KENYA INSTITUTE OF CURRICULUM DEVELOPMENT

A Skilled and Ethical Society

DIPLOMA IN TEACHER EDUCATION
PRE-PRIMARY AND PRIMARY

MATHEMATICS CURRICULUM DESIGN

2024

First Published in 2021

Revised 2024

ISBN: 978-9966-31-980-7

Published and printed by Kenya Institute of Curriculum Development

TABLE OF CONTENTS

INTRODUCTION

The development of the curriculum for Diploma in Teacher Education for the Pre-Primary and Primary level **(DTE–PP&P)** is a critical milestone in the implementation of Competency Based Curriculum (CBC) in Kenya. The curriculum designs herein have been developed to prepare the teacher trainee to be able to effectively guide the learners at the Pre-Primary and Primary School level; that is from Pre-Primary One (PP1) to Grade Six (G6) in Basic Education.

It is envisaged that the teacher educator will guide the teacher trainees appropriately to embrace the shift from the Objective-Based to the Competency Based Curriculum which is hinged on use of learner-centred pedagogy for realisation of the stated expected learning outcomes. In addition, the emphasis on formative assessment to facilitate learning should be underscored as the basis for determining learner aptitude and performance. Other key aspects that have been introduced include structured micro-teaching, a longer period for the practicum and the introduction of specific Professional Courses that ensure congruence with the CBC vision, mission, pillars and guiding principles as enshrined in the *Basic Education Curriculum Framework* (KICD, 2017).

The DTE-PP&P curriculum seeks to develop the teacher to act as a facilitator in the learning process taking into consideration the different abilities and learning styles of individual target learners. The curriculum has been designed with emphasis on experiential and reflective learning to develop appropriate Pedagogical Content Knowledge (PCK); hence, the emphasis on integrated content and pedagogy for the student teachers while at college. This is to ensure that the student teacher is given adequate time to practice how to facilitate learning of the different strands prescribed in the curriculum designs.

The Curriculum designs for the DTE-PP&P are packaged according to courses of training as follows:

Professional Learning areas

1. Child Development and Psychology
2. Curriculum Studies
3. Educational Resources
4. ICT Integration in Education
5. Educational Assessment
6. Research Skills
7. Inclusive Education
8. Educational Leadership and Management
9. Sociological and Philosophical Foundations of Education
10. Historical and Comparative Foundations of Education
11. Micro Teaching
12. Practicum

Integrated Content and Pedagogy Learning areas

1. English
2. Kiswahili
3. Mathematics
4. Science and Technology
5. Agriculture
6. Home Science
7. Religious Education: CRE/IRE/HRE
8. Social Studies

9. Physical and Health Education
10. Art and Craft
11. Music
12. Indigenous Language
13. Foreign Languages: French/ Arabic/ German/ Mandarin (Chinese)/ KSL

REGULATIONS FOR DIPLOMA IN TEACHER EDUCATION -PRE-PRIMARY AND PRIMARY (DTE-PP&P)

Entry Requirements

The entry requirements for the Diploma in Teacher Education – Pre-Primary and Primary shall be **C Plain** Mean Grade in the Kenya Certificate of Secondary Education examination (KCSE) or its equivalent (as equated by the Kenya National Examinations Council (KNEC). The Special Needs Candidates (SNE) could be admitted with **C Minus (-)** Grade in KCSE or equivalent

Duration of Training

The duration for the Diploma in Teacher Education – Pre-Primary and Primary shall be **three years**.

Subjects Offered

The trainee undertaking the Diploma in Teacher Education – Pre-Primary and Primary (DTE –PP&P) shall take **ALL** courses specified in the DTE- PP&P curriculum; which includes Professional Courses and learning areas (subjects) related to the content in the Pre-Primary and Primary School Curriculum.

Micro-Teaching and Practicum

Micro Teaching shall be undertaken as a course and shall be a pre-requisite for the Practicum; hence a course design has been developed for it. There shall be two (2) school term practicum sessions for which guidelines shall be developed.

Award of the Diploma

To be awarded the Diploma in Teacher Education – Pre-Primary and Primary (DTE-PP&P), the candidate must achieve the following:

i) Complete the required hours for coursework and pass the stipulated assessment as directed by the Kenya National Examinations Council (KNEC).

ii) Complete the required hours for the Practicum and pass the stipulated assessment as directed by the Kenya National Examinations Council (KNEC).

