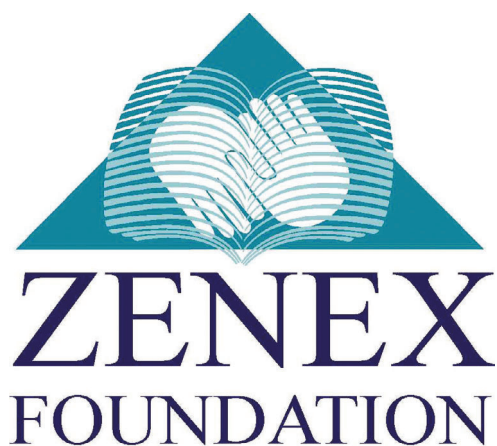


Fundamentals in ECD – Maths Trainer's Manual



Writers:



Fundamentals in ECD:

Mathematical Literacy

Trainer's Manual

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Fundamentals in ECD

Communications Level One Learner's Manual

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Problem Centred Mathematics for the use and adaptation of the following selected activities:

Module 1

Unit 6: Activity 7

Unit 8: Activity 5-10

Module 2

Unit 8: Activity 2

Module 3

Unit 6: Activities 2-3

Unit 7: Activities 2-7

Unit 10: Activities 1-3

Unit 11: Activity 9

CONTENTS

Introduction	vi
1. Who is this manual for?	vi
2. ECD Fundamentals	vi
3. Unit Standard Outcomes	vii
4. Language of learning	vii
5. The learning cycle	viii
6. How to use your Manual	ix
7. What you need	x
8. Assessment	xi
9. Using your journal for the first time	xi
10. Bantwana bami	xiii

Fundamentals Communication Unit Standards	xiv
1. Unit Standard 7451	xiv
2. Unit Standard 7449	xv
3. Unit Standard 7463	xvi
4. Unit Standard 7453	xvii
5. Unit Standard 7461	xviii
6. Unit Standard 7450	xviii
7. Unit Standard 7448	xiv
8. Unit Standard 7447	xx
9. Unit Standard 7464	xxii

INTRODUCTION

You are a teacher and a learner at the same time. At your ECD site you are a teacher. In this course you are a learner.



Trainer's Note:

This manual is for you, the trainer. You will use it to train ECD practitioners at NQF Level One Fundamentals Mathematical literacy. There is also a Learner's Manual which your learners will use. This manual is the same as the Learner's Manual, except that Trainer's notes have been added. These notes will give guidance and ideas on how to facilitate the fundamentals course for your learners. You will identify the Trainer's notes quickly because they are in a box headed 'Trainer's Note:'. Of course, you need to read this Trainer's Manual beforehand, and prepare yourself and your resources well.

1. Who is this manual for?

This manual is for you, the ECD practitioner. You will use it to study for Fundamentals in Mathematical literacy at NQF Level One. It is written so that you can work through it alone, or with other early childhood practitioners in a small study group, or in a workshop group with a trainer. Read the introduction carefully alone or with your study group or trainer, to make sure you understand what you are doing. As you work through the activities you will slowly address all the Unit Standard Outcomes for Fundamentals in Mathematical literacy.

2. ECD Fundamentals

Fundamentals in Mathematical Literacy form one part of a full ECD qualification at Level One. For a full qualification you need to have 120 credits. These are made up like this:

ECD Core: 48 credits

ECD Elective: 36 credits

Fundamentals Communication: 20 credits

Fundamentals Mathematical Literacy: 16 credits

You can see that for Fundamentals Mathematical Literacy you need to get 16 credits. That means that you should spend about 160 hours, or 20 days, studying on this course. This time includes study outside of workshops such as on assignments and portfolio work. Remember that some people will need more time, and others will not need as much.

Trainer's Note:

You need to plan your workshop time according to this notional time. But remember to take account of who your learners are. Many people need more time to work with mathematical concepts, especially if they haven't worked with mathematics for a while. So when you plan your time be prepared to be flexible and allow more time if necessary.

