Key Elements

- Background
- Principles and Values Guiding the Curriculum
- Goals of the Curriculum
- Learning Areas
- Teaching and learning Methods
- Assessment and Learning
- Strategies for effective implementation
- The Future

UNIT 2

SYLLABUS INTERPRETATION

Introduction

Syllabus interpretation is the process of making sense of the syllabus. Interpretation is about finding meaning. It is the process of unpacking the syllabus, analysing it and synthesising it.

Objectives

The following are objectives for syllabus interpretation

- To help the teacher to share the same meaning with the developer.
- To put the teachers' at the same level.
- To assist the teacher to implement the new curriculum
- To achieve the assessment objectives.
- To assist the teacher in scheming and planning.

Types of Syllabuses

There are two types of syllabuses namely
- National Syllabus
- School syllabus

National Syllabus

It is a policy document that outlines and specifies the learning area philosophy, aims and objectives, Learning/teaching concepts and content, suggested methodology and assessment criteria at every grade level. As a teacher you should always have it and use it to guide you in your day to day teaching and learning activities.

It is a major curriculum document which prescribes what government would like to see taught in all schools as spelt out in the curriculum framework and outlines the experiences that learners should undergo in a particular course of study: infant, junior, secondary.

Elements

The national syllabus consists of:
- Preamble
- Presentations of syllabus
- Aims
- Objectives
- Topics
- Methodology
- Time Allocation
- Scope and sequence
- Competency Matrix
- Assessment
- Appendix

Content

- Real Numbers
- Sets
- Financial Mathematics
- Measures and Mensuration
- Graph
- Variation
- Algebra
- Geometry
- Statistics
- Trigonometry
- Vectors
- Matrices
- Transformation
- Probability

2.2 School Syllabus

It is a breakdown of the national syllabus which is drafted at school level with experts from the learning area by reorganising content taking into account local factors.

Factors Influencing drafting:

In coming up with the school syllabus the following should be taken into consideration

- Level of learner performance (Knowledge they already have)
- Availability of resources
- Time allocation in the official syllabus
- Attitudes and values of some topics by learners and teachers
- Education technology

Elements

The School syllabus consists of:

- Preamble
- Presentations of syllabus
- Aims
- Objectives
- Topics
- Methodology
- Time Allocation
- Scope and sequence
- Competence Matrix
- Content Matrix
- Assessment
- Appendix

UNIT 3

Scheme of work

This is a document that you as a teacher should draw from the national and school syllabus. You should outline the Week ending/cycle ending, Topic/Content, Objectives, Competencies/Skills/Knowledge, Sources of Material/Media, Suggested Resources, Methods or Activities and Evaluation. It's a weekly breakdown of activities which should enable you to organise teaching activities from the topics which are set in the syllabus. You as a teacher should draw your scheme of work /Scheme-cum plan two weeks ahead of lesson delivery date. (USE OF ICT IN DRAWING THE DOCUMENTS IS ENCOURAGED).

A well-prepared Scheme of work does the following:

- Give an overview of the total course content
- Provide for a sequential listing of learning tasks
- Show a relationship between content and resource materials
- Provide a basis for long range planning and evaluation of the learning area

COMPONENTS

The components of a scheme of work include the following aspects:

- Level of learners Form 3
- Learning Area : Mathematics
- Aims (Extract from the national syllabus)
- Week ending: dd/mm/year
- Topic/Content: Content from simple to complex
- Objectives: Should be SMART (Specific ,Measurable, Accurate, Result Oriented and Time framed
- Competencies/skills/Knowledge: Any skill that the learner has to achieve
- Source of material /media: eg Reference of national syllabus ,textbooks
- Suggested Resources: eg ICT tools
- Methods/Activities:
- Evaluations

EXAMPLE
FORM 3 SCHEMES OF WORK
Learning area: Mathematics
Aims: By the end of the term learners should be able to:

- develop an understanding of mathematical concepts and processes in a way that encourages confidence, enjoyment and interest
- further acquire appropriate mathematical skills and knowledge
- develop the ability to think clearly, work carefully and communicate mathematical ideas successfully
- apply mathematics in other learning areas and in life
- develop an appreciation of the role of mathematics in personal, community and national development
- engage, persevere, collaborate and show intellectual honesty in performing tasks in mathematics, in the spirit of Unhu/ Ubuntu/Vumunhu
- use I.C.T tools to solve mathematical problems