Note: If the student teacher fails to meet the requirements for award of the Diploma in Teacher Education – Pre-Primary and Primary (DTE –PP&P) he/she will be allowed to repeat the specific component or learning area failed.

Grading

The Diploma in Teacher Education – Pre-Primary and Primary (DTE PP&P) shall be graded as stipulated by the Kenya National Examinations Council (KNEC).

TABLE 1: DISTRIBUTION OF PROFESSIONAL LEARNING AREAS

	SUBJECT	TERM 1	TERM 2	TERM 3	TERM 4	TERM 5	TERM 6	Sub Total	TERM 7 Micro Teaching - Subject Practicals	TERM 8	TERM 9	TOTAL FOR PROGRAMME
PROFESSIONAL LEARNING AREAS												**PROFESSIONAL LEARNING AREAS (420 Hours)**
1.	Child Development and Psychology	10	10	10	10	10	10	60				
2.	Curriculum Studies	30	20	20	20			90				
3.	Educational Resources	10	10	10				30				
4.	ICT Integration in Education	10	10	10				30				
5.	Educational Assessment	10	10	10				30				
6.	Research Skills	10	10	4				30				
7.	Inclusive Education	10	10	10				30				
8.	Educational Leadership and Management				10	10	10	30				
9.	Sociological and Philosophical Foundations of Education				10	10	10	30				
10.	Historical and Comparative Foundations of Education				10	10	10	30				
11.	Micro Teaching	30						30				
SUB TOTAL		**120Hrs**	**80Hrs**	**80Hrs**	**60Hrs**	**40Hrs**	**40Hrs**	**420Hrs**				

TABLE 2: DISTRIBUTION OF CONTENT + PEDAGOGY (SUBJECTS)

CONTENT + PEDAGOGY (SUBJECTS)												
	SUBJECT	**TERM 1**	**TERM 2**	**TERM 3**	**TERM 4**	**TERM 5**	**TERM 6**	**SUB TOTAL**	**TERM 7 Micro Teaching - Subject Practicals**	**TERM 8**	**TERM 9**	**TOTAL FOR COURSE**
1	English	24	34	34	35	29	30	186	30	Practicum 300 Hours	Practicum 300 Hours	**CONTENT& PEDAGOGY (SUBJECTS) (1680 Hrs)** **+ PRACTICUM (600Hrs)**
2	Kiswahili	20	20	20	20	20	20	120	20			
3	Mathematics	30	30	30	30	30	30	180	30			
4	Science and Technology	20	20	20	20	20	20	120	30			
5	Agriculture	20	20	20	20	20	20	120	20			
6	Home science	20	20	20	20	20	20	120	20			
7	Religious Education:- (CRE, IRE, HRE)	20	20	20	20	20	20	120	20			
8	Social Studies	20	20	20	20	20	20	120	20			
9.	Physical and Health Education	10	10	10	30	30	30	120	30			
10.	Art and craft	10	30	30	10	20	20	120	20			
11.	Music	10	20	20	20	20	30	120	20			
12.	Indigenous Languages	10	20	20	20	30	20	120	20			
13	Foreign Languages: French/ Arabic/ German/ Mandarin (Chinese)/ KSL	10	10	10	30	30	30	120	20			
SUB TOTAL		230 Hrs	270 Hrs	270 Hrs	290 Hrs	310 Hrs	310 Hrs	1686Hrs				
TOTAL		**350**	**350**	**350**	**350**	**350**	**350**	**2100**	**300**	**300**	**300**	**3000 HRS**

NATIONAL GOALS OF EDUCATION

Education in Kenya should:

1. **Foster nationalism and patriotism and promote national unity.**
   Kenya's people belong to different communities, races and religions, but these differences need not divide them. They must be able to live and interact as Kenyans. It is a paramount duty of education to help young people acquire this sense of nationhood by removing conflicts and promoting positive attitudes of mutual respect which enable them to live together in harmony and foster patriotism in order to make a positive contribution to the life of the nation.

2. **Promote the social, economic, technological and industrial needs for national development.**
   Education should prepare the youth of the country to play an effective and productive role in the life of the nation.
   a) **Social Needs**
      Education in Kenya must prepare children for changes in attitudes and relationships which are necessary for the smooth progress of a rapidly developing modern economy. There is bound to be a silent social revolution following in the wake of rapid modernization. Education should assist our youth to adapt to this change.
   b) **Economic Needs**
      Education in Kenya should produce citizens with the skills, knowledge, expertise and personal qualities that are required to support a growing economy. Kenya is building up a modern and independent economy which is in need of an adequate and relevant domestic workforce.
   c) **Technological and Industrial Needs**
      Education in Kenya should provide learners with the necessary skills and attitudes for industrial development. Kenya recognizes the rapid industrial and technological changes taking place, especially in the developed world. We can only be part of this development if our education system is deliberately focused on the knowledge, skills and attitudes that will prepare our young people for these changing global trends.