Trainer's Note:

The Fundamentals Unit Standards for Mathematical Literacy are currently under review, and they may change. If they change you will see that some of the outcomes are different. Some may be taken out and others added in, or existing ones may be worded differently. It is also possible that Unit Standard 7447 will be included in the qualification. This is another reason why we included it in this manual. Remember that the learners do not need to get credits for all the unit standards. They only need to get 16 credits altogether. At the moment this does not include the 6 credits from unit standard number 7447. So when you plan your time you should add 60 hours notional time for the extra unit standard. Even though it is not required for the qualification we recommend that you do it anyway.

3. Unit Standard Outcomes

There are eight Unit Standards for Fundamentals Mathematical literacy. They show what you need to be able to do (the specific outcomes) and how well you must be able to do them (the Assessment Criteria). These are the unit standards covered by this Manual:

	ID	Unit Standard Title	Level	Credits
Fundamentals Mathematical literacy	7451	Collect, analyse, use and communicate numerical data	Level 1	2
	7449	Critically analyse how mathematics is used in social, political and economic relations	Level 1	2
	7463	Describe and represent objects and the environment in terms of shape, space, time and motion	Level 1	2
	7453	Use algebraic notation, conventions and terminology to solve problems	Level 1	3
	7461	Use maps to access and communicate information concerning routes, location and direction	Level 1	1
	7450	Work with measurement in a variety of contexts	Level 1	2
	7448	Work with patterns in various contexts	Level 1	4
	7464	Analyze cultural products as representations of shape, space and time	Level 1	2
Additional Unit Standard not specified for ECD Level One Qualification	7447	Work with numbers in various contexts	Level 1	6
		Credits needed for Mathematical literacy (16)		

The last Unit Standard number 7447 is not required for a Level One ECD Qualification, but we have addressed it in this course because we think it is very helpful and relevant to your work with children.

We have included some sections which are not specified in the Unit Standards, for example the theorem on Pythagoras. We have included them because the Unit Standards are currently being reviewed, and we believe these sections may be included in the new Unit Standards.

There is a list of all the Unit Standard Specific Outcomes and Assessment Criteria on page xiv.

Trainer's Note:

Learners may find some words in this course difficult. We have put a dictionary in the margin on each page. Encourage learners all the time to add their own words to the dictionary.

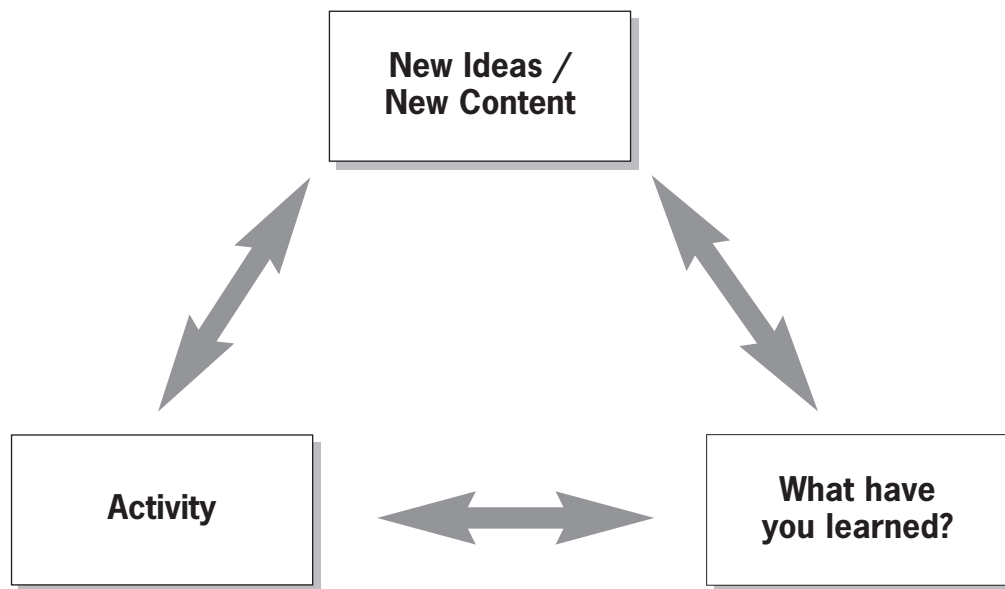
4. Language of learning

This manual is written in English. Maybe English is your second, or even third language. You may need help with some of the English in this manual. You might need a dictionary, or perhaps you know someone who can translate some of the difficult language for you.