WEEK ENDING	TOPIC/CONTENT	OBJECTIVES	COMPETENCIES/ SKILLS/ KNOWLEDGE	SOM/ MEDIA	SUGGETSED RESOURCES	METHODS/ ACTIVITIES	EVALUATION
16-02-16	Equations -Simultaneous linear equations -Quadratic equations Inequalities -Simultaneous inequalities -Graphs of inequalities	Learners should be able to: ● solve simultaneous linear equations using elimination, substitution and the graphical technique ● solve quadratic equations using factorisation and graphical method ● solve simultaneous linear inequalities in one variable ● represent solution set on line graph ● solve simultaneous ● linear inequalities ● graphically	-- Critical thinking -problem solving - Collaboration	-Mathematics Form 1-4 National syllabus Page 54-55 -relevant text - Talking books/software	• ICT tools, • Relevant texts • Braille material and equipment • Talking books	-Solving simultaneous linear equations using the elimination, substitution and the graphical method -Solving quadratic equations using factorisation and the graphical methods -Solving simultaneous linear inequalities in one variable -Representing solution set on a line graph -Representing linear inequalities in two variables on the Cartesian plane by shading the unwanted regions -Representing the solution set of simultaneous linear inequalities in a Cartesian plane	Should show strength and weaknesses of methodology, and whether objectives were achieved. Map the way forward. This forms the basis for remedial work

UNIT 4

Lesson Plan

This is a detailed daily plan of what you intend to deliver during the lesson. This is to be used in the event of you having drawn a scheme of work rather than a scheme- cum plan.

DETAILED LESSON PLAN

CLASS: Form 3

LERANING AREA: Mathematics

DATE: 16 Feb 2016

TIME: 1030hrs – 1110hrs

NUMBERT OF LEARNERS:35

TOPIC: Inequalities

Content

- Simultaneous inequalities
- Graphs of inequalities

S.O.M /MEDIA

- Mathematics Form 1-4 National syllabus Page 55 ,relevant text,Talking books/software

ASSUMED KNOWLEDGE:

Learners are able to solve linear equations and linear inequalities, be familiar with inequality signs as well as number line and Cartesian plane

LESSON OBJECTIVES

During the lesson learners will:

- solve simultaneous linear inequalities in one variable
- represent solution set on line graph solve simultaneous linear inequalities graphically

STAGE	CONTENT	ORGANISATION	COACHING POINTS
Introduction (5 min)	-Teacher introduces the lesson by asking questions on the assumed knowledge -Learners answer questions, give examples as well as asking questions if they have	-individual	
Lesson development (30min)	-Illustration on the whiteboard by the teacher -Class discussion -Solving simultaneous linear inequalities in one variable be learners -Learners to discuss and represent inequalities on a number line	-in pairs learners solve simultaneous linear inequalities -group discussion on representing inequalities on a number line - group present their discussions whilst the whole class assist them	-learners to recall that dividing or multiplying both sides of an inequality by a negative number reverses the sign
Conclusion (5min)	-concepts learnt	-feedback by learners and teacher	

LESSON EVALUATION:

Strength: .....
.....
.....
.....

Weaknesses: .....
.....
.....
.....

Way forward: .....
.....
.....
.....

NB .The combination of a scheme of work and a lesson plan gives a scheme-cum plan

Week ending	Topic/content	Objectives Learners should be able to:	Competencies/ Skills/ Knowledge	Methods and Activities	Suggested Resources/Media/ References	Evaluation
12/02/16	**Simultaneous linear equations** -Substitution method -Elimination method	-Solve linear equations using elimination, substitution methods	-critical thinking -solving problems -problem solving	-Solving simultaneous linear equations using guided discovery -class discussion	-national syllabus page 54 -School syllabus -relevant textbooks -ICT tools -Braille material -Talking books	Should show strength and weaknesses of methodology, and whether objectives were achieved. Map the way forward. This forms the basis for remedial work
	Simultaneous linear equations -Graphical method	-Solve simultaneous linear equations using the graphical method	-critical thinking -solving problems -problem solving	-Exposition -Demonstrations and illustrations by learners -individual work	-national syllabus page 54 -School syllabus -relevant textbooks -ICT tools -Braille material -Talking books	Should show strength and weaknesses of methodology, and whether objectives were achieved. Map the way forward. This forms the basis for remedial work