3. **Promote individual development and self-fulfilment**
   Education should provide opportunities for the fullest development of individual talents and personality. It should help children to develop their potential interests and abilities. A vital aspect of individual development is the building of character.

4. **Promote sound moral and religious values.**
   Education should provide for the development of knowledge, skills and attitudes that will enhance the acquisition of sound moral values and help children to grow up into self-disciplined, self-reliant and integrated citizens.

5. **Promote social equity and responsibility.**
   Education should promote social equality and foster a sense of social responsibility within an education system which provides equal educational opportunities for all. It should give all children varied and challenging opportunities for collective activities and corporate social service irrespective of gender, ability or geographical environment.

6. **Promote respect for and development of Kenya's rich and varied cultures.**
   Education should instill in the youth of Kenya an understanding of past and present cultures and their valid place in contemporary society. Children should be able to blend the best of traditional values with the changing requirements that must follow rapid development in order to build a stable and modern society.

7. **Promote international consciousness and foster positive attitudes towards other nations.**
   Kenya is part of the international community. It is part of the complicated and interdependent network of peoples and nations. Education should therefore lead the youth of the country to accept membership of this international community with all the obligations and responsibilities, rights and benefits that this membership entails.

8. **Promote positive attitudes towards good health and environmental protection.**
   Education should inculcate in young people the value of good health in order for them to avoid indulging in activities that will lead to physical or mental ill health. It should foster positive attitudes towards environmental development and conservation. It should lead the youth of Kenya to appreciate the need for a healthy environment.

LEVEL LEARNING OUTCOMES FOR DIPLOMA IN TEACHER EDUCATION - PRE-PRIMARY AND PRIMARY (DTE–PP&P)

By the end of the course the teacher trainee should be able to:

1. Model appropriate behaviour and values for Pre-Primary and Primary school learners to emulate for development of good citizenship
2. Communicate and collaborate effectively with learners, peers, parents and the community to create a conducive learning environment.
3. Use appropriate pedagogical approaches to facilitate learning for Pre-Primary and Primary school learners in and out of the classroom
4. Apply inclusive practices to support all Pre-Primary and Primary school learners including those with disabilities and special educational needs
5. Employ ICT skills in the learning process to enhance digital literacy
6. Employ appropriate assessment approaches to promote effective learning
7. Identify and nurture learner's potential and talents for appropriate placement and transition into Junior School.
8. Develop environmental conservation skills in Pre-Primary and Primary school learners to promote education for sustainable development
9. Create innovative and effective solutions to challenges in the learning process.
10. Integrate pertinent and contemporary issues in learning to enable learners to cope with daily challenges.

ESSENCE STATEMENT

Mathematics is a language that involves numbers in the exploration and use of patterns and relationships in quantities, space and time. It equips learners with ways of thinking, reasoning, generalizing and decision-making. It has practical applications to everyday life, from financial literacy to recreation and leisure.

Mathematics and Mathematical Activities in Diploma in Teacher Education (DTE-PP&P) will expose teacher trainees to different learning strategies including project work, role-play, discussions, action research and practical activities. These will equip the teacher trainee with knowledge, skills, attitudes and values that will enable him/her to become creative, analytical and a problem solver who will identify and nurture the mathematics potential of every learner. The acquisition of these knowledge and skills will enable the teacher trainee to progress to higher levels of learning.

The learning of Mathematics at this level is backed by Dubinsky's Action, Processes, Object, Schema (APOS) Constructivist Theory of Learning Mathematics. This theory hypothesizes that mathematical knowledge consists in an individual's tendency to deal with perceived mathematical problem situations by constructing mental actions, processes and objects and organizing them in schemas to make sense of situations and solve the problems. Dubinsky explains that verbal explanations that do not relate to student teachers' prior experience are quite ineffective in learning Mathematics. Hence, there is need to replace the lecture method with constructive interactive methods including computer/ mathematical activities, differentiated and cooperative learning. This will radically improve the amount of meaningful learning that takes place. Gardner's Multiple Intelligence Theory and Piaget's Cognitive Theory of Development also back it.