We have created a dictionary in the margin on each page. Add new words to the dictionary whenever you want to. Maybe studying will be easier if you are in a group learning together with one Trainer. You can have discussions in home languages and ask for translations anytime. But we are assuming that you will be assessed in English.

5. The learning cycle

In this manual you will see there are **new ideas** for you to read and think about. There are **activities** for you to do and there are opportunities for you to **think about what you have learned**. Think of this as a learning cycle or learning path. It does not really matter where you begin in the cycle. You may begin with a new idea, do an activity, and then go back to the new idea before you think about what you have learned. You could also begin with an activity, look at new information and then think about what you have learned. Good learning will always include all three parts of the cycle. The learning cycle can be drawn like this:



Trainer's Note:

Help practitioners to understand the link between this cycle and how the Educator's Manual has been written. You can do this during the discussion about the following icons.

DICTIONARY:

icon – small picture

6. How to use your Manual**Structure**

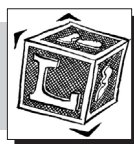
All the way through the manual you will see the same cycle that you saw above. Each part of the cycle has an icon to show what it is:

**Activity**

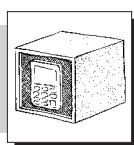
In each activity you will do something, think about what you have done, and discuss or write down your thoughts. You can do most of the activities in your Manual unless you need more space. Sometimes the Manual will show that you have to do an activity on a separate paper for your portfolio. There is a time shown for each activity. This is only a guide because different learners may need different amounts of time. It does not really matter how much time you spend, as long as you find it meaningful, and you are sure that you understand.

**New ideas/content**

Often there are some new ideas for you to read and think about before you do an activity. This might be information that you know already, or it might be new information. These ideas will also prepare you for the activity.

**What have you learned?**

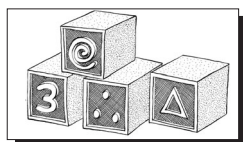
After activities there is writing that will help you to think about what you have learned.



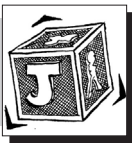
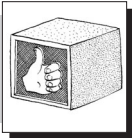
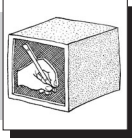
There are other parts in the manual too. They also have icons. These are:

Calculator

There will be times when you need to use a calculator. This little icon will show you when it is appropriate to use a calculator. There are other times when you might want to use a calculator but it is better to do the calculations without the help of a calculator.

**Linking your learning to your ECD work**

We want you to think about what you will teach children from what you have learned in this course. This section in each unit will help you to think about that. We believe that it is not good teaching practice to force ideas onto children. So do not go and simply teach them what you have learned. What you have learned is at the wrong level for young children. There will be times when children show interest in something related to what you have learned. You can link the children's interest to something you have learned here and work at the right level with children.

**DICTIONARY:**

reflect on – think about

Portfolio Work

This icon shows when it will be good for you to put activities or assignments into your portfolio for assessment.

Self-assessment Checklist

You can use the self-assessment checklist to check your progress against the listed outcomes. They will also help your Trainer to keep track of how you are progressing.

Using a Journal

A journal is a book where you can reflect on your experience as a learner and as a teacher. There may be times when you feel worried about something. Then you can write down your worries. You can write down tips and reminders to yourself.

Next to this icon you will always see a set of questions which will help you to think about what to write. Answer these questions in your own words in your journal. Remember to put a date every time you write in your journal.

The purpose of your journal is:

- To make your ideas clearer to yourself by writing them down
- To express your feelings about your learning
- To keep track of your progress in your learning. This is another kind of self-assessment. You will keep a record of your understanding throughout the course. You can come back to something you have written in your journal and see how your understanding has changed.
- To practice writing without worrying about handwriting, grammar, spelling, correct order, paragraphs and other things. This will be very good for your writing skills, believe it or not.