	Quadratic equations (double lesson) **-**Factorisation method -Graphical method	-solve quadratic equations using factorisation and graphical method	-critical thinking -solving problems -problem solving	-learners discuss in small books -Group presentations -problem solving individually -demonstrations and illustrations	-national syllabus page 54 -School syllabus -relevant textbooks -ICT tools -Braille material -Talking books	Should show strength and weaknesses of methodology, and whether objectives were achieved. Map the way forward. This forms the basis for remedial work
	Inequalities **-**Simultaneous linear inequalities in one variable	-Solve simultaneous linear inequalities in one variable and represent the solution set on the number line.	-critical thinking -solving problems -problem solving	-Exposition -problem solving in pairs -Demonstrations and illustrations -Feedback of group work	-national syllabus page 55 -School syllabus -relevant textbooks -ICT tools -Braille material -Talking books	Should show strength and weaknesses of methodology, and whether objectives were achieved. Map the way forward. This forms the basis for remedial work
	Inequalities -Simultaneous linear inequalities in two variables	-represent linear inequalities in two variables on the Cartesian plane by shading the unwanted region -solve and represent simultaneous linear inequalities on the Cartesian plane	-critical thinking -solving problems -problem solving	-Demonstrations and illustrations -Problem solving in pairs -interactive e-learning	-national syllabus page 55 -School syllabus -relevant textbooks -ICT tools -Braille material -Talking books	Should show strength and weaknesses of methodology, and whether objectives were achieved. Map the way forward. This forms the basis for remedial work

UNIT 5

RECORD - KEEPING

Records are critical documents about the teaching – learning process, which you must keep as a teacher
They include:

- Syllabuses (National and School)
- Staff (for HOD's) and pupil details
- Continuous assessment and examination mark lists
- Stock control registers
- Attendance register

TYPES OF RECORDS

- Official syllabuses
- School syllabuses
- Attendance Register
- Records of staff details
- Records of learner details
- Supervision records
- Files, circulars, handouts, past exam papers
- Minutes of meetings
- Inventory of resource materials
- Stock control registers
- Learner Profiles

CONCLUSION

Critical Documents are a must that you as a teacher must have for effective teaching and learning to take place .You need to be familiar with the requirements of the New Curriculum by reading the Curriculum Framework for Primary and Secondary Education and not by just having it. As a teacher you need to scheme, plan and prepare for your lessons well in advance to show preparedness and commitment to work.

PART B CURRICULUM DELIVERY

Introduction

This section comprises of the objectives, content, methodology, teaching-learning materials, class management, evaluation and assessment. These assists you as a teacher in lesson delivery.

OBJECTIVES (EXAMPLES)

By the end of this unit, you should be able to:
- select appropriate teaching methods for your lessons
- design meaningful and effective instructional material
- use a variety of learner-centred approaches
- plan and organise educational tours
- help pupils carry-out projects or experiments
- make good quality aids from available resources

(Types: charts, chalkboard, whiteboard, computers slides, films, videos, flannel graph, textbooks)

CONTENT

The following is the content you should cover:
- Real Numbers
- Sets
- Financial Mathematics
- Measures and Mensuration
- Graphs
- Variation
- Algebra
- Geometry
- Statistics
- Trigonometry
- Vectors
- Matrices
- Transformation
- Probability

METHODOLOGY

As a teacher it is important for you to use problem solving and learner–centred approaches. You are the facilitator and the learner is the doer. You should select appropriate teaching methods for your lessons. They should be varied and motivating. You should select one or several methods depending on:

- The subject matter
- Instructional objectives
- The learner
- Your personality
- Learners level of development (cognitive, affective and psychomotor))
- Content to be covered
- The time
- Learning material

- The environment
- Competencies to be developed

Teaching methods can be grouped under three main categories:

a) Cognitive development methods

These are mainly:
- Discussion Method
- Socratic (Question and answer)
- Team Teaching Method
- Self-activity/independent learning
- Educational tours Method
- Group work
- Problem solving

b) Affective development methods

- Modelling Method
- Simulation Method
- Observation
- Exposition
- Lecture

c) Psychomotor development methods

- Inquiry
- Interactive e-learning
- Guided Discovery
- Demonstration and illustration Method
- Experimentation Method
- Programmed Learning Method
- Assignment Method
- Research
- Project Method
- Microteaching Method