GENERAL LEARNING OUTCOMES

By the end of course, the trainee should be able to;

1. Develop estimation skills and mental arithmetic skills for use in mathematics operations.
2. Utilize different learning strategies and instructional approaches including use of new technologies and differentiated learning to enhance acquisition of Mathematics concepts.
3. Create practical activities in Mathematics to facilitate the acquisition of core competencies and values in learners using a variety of learner centred techniques.
4. Analyse the learning difficulties of their pupils in mathematics and provide the necessary remedies.
5. Prepare and use professional documents in a learning situation.
6. Produce and use relevant learning materials and resources with an emphasis on improvisation to make learning of Mathematics realistic and enjoyable.
7. Use mathematics concepts in the classroom to address pertinent and contemporary issues in society.
8. Develop and use tools of evaluation and assessment in Mathematics with a view to laying a firm foundation for logical thinking and problem- solving.
9. Apply mathematical knowledge and skills that will enable learner's nurture their potential and use them in their lives

STRAND 1.0 OVERVIEW OF MATHEMATICS IN PRE-PRIMARY AND PRIMARY TEACHER EDUCATION

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
1.0 Overview of mathematics in Pre-Primary and primary teacher education	**1.1 Learning mathematics for pre-primary and primary education** **(6 hours)**	By the end of the sub strand, the teacher trainee should be able to: a) analyse the essence statements for pre-primary and primary school mathematics, b) interrogate the scope of mathematics in early year education, c) interrogate the spiral nature of the early year education mathematics curriculum, d) conduct desk research on the best practices for teaching and learning mathematics in pre-primary and primary education, e) examine best	The teacher trainee to: • study the essence statements in pre-primary and primary school mathematics curriculum designs and derive justification for teaching mathematics curriculum for the level, • conduct guided discussion and make note on the scope of pre-primary and primary school mathematics, • Use early year education curriculum designs and study the progression in scope and depth of the mathematical concepts from PP1 to grade 3 and present the findings in class plenary, • create learning experiences appropriate for developing the concepts of any sub-strand in pre-primary, lower primary and upper primary, • use locally available materials to develop resources appropriate for teaching and learning of	1. How do core competencies, values and PCIs contribute to achieving learning outcomes in teacher education? 2. Which teaching methods and activities enhance the acquisition of mathematical skills and concepts in pre-primary and primary

		approaches for developing core competencies in pre-primary and primary school mathematics, f) appreciate learning of mathematics for pre-primary and primary education in daily life situations.	mathematics in pre-primary and primary education, • conduct online research on best approaches for developing core competences in mathematical activities, • brainstorm on the indicators of the core competencies in primary mathematical activities, • conduct guided class discussion on best approaches for developing core competencies in pre-primary and primary mathematics.	education?

Core Competencies to be developed:

- Learning to learn and reflective practice - as teacher trainees interrogate the scope of mathematics in Early Year Education.
- Pedagogical Content Knowledge – as the teacher trainee acquires knowledge and skills on the best approaches for developing core competencies in learners in mathematics and mathematical activities.

Values:

Unity is enhanced as teacher trainees collaborate in pairs and in groups.

Suggested Formative Assessment Rubric				
Level / **Indicators**	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to analyse the essence statements for pre-primary and primary school mathematics.	Analyses the essence statements for pre-primary and primary school mathematics comprehensively.	Analyses the essence statements for pre-primary and primary school Mathematics.	Analyses the essence statements for pre-primary and primary school mathematics somewhat comprehensive.	Analyses the essence statements for pre-primary and primary school mathematics superficially.
Ability to interrogate the scope of mathematics in pre-primary and lower primary school education.	Interrogates the scope of mathematics in pre-primary and lower primary school education comprehensively.	Interrogates the scope of mathematics in pre-primary and lower primary school education.	Interrogate the scope of mathematics in pre-primary and lower primary school education fairly detailed.	Interrogates the scope of mathematics in pre-primary and lower primary school education narrowly.
Ability to interrogate the spiral curriculum nature of mathematics. for the early years education.	Interrogates the spiral curriculum nature of mathematics for the early years education thoroughly.	Interrogates the spiral curriculum nature of mathematics for the early year's education.	Interrogates the spiral curriculum nature of mathematics for the early year's education somewhat broadly.	Interrogates the spiral curriculum nature of mathematics for the early year's education shallowly.