7. What you need

- A punched exam pad for your exercises and assignments. You will file these assignments in your portfolio
- A file to keep your work safe and in order. File your work as you go along – don't leave it to the last minute. This file will be your portfolio.
- A pen or pencil
- A dictionary. Some good dictionaries for this level are:
SA Oxford Dictionary for Adult Learners
Pocket Oxford Dictionary
SA Schools Dictionary
Mini Dictionaries
You can buy these at any big branch of JUTA or CNA.
- An exercise book to use as your journal
- A calculator

You may need other resources for some activities. These will be listed for you.

Trainer's Note:

Before you train this course you need to be sure that your organisation is accredited to train fundamentals. You will have to apply to the ETD P SETA for that accreditation. You will need to print the letter and the materials from the Thutong website and send these with your application. Even if you are accredited you will still need to register all your learners with an accredited fundamentals assessment agency such as IEB or UNISA. You will find their details in the Assessment Guide at the back of this Trainer's Manual.

The assessment that you conduct with the learners on this course will be formative assessment, and preparation for the summative assessment.

The Assessment Guide will guide you and the learners through formative assessment, through preparing a portfolio and through preparing for a summative exam. Remember that most learners will need a lot of guidance on how to compile a portfolio. That is part of your training responsibility.

The activities are aligned with the Fundamentals Unit Standards and can be used as formative assessment. Some of the activities can be written separately or copied and put into the portfolio.

Assignments are all portfolio work. It would be a good idea to read your Assessment Guide now.

8. Assessment

Your trainer will provide you with a clear assessment guide. You must check that your trainer has arranged for you to be assessed by an accredited fundamentals agency, like IEB or UNISA. If you are studying on your own or in a study group make sure you register with an assessment agency to be assessed. These are the only organisations that can assess you and give you credits for your qualification.

When you are assessed you will be assessed against the Unit Standard outcomes. Some of the activities can be used for assessment. These activities and all the assignments will go into your portfolio. You will see the Portfolio Work icon next to these activities and assignments. In addition to your portfolio you will do an exam (test).

Your Trainer will only do formative assessment to help you prepare for the final assessment. Formative assessment is not assessment for credit.

What is a portfolio?

A portfolio is a collection of your work that you show to a qualified assessor. Of course, it should all be your own work, not copied. If your work is satisfactory, the portfolio will help to prove that you are competent in NQF1 Mathematical literacy. In this course your portfolio will contain:

- Some activities
- All your assignments
- Your journal

Don't worry if you have never written a journal before. You will practise writing a journal as part of this course.



9. Using your journal for the first time

Remember the purpose of your journal is:

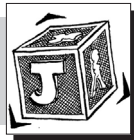
- To make your ideas clearer to yourself by writing them down
- To express your feelings about your learning
- To keep track of your progress in your learning.

In the next set of activities you will begin to write your journal. Do the activities in your journal.





Time needed
55 minutes



Trainer's Note:
 This set of activities is really the beginning of the learners' learning. They will be using a journal all the way through the course, both for some activities and for their own reflection on their learning. You may want to have a break here, or do an icebreaker to set the tone for a shift in thinking.

**Activity 1:
Using your journal to learn**

Write all these answers in your journal.

1. Explain in writing what a journal is. Write in your home language. Use your own words - don't just translate directly from the explanation in this manual.
2. Explain verbally what a journal is. Speak to somebody who speaks a language other than English.
3. Write down in your home language how you feel about writing a journal. Ask yourself these questions:
 - a. Have I done journal writing before?
 - b. Am I still a bit worried about writing a journal?
 - c. Is writing in my journal harder than I thought or easier?
 - d. Do I usually worry about punctuation and spelling and grammar every time I write?
 - e. Did I manage to forget about grammar etc while I was writing in my journal?
4. Complete this sentence in English in your journal:

For me, writing in my journal

Congratulations! You have just completed your first entry in your journal.

Now do Activity 2.