CROSS CUTTING ISSUES

- Life skills
- Enterprise skills
- Financial literacy
- ICT
- HIV and AIDS
- Environmental issues
- Disaster Risk management
- Collaboration

TEACHING - LEARNING MATERIALS

These are materials which help the learner to learn effectively, faster, capture learners' interest and create virtual reality.

EXAMPLES

- ICT tools
- Geo-Board
- Environment
- Relevant texts
- Braille materials and equipment
- Talking books
- Charts
- Whiteboard or Chalkboard
- Videos

ASSESSMENT AND EVALUATION

Is the measure of success or failure in the teaching-learning process and provides feedback on the acquisition of knowledge and skills by learners as well as attitude.

EXAMPLES

Tests and exercises
Assignments
Examinations
Projects
Presentations

CLASS MANAGEMENT

This is a process of planning, organising, leading, controlling classroom activities and maintaining discipline to facilitate an effective learning environment hence motivating learners.

Organisational skills for effective learning

This covers classroom organization from:

- **Physical environment**

- Classroom to be clean, tidy and airy
- Safety considerations when arranging furniture
- Teaching aids to be visible to learners.

- Emotional environment

- You need to be pleasant, firm but friendly.
- set the right tone
- tell learners what you expect from them.

- Grouping

- You may group your learners according to needs, abilities, and be gender sensitive.
- Encourage them to share ideas in groups.

- **Class control and discipline**

- be prepared for the lesson
- Be familiar with the schools policy on discipline.
- Be firm but fair
- Acknowledge good behaviour
- Punishments must be corrective and to the benefit of the child.
- create an atmosphere of trust and honesty

- **Motivation**

- Make your learners feel important through recognizing and rewarding achievements
- encouraging those who are lagging behind to continue working hard.
- Knowing learners by their names creates good rapport.
- Be a role model to your learners

.

- **Supervision**

- Always check learners' work in order to guide and correct them.
- Give immediate feedback in order to motivate learners.

UNIT 6

SCOPE OF THE GUIDE

TOPICS

The following topics are to be covered from form 1-4

- Real Numbers
- Sets
- Financial Mathematics
- Measures and Mensuration
- Graphs
- Variation
- Algebra
- Geometry
- Statistics
- Trigonometry
- Vectors
- Matrices
- Transformation
- Probability

TOPIC (breakdown)

GEOMETRY

- Points, lines and angles
- Bearings
- Polygons and circles
- Similarity and congruency
- Constructions and loci
- Symmetry

CONTENT Geometry	ACTIVITIES	METHODOLOGY	MATERIALS	EVALUATIONS
● Triangles ● Quadrilaterals	● Constructing triangles and quadrilaterals ● Solving problems using construction of triangles and quadrilaterals ● Problem solving	● Discussion ● Problem solving ● Experimentation ● Demonstration and illustration ● Interactive e-learning	● ICT tools ● Maths set ● Environment ● Relevant texts ● Braille material and equipment ● Talking books ● Talking software	Should show strength and weaknesses of methodology, and whether objectives were achieved. Map the way forward.

TEACHABLE UNIT: CONSTRUCTION AND LOCI (hints)

NB . break down all the topics using the format above

FORM 1	FORM 2	FORM 3	FORM 4
Real numbers	Real numbers	Real numbers	
Sets	Sets	Sets	
Financial mathematics	Financial mathematics	Financial mathematics	Financial mathematics
Measures and mensuration	Measures and mensuration	Mensuration	Mensuration
Graphs	Graphs	Graphs	Graphs
	Variation	Variation	Variation
Algebra	Algebra	Algebra	Algebra
Geometry	Geometry	Geometry	Geometry
Statistics	Statistics	Statistics	Statistics
		Trigonometry	trigonometry
	Vectors	Vectors	Vectors
	Matrices	Matrices	
Transformations	Transformations	Transformations	Transformations
	Probability	Probability	Probability

CONCLUSION

This part on curriculum delivery assists you the teacher on expectations during lesson delivery eg classroom management and breaking down of topics. The guide might not have exhausted everything that is essential for curriculum delivery hence you are allowed to exploit more.