Ability to conduct desk research on best practices for teaching and learning mathematics in pre primary and primary education.	Conducts desk research on best practices for teaching and learning mathematics in pre-primary and primary education systematically.	Conducts desk research on best practices for teaching and learning mathematics in pre-primary and primary education.	Conducts desk research on best practices for teaching and learning mathematics in pre-primary and primary education fairly systematic.	Conducts desk research on best practices for teaching and learning mathematics in pre-primary and primary education with minimal organisation.
Ability to examine the best approaches for developing core competencies in primary school mathematics.	Examines best approaches for developing core competencies in primary school mathematics thoroughly.	Examines best approaches for developing core competencies in primary school mathematics.	Examines best approaches for developing core competencies in primary school mathematics fairly thorough.	Examines best approaches for developing core competencies in primary school mathematics narrowly.

STRAND 2.0 NUMBERS

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
2.0 Numbers	**2.1 Number Concept** **(6 hours)**	By the end of the sub strand, the teacher trainee should be able to: a) analyse pre-number activities for learning as foundation of number concept, b) discuss ways of identifying similarities and differences among objects, c) model safe activities for sorting and grouping objects according to different attributes, d) generate activities for matching and pairing objects according to different attributes, e) model appropriate activities for learning	The teacher trainee to: • explore pre-number activities and number concepts used in everyday life *(sorting and grouping, matching and pairing, ordering and pattern),* • observe objects to identify different attributes that can be used to classify them, • illustrate the process sorting, grouping and comparing attributes of objects using different attributes, • create appropriate activities that facilitate learning the concept of match objects according to different attributes, • use appropriate activities to facilitate learning of arranging and sequencing sequence objects in ascending and descending order, • demonstrate arranging of objects to form pattern, • compose songs, poems and rhymes to	1. Why introduce Number concepts in EYE? 2. What strategies can you use to teach the number concept? 3. How can you use the number concept in real life?

		the concepts of arranging and sequencing objects in ascending and descending order, f) generate activities for creating patterns using concrete objects in the environment g) appreciate the use of number concepts in real life.	facilitate learning of sorting and grouping, matching and pairing, ordering and pattern making and their application in real life situations, • use the curriculum designs for preprimary and primary to model materials and activities in the suggested learning experiences in the sub strand pre number activities, • discuss with peers the importance of pre-number activities and make presentations in class, • assemble concrete objects appropriate learning pre-number activities	

Core Competencies to be developed:

- Self-efficacy - as teacher trainees model materials and activities for number concept.
- Pedagogical content knowledge - as teacher trainees identify and use a range of strategies and learning resources in number concepts.

Values:

- Responsibility is enhanced as teacher trainees collect objects for use in learning number concepts.
- Unity is enhanced as teacher trainees work together modeling materials and activities for number concept.

Suggested Formative Assessment Rubric				
Level / **Indicators**	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to analyse pre-number activities for learning the number concepts	Analyses pre-number activities for learning the number concepts coherently.	Analyses pre-number activities for learning the number concepts.	Analyses pre-number activities for learning the number concepts fairly coherent.	Analyses pre-number activities for learning the number concepts shallowly.
Ability to discuss ways of identifying similarities and differences to distinguish among object.	Discusses ways of identifying similarities and differences to distinguish among object comprehensively.	Discusses ways of identifying similarities and differences to distinguish among object.	Discuss ways of identifying similarities and differences to distinguish among object moderately comprehensive.	Discusses ways of identifying similarities and differences to distinguish among object superficially.
Ability to model safe activities for sorting and grouping according to different attributes.	Models safe activities in sorting and grouping according to different attributes creatively.	Models safe activities in sorting and grouping according to different attributes.	Model safe activities in sorting and grouping according to different attributes reasonably creative.	Models safe activities for sorting and grouping according to different attributes with minimal creativity.