**Activity 2:
Writing a journal to suit the purpose**

Work alone

1. Look at the first writing activity in your journal and answer the following questions in writing in your journal:
 - a. How will you know when you wrote in your journal?
 - b. How will you know what activity you were writing about?
 - c. Did you write full sentences? Are full sentences helpful?
 - d. Would it help if you highlighted or underlined ideas, wrote them in colour, added arrows and numbers?
 - e. Do you think you could draw some pictures in your journal?
 - f. Discuss your answers with someone who is also using a journal.

Remember your journal is not only to write down answers to questions, it is also a place for you to write down your feelings. Your feelings about your learning are not right or wrong. It may take a little time to get used to writing your real feelings. But often it is the best way to learn.



Linking using a journal with your ECD work

This is the first time in the course that you are going to think about how your learning links with your work as an ECD practitioner. These questions might help you to think about it some more:

- a. Can children keep a journal?
- b. How can children keep a journal if they cannot write? Are there other ways of recording thoughts and feelings?
- c. What kind of things do you think children can draw or write about?
- d. What do you think children can learn from keeping a journal?
- e. How do you think you can help children to understand what a journal is?
- f. How can you help children to write down their thoughts and feelings?
- g. Why is it useful for children to think about their feelings?

There will be more opportunities for you to discuss these ideas later on in the manual. For now we want you to know that we think it is important for young children to learn to reflect on their thoughts and feelings.

10. Bantwana Bami

Finally, let us introduce you to some of the characters you will meet in this manual.

Mrs Refiloe Maseko is the teacher and principal at Bantwana Bami home-based day care centre. She has 18 children in her care and she uses her garage, a room in her house and her yard to provide a space for the children to play and work. Mrs Maseko does the very best for her children. She makes sure she spends time chatting with them, reading to them, asking them questions and listening to them.

Mrs Dlamini is a friend of Mrs Maseko. She runs an ECD centre in the next village. They often sit together and chat about their work.



Fundamentals Mathematical Literacy

Unit Standards

1. Unit Standard 7451

Collect, analyze, use and communicate numerical data

Specific Outcomes and Assessment Criteria:

S01:

Identify situations for investigation and data collection and collect numerical data.

1. Situations for data collection are identified in terms of the purpose for data collection.
2. Appropriate methods are selected to collect data.
3. A variety of appropriate data collection methods are used to collect data from primary and secondary sources. (Surveys, books, interviews, observations, tally sheets and questionnaires.)
4. The potential misuse of data achieved through the data collection method is described.
5. Reasons for and limitations of using sampling are described.

S02:

Classify and analyze numerical data. (Grouped and ungrouped data.)

1. Data is organized for meaningful analysis. (Classification, ordering, listing.)
2. Analytical tools are used correctly and appropriately to analyze the data. (Median, mean, modes, frequency, range.)
3. The differences between and uses of mean, median and mode are described.

S03:

Summarize and display organized numerical data. (Graphs: pie, frequency polygon, histogram, simple bar graph, stem and leaf. Tables, basic tree diagrams.)

1. The form of display is appropriate to the data and context, and is justified in terms of its appropriateness.
2. The scale is selected and used for a reasonable presentation of the data, and the scale is justified in terms of its reasonableness.
3. Different forms of display are identified and evaluated in terms of their purposes.

S04:

Extract, interpret and critically evaluate information from various forms of display. (Graphs: pie, frequency polygon, histogram, simple bar graph, stem and leaf. Tables, basic tree diagrams.)

1. The information extracted from the display is consistent with the display.
2. The information is interpreted to form informed opinions.
3. Displays that distort information are identified and the manner in which they distort information is described.
4. The effect of distortions in displays is described in terms of the impact on meaning in social, socio-historical, political and economic contexts.

5. Projections or predictions are made in a manner that is consistent with the display.
6. The information is analyzed to determine and report on the validity of data collection methods, forms of display and projections that are made.
7. Communication of findings is clear, consistent with the display and makes use of accepted terminology.

S05:

Demonstrate understanding of the concept of chance and calculate simple probabilities. (Limited to systematic counting strategies.)

1. Situations are identified in which chance arises.
2. Simple probabilities are determined.
3. Statements of chance are correctly interpreted.
4. The number of combinations and the probability of a particular event are determined.
5. Probabilities are used to address simple real or simulated problems.