ANNEXTURE 1: SCOPE AND SEQUENCE

TOPICS FOR EACH LEVEL

SCOPE AND SEQUENCE

7.1 **Real numbers**

TOPIC	FORM 1	FORM 2	FORM 3	FORM 4
Number Concepts and Operations	• Number types • Factors and multiples • Directed numbers • Fractions and percentages • Order of operations	• Factors and multiples • Squares and square roots • Cubes and cube roots	• Order of operations • Irrational numbers • Number patterns	
Approximations and estimations	• Round off numbers • Decimal places	• Significant figures • Estimations	• Significant figures • Estimations • Limits of accuracy	
Ratios, rates and proportions	• Ratios	• Ratios • Proportions	• Ratios • Rates • Proportions	
Ordinary and standard form	• Large and small numbers	• Numbers in standard form	• Operations in standard form	
Number bases	• Number bases in everyday life • Place values	• Converting numbers from one base to another	• Operations in number bases	
Scales and simple map problems	• Scale measurement	• Scale drawing	• Scales • Length factor • Area factor	

7.2 **Sets**

TOPIC	FORM 1	FORM 2	FORM 3	FORM 4
• Sets	• Sets and Set notation • Types of sets	• Types of sets • Venn diagram with two subsets	• Set Builder Notation • Venn diagrams with three subsets	

7.3 **Financial Mathematics**

TOPIC	**FORM 1**	**FORM 2**	**FORM 3**	**FORM 4**
Consumer arithmetic	• Household bills • Profit and loss • Discount • Household budgets	• Corporate bills • Profit and loss • Simple interest • Hire purchase • Small scale enterprise budgets	• Bank statements • Compound interest • Commission • Hire purchase	• Foreign exchange • Sales and income tax rates (Pay as you earn (PAYE)) • Value added tax (VAT) • Customs and Excise Duty

7.4 Measures and Mensuration

TOPIC	FORM 1	FORM 2	FORM 3	FORM 4
Measures	Units of : - Time - Mass - Length - Temperature - Capacity	Units of: - Area - Volume - Capacity - Density		
Mensuration	• Perimeter of plane shapes • Area of plane shapes	• Perimeter of plane shapes • Area of plane shapes • Volume of cuboids	• Perimeter of combined shapes • Area of combined shapes • Volume of cylinders	• Area and volumes of solid shapes • Surface area • Density

7.5 Graphs

TOPIC	FORM 1	FORM 2	FORM 3	FORM 4
Functional Graphs	• Cartesian plane • Scale • Co-ordinates	• Cartesian plane • Table of values • Linear graphs • Scale	• Functional Notation • Linear graphs • Quadratic graphs	• Cubic graphs • Inverse graphs
Travel Graphs	• Distance time graphs	• Distance time graphs	• Distance time graphs • Speed-time graphs	• Displacement time graphs • Velocity-time graphs

7.6 **Variation**

TOPIC	FORM 1	FORM 2	FORM 3	FORM 4
Variation		• Direct variation	• Direct variation • Inverse variation	• Joint variation • Partial variation

7.7 **Algebra**

TOPIC	FORM 1	FORM 2	FORM 3	FORM 4
Algebraic Manipulation	• Basic arithmetic processes in letter symbols • Substitution of values • Algebraic expressions	• Substitution of values • Algebraic expressions • Algebraic fractions • Quadratic expressions • Factorisation	• Algebraic fractions • Highest Common Factor (HCF) and Lowest Common Multiple (LCM) of algebraic expressions • Quadratic expressions • Factorisation	• Algebraic fractions • Quadratic expressions • Factorisation • Completing the square
Equations	• Linear equations	• Equations with brackets • Equations with fractions • Change of subject of formulae • Simultaneous linear equations	• Simultaneous equations • Quadratic equations • Change of subject in formulae Substitution of values	• Completing the square • Quadratic formulae