Ability to generate activities for matching and pairing objects according to different attributes.	Generates activities for matching and pairing objects according to different attributes thoroughly.	Generates activities for matching and pairing objects according to different attributes.	Generate activities for matching and pairing objects according to different attributes fairly thorough.	Generates activities for matching and pairing objects according to different attributes with minimal details.
Ability to model appropriate activities for arranging and sequencing sequence objects in ascending and descending order using physical attributes	Models appropriate activities for arranging and sequencing sequence objects in ascending and descending order using physical attributes innovatively.	Models appropriate activities for arranging and sequencing sequence objects in ascending and descending order using physical attributes	Models appropriate activities for arranging and sequencing sequence objects in ascending and descending order using physical attributes reasonably innovative.	Models appropriate activities for arranging and sequencing sequence objects in ascending and descending order using physical attributes with minimal innovativeness.
Ability to generate activities for creating different patterns using concrete objects in the environment	Generates activities for creating different patterns using concrete objects in the environment thoroughly.	Generates activities for creating different patterns using concrete objects in the environment	Generates activities for creating different pat-terns using concrete objects in the environment moderately thorough.	Generate activities for creating different patterns using concrete objects in the environment with minimal thoroughness.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
2.0 Numbers	**2.2 Rote Counting** **(2 Hours)**	By the end of the sub strand, the teacher trainee should be able to: a) explain reasons for learning rote counting in pre-primary mathematical activities, b) model activities appropriate for learning rote counting, c) select interactive games appropriate for teaching and learning rote counting, d) develop activities appropriate for learning counting forward and backward in given cases, e) recognise the role of rote counting in daily life situations.	The teacher trainee to: • Carry out online research on the reasons for learning rote counting in preprimary mathematical activities, • compose songs, poems, rhymes appropriate for learning rote counting in pre-primary 1 and 2 mathematical activities, • use pedagogical knowledge to develop activities appropriate for learning rote counting in pre- primary mathematical activities, • design games, songs, poems, rhymes and body actions on rote counting activities, • create activities appropriate for learning forward and backward counting in mathematical activities, • use digital device to search and select interactive games appropriate for teaching and learning rote counting sub	1. Which situations use rote counting in real life? 2. How can mastery of pedagogical content knowledge be portrayed in rote counting?

			strand in pre-primary 1 and 2 mathematical activities.	

Core Competencies to be developed:

- Pedagogical Content Knowledge – as the teacher trainee acquires knowledge and skills on appropriate procedure for facilitating learning in rote counting.
- Instructional leadership – as teacher trainees model activities appropriate for teaching and learning rote counting.

Values:

Unity is enhanced as teacher trainees work together in pairs/groups during rote counting.

Suggested Formative Assessment Rubric				
Level / **Indicator**	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to explain reasons for learning rote counting in preprimary mathematical activities.	Explains reasons for learning rote counting in preprimary mathematical activities coherently.	Explains reasons for learning rote counting in preprimary Mathematical activities.	Explains reasons for learning rote counting in preprimary mathematical activities moderately coherent.	Explains reasons for learning rote counting in pre-primary mathematical activities with minimal coherence.
Ability to model activities appropriate for learning rote counting sub strand in pre- primary	Models activities appropriate for learning rote counting sub strand in pre- primary mathematical activities creatively.	Models activities appropriate for learning rote counting sub strand in pre-primary mathematical activities.	Models some activities appropriate for learning rote counting sub strand in pre-primary mathematical activities reasonably	Models activities appropriate for learning rote counting sub strand in pre-primary mathematical activities with minimal creativity.

mathematical activities.			creative.	
Ability to select interactive games appropriate for teaching and learning rote counting.	Selects interactive games appropriate for teaching and learning rote counting objectively.	Selects interactive games appropriate for teaching and learning rote counting.	Selects interactive games appropriate for teaching and learning rote counting fairly objective.	Selects interactive games appropriate for teaching and learning rote counting least objective.
Ability to develop activities appropriate for learning counting forward and backward.	Develops activities appropriate for learning counting forward and backward innovatively.	Develops activities appropriate for learning counting forward and backward.	Develops some activities appropriate for learning counting forward and backward moderately innovative.	Develops a few activities appropriate for learning counting forward and backward minimal creativity.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
2.0 Numbers	**2.3 Number Recognition** **(3 Hours)**	By the end of the sub strand, the teacher trainee should be able to: a) examine best practices in teaching and learning number recognition, b) design materials appropriate for learning and teaching the concept of number recognition, c) embrace safety measure when developing appropriate materials for learning numbers recognition concept.	The teacher trainee to: • conduct research from print and online sources on best practices for teaching and learning number recognition and present findings in plenary, • design number cards and charts appropriate for use in learning mathematics, • Use safe locally available materials to prepare resources for teaching number recognition concept, • Use video clips on songs and games based on number recognition, • compose songs, poems, rhymes for teaching and learning number recognition on number recognition sub strand in pre-primary1 and 2 curriculum design, • conduct guided class discussions on safety precautions to consider when designing materials for learning the concept of number recognition.	How can you teach number recognition using creative and innovative methods?
Core Competencies to be Developed: • Pertinent and contemporary issues of safety - as teacher trainee integrate safety measures in designing materials appropriate				

for learning the concept of number recognition