2. Unit Standard 7449

Critically analyze how mathematics is used in social, political and economic relations

Specific Outcomes and Assessment Criteria:**S01:**

Critically analyze the use of mathematical language and relationships in the workplace. (Wage negotiations, salary increases, and productivity as a ratio.)

1. The ways in which mathematics is used in the workplace are described. (Percentage, graphs, differences, ratio and proportion.)
2. Ways in which mathematical relationships and language can be used to represent particular perspectives are described. (Different forms of comparisons such as differences versus ratio. Manipulation of graphs through choice of graph, scale of axes and nature of axes. Use of different averages: mean, median, mode. More than one perspective is to be described.)

S02:

Critically analyze the use of mathematical language and relationships in the economy. (Budgeting, banks: interest rates, mortgage, service charges; fuel prices; pensions; inflation; value of the rand and exchange rates.)

1. The ways in which mathematics is used is described. (%, graphs, differences, ratio and proportion.)
2. Ways in which mathematical relationships and language can be used to represent particular perspectives are described. (Different forms of comparisons such as differences versus ratio. Manipulation of graphs through choice of graph, scale of axes and nature of axes. Use of different averages: mean, median, and mode. More than one perspective to be described.)
3. The impact of economic changes on the individual is described.

S03:

Critically analyze the use of mathematics in social relations. (Social differentiation: gender, social mobility, race; historical and possible future contexts, e.g. employment equity; apartheid policies.)

1. Ways in which mathematics can be used as a filter for social differentiation are described. (Social differentiation includes examples such as entrance qualifications; number of women doing mathematics.)
2. The significance attached to number by different societies is described. (Spiritual; superstitious; aesthetic; political.)
3. The use of mathematics in the media is described. (Adverts, reports, sports.)

S04:

Critically analyze use of mathematics & mathematical language & relationships in political relations (Income distribution; census; elections; voting; opinion polls.)

1. The ways in which mathematics is used is described. (Percentage, graphs, differences, ratio and proportion.)
2. Ways in which mathematical relationships and language can be used to represent particular perspectives are described. (Different forms of comparisons such as differences versus ratio. Manipulation of graphs through choice of graph, scale of axes and nature of axes. Use of different averages: mean, median, and mode. More than one perspective to be described.)
3. The impact of the use of mathematics in these contexts on individuals and social groups is described.

3. Unit Standard 7463

Describe and represent objects and the environment in terms of shape, space, time and motion

Specific Outcomes and Assessment Criteria:**S01:**

Describe and represent the position and change in position of an object in space. (Words, rough sketches and abstract representation on a Cartesian plane.)

1. The positions of objects are described in relation to each other using graphs and sketches and written or verbal descriptions.
2. The positions of objects are represented correctly on a Cartesian plane.
3. The change of position of objects in terms of the relationship between space and time is described.
4. Tessellations are identified.

S02:

Illustrate changes in size & shape of appearance of objects as result of changes in orientation.

1. The perception of the changes in an object is described from different observational points. (3-dimensional objects and 2-dimensional representations of 3-dimensional objects.)
2. 3-dimensional objects are represented in 2 dimensions in such a way that the size and shape of the object are correctly represented.
3. The relationships between surface area and volume are described.

4. Unit Standard 7453

Use algebraic notation, conventions and terminology to solve problems

Specific Outcomes and Assessment Criteria:**S01:**

Form and use algebraic equations and inequalities to represent and solve problems. (Simple linear equations and inequalities.)

1. The problem is represented completely through equations or inequalities, which are consistent with the problem.
2. The concepts of equations and inequalities are explained.
3. Situations requiring the use of equations as opposed to inequalities, and vice versa, are identified.
4. Algebraic notation, conventions and terminology are used correctly.
5. The solution is correct in terms of the problem context.
6. The solution is verified through substitution or other verification processes.

S02:

Manipulate algebraic expressions to find equivalent forms. (Common factors, products and grouping using associative, distributive and commutative properties.)

1. The manipulated form is equivalent to the original form. (The original expression is manipulated to achieve at least two different forms.)

S03:

Select and use algebraic formulae to solve problems. (Substitution into any formula, solve for one variable, supplied formulae from any context.)

1. The correct formula is selected in terms of the problem context.
2. The formula is applied correctly to obtain a valid solution.
3. Units are used correctly.

5. Unit Standard 7461

Use maps to access and communicate information concerning routes, location and direction

Specific Outcomes and Assessment Criteria:

S01:

Read, interpret and use maps, to depict and make sense of real locations, distances and position (Street maps: local and national maps.)

1. Objects are identified on a map.
2. The positions of objects on a map are given using reference points on a grid.
3. A variety of routes between two points on a map are identified and described.
4. Appropriate routes are identified and selected to meet the requirements of a variety of circumstances.
5. Real distances between points on a map are determined correctly in accordance with the scale.
6. Landmarks are used to give direction in real life, and these landmarks are identified and located on a map.
7. Directions are given correctly using maps and in real life. (Bearing and the four compass points.)

S02:

Draw maps according to scale. (Non-contoured maps.)

1. Maps are drawn such that the relative positions of places and objects match the real situation.
2. A suitable scale is chosen, indicated and applied correctly.
3. Symbols used conform to conventional uses or are defined through a key or legend.
4. The map is clear and neat and contains all critical information as required by the situation.
5. Maps are converted from one scale to another.

6. Unit Standard 7450

Work with measurement in a variety of contexts

Specific Outcomes and Assessment Criteria:

S01:

Apply relationships between common quantities in various contexts. (Mass and weight, distance and displacement, speed and velocity, volume and density, volume and surface area, area and perimeter, distance and time, volume and capacity.)

1. Terms are used in the proper context.
2. Comparisons between quantities are made and differences and relationships described.
3. Formulae and units are described in context to show the relationships and differences.

S02:

Use measuring instruments to measure and calculate quantities in various contexts. (Quantities include all of: length, distance, mass, time, temperature, volumes of regular prisms, perimeter, area, weight, surface area, density, displacement and angles. Measuring instruments include all of: rulers, tape measures, scale, clocks, thermometers, capacity measuring instruments, and protractors.)

1. Measuring instruments are used correctly.
2. Readings are recorded and reported within the margin of error as limited by the instrument and as is appropriate within the context.
3. Measuring instruments are chosen to comply with the accuracy requirements of the context.

S03:

Solve measurement problems in various contexts. (Practical and non-practical processes, trigonometric right-angled heights and distances.)

1. Solutions are correct within margins of error allowed within the context.
2. Units are used correctly.
3. Methods and solutions are justified.

7. Unit Standard 7448

Work with patterns in various contexts

Specific Outcomes and Assessment Criteria:**S01:**

Recognize, identify and describe patterns in various contexts. (Numeric, geometric, patterns from a variety of contexts.)

1. Patterns are recognized in terms of the relationship between the elements of the pattern.
2. Patterns are correctly identified in terms of the relationship between the elements of the pattern.
3. Patterns are correctly described in terms of the relationship between the elements of the pattern and remain consistent through the pattern.
4. The language of comparison is appropriate and describes the relationship between the elements of the pattern.

S02:

Complete, extend and generate patterns in a variety of contexts. (Numeric, geometric, patterns from a variety of contexts.)

1. Completed patterns are internally consistent with respect to the relationship between elements of the pattern.
2. The extension is consistent with respect to the relationship between elements of the pattern.
3. Generated patterns are internally consistent.

S03:

Devise processes for a general rule. (Processes include: systematic counting, sequencing numbers, tables, drawings, pictures, classification, organized lists, mathematical and models such as graphs.)

1. Appropriate processes are devised according to the context.
2. Processes have potential to lead to a general rule.
3. A general rule is devised such that it is consistent with the relationship of the elements of the patterns.

S04:

Represent patterns using different generalized mathematical forms. (Graphs, formulae, expressions and other rules for expressing patterns.)

1. Appropriate mathematical forms are used to represent patterns.
2. The representation is consistent with relationships within the pattern and represents the pattern completely.
3. Conversions are made between various forms of representations.
4. Relationships between various possible forms of representations are described.

S05:

Use general rules to generate patterns. (Processes include: systematic counting, sequencing numbers, tables, drawings, pictures, classification, organized lists, mathematical models such as graphs.)

1. Patterns generated are consistent with the general rule.
2. Patterns are generated to the extent that they enable the rule to be devised from the pattern.

8. Unit Standard 7447

Working with numbers in various contexts

Specific Outcomes and Assessment Criteria:**S01:**

Express and interpret a range of contexts using mathematical symbols and find applications for numerical models. (Everyday problems, numerical contexts. Numerical models include equations, expressions and terms.)

1. Mathematical sentences reflect the situation completely and accurately. (Everyday problems, numerical contexts. Numerical models include equations, expressions and terms.)
2. The form of expression is appropriate to the context.
3. Application for given numerical models are developed such that the meaning of symbols and relationships between them are clarified.

S02:

Solve a range of everyday problems using estimation and calculations. (Rounding off and truncating, with or without calculator, combination, separation, comparison, equalisation, sharing and grouping.)

1. Problem solving strategies are based on a correct interpretation of the problem situation.
2. Estimates can be justified within context.
3. Calculations are performed accurately.
4. Calculations follow some form of logical reasoning process, which is presented clearly.
5. Solutions are correct in terms of the context.

S03:

Verify and justify solutions within different contexts. (Solutions derived by learners and by others.)

1. The reasoning process is explained clearly.
2. Solutions are justified in terms of the context. (Appropriate and inappropriate solutions.)
3. Solutions are shown to be consistent with estimations and vice versa.

S04:

Perform operations on simple and complex numerical expressions. (Four basic operations in all combinations. Expressions involving exponents that can be calculated without a calculator. Operations to be performed with and without a calculator.)

1. Operations are performed according to the conventions governing the order of operations.
2. Solutions are correct.

S05:

Describe and compare counting systems from different cultures. (Own, African culture other than own, one other.)

1. Numbers are translated from one base system to another. (Base 2, 5, 10, and 16.)
2. Descriptions show understanding of how counting systems developed and their significance.
3. Descriptions show examples of how the systems might have been used, and the limitations of the system.

S06:

Critically analyze the development of the base ten number system. (Place value, role of 0 in our number system, patterned nature of whole numbers, history and contestations.)

1. The development and significance of zero is explained.
2. Understanding of the place value of numbers is demonstrated. (Expansion of numbers in different ways, the value of a numerical symbol in a number.)
3. The patterned nature of whole numbers and its historical development are described.
4. The contestations around, and use and popularisation of the decimal number system are described. (Uses in economics and politics.)

S07:

Analyze the relationship between rational and whole numbers.

1. Demonstrations describe the increasing density of the system.
2. Demonstrations show that whole numbers are a subset of rational numbers.
3. The properties of whole numbers and rational numbers are given.

S08:

Analyze the relationship between rational numbers and integers.

1. Demonstrations describe the increasing density of the system.
2. Demonstrations show that whole numbers are a subset of rational numbers.
3. The properties of whole numbers and rational numbers are given.

9. Unit Standard 7464

S01

Identify geometric shapes and patterns in cultural products. (shapes of and decorations on cultural products such as drums, pots, mats, buildings, and necklaces.)

1. Basic transformations are identified. (translations, reflections and rotations.)
2. Basic geometric shapes are identified.
3. Basic patterns are identified and described.
4. Basic patterns are extended in a way that maintains the consistency of the pattern.

S02

Analyze similarities & differences in shapes & patterns, & effect of colour, used by cultures. (analyze similarities and differences in shapes and patterns, and the effect of colour, used by different cultures.)

1. Similarities in shapes and patterns are identified.
2. Differences in shapes and patterns are identified.
3. Possible reasons for similarities and/or differences in shapes and patterns used by different cultures are identified.
4. The effect of colour on shape and symmetry is described and illustrated.

S03

Analyze and explain the way shapes and space are used in different epochs and cultures. (Architecture, town and settlement planning.)

1. Shapes used by different cultures are identified.
2. The use of space in different cultures is analyzed and explained.
3. The use of space in different epochs is analyzed.