		• Quadratic equations		
Inequalities	• Linear inequalities	• Linear inequalities • Number line • Cartesian plane	• Simultaneous inequalities • Graphs of inequalities	• Linear programming
Indices and Logarithms	• Index form	• Laws of indices • Highest Common Factor (HCM) and Lowest Common Multiple (LCM) in index form • Squares and square roots • Cubes and cube roots	• Indices • Logarithms • Theory of logarithms • Equations involving indices and logarithms	

7. 8 **Geometry**

TOPIC	FORM 1	FORM 2	FORM 3	FORM 4
Points, lines and angles	• Points • Lines • Angles	• Angles • Parallel and Transversal lines	• Angles of elevation and depression	
Bearing		• Cardinal points • Three figure bearing • Compass bearing	• Three figure bearing • Compass bearing	
Polygons	• Polygons	• Properties of polygons (triangles and quadrilaterals)	• Properties of polygons • Angles and properties of polygons • Numbers of sides of polygons	• Circle theorems
Similarity and Congruency		• Similar and congruent figures • Cases of congruency	• Areas of similar figures • Volume and mass of similar solids	
Constructions and Loci	• Construction of lines and angles	• Construction of angles • Bisecting lines and angles	• Construction of triangles and quadrilaterals	• Construction of diagram to a scale • Loci
Symmetry		• Line symmetry in two dimensions	• Rotational symmetry in two dimensions	

7.9 **Statistics**

TOPIC	**FORM 1**	**FORM 2**	**FORM 3**	**FORM 4**
Data Collection, Classification and Representation	• Data collection • Data classification	• Data collection • Classification of ungrouped data	• Collection and classification of grouped data • Frequency table • Pie chart • Histogram • Frequency polygon •	• Frequency table • Frequency polygon • Cumulative frequency table • Cumulative frequency curve
Measures of Central Tendency		• Mean • Mode • Median • Assumed mean	• Mean, median and mode of grouped data • Assumed mean	• Median from cumulative frequency curve
Measures of Dispersion				• Quartiles • Inter quartile range

7.10 **Trigonometry**

TOPIC	**FORM 1**	**FORM 2**	**FORM 3**	**FORM 4**
Pythagoras Theorem			• Pythagoras theorem • Pythagorian tripple	
Trigonometrical Ratios			• Trigonometrical ratios of acute angles: - sine - cosine - tangent • Trigonometrical ratios of obtuse angles: - sine - cosine - tangent	• Cosine rule • Sine rule • Area of a triangle

7.11 **Vectors**

TOPIC	FORM 1	FORM 2	FORM 3	FORM 4
Definition and Notation		• Definition of vector • Vector notation		
Types of Vectors		• Translation vectors • Negative vectors • Equal vectors • Parallel vectors	• Translation • Negative • Equal • Parallel • Position	
Operations		• Addition of vectors • Subtraction of vectors	• Addition of vectors • Subtraction of vectors • scalar multiplication • Magnitude • Combined vector operations	• Vector properties of plane shapes

7.12 Matrices

TOPIC	FORM 1	FORM 2	FORM 3	FORM 4
Order		• Order of matrices • Types of matrices		
Operations			• Addition and Subtraction of matrices • Scalar multiplication of matrices • Multiplication of matrices	
Determinants			• Determinants of Matrices • Singular and non-singular matrices	
Inverse Matrix			• Inverse of matrix • Simultaneous linear equations in 2 variables	

7.13 **Transformation**

TOPIC	FORM 1	FORM 2	FORM 3	FORM 4
Translation	• Translation of plane figures	• Translation vector to move a point	• translation vector to move a plane figure on Cartesian plane	
Reflection		• Reflection of plane figures	• Reflection of plane figures on a Cartesian plane in the x-axis, y-axis, lines of the form y=a and x=b	• Reflection of plane figures in any line and use of matrices
Rotation			• Rotation of plane figures in a Cartesian plane by drawing	• Rotation of plane figures by drawing and use of matrices
Enlargement			• Enlargement about the origin using a rational scale by drawing	• Enlargement using matrices and about any point using a rational scale
Stretch				• One-way and two-way stretch using matrices and geometrical methods
Shear				• Shear using matrices and geometrical methods

7. 14 **Probability**

TOPIC	FORM 1	FORM 2	FORM 3	FORM 4
Probability		• Definition of probability terms • Experimental probability	• Experimental probability • Theoretical probability • Single events	• Combined events • Application of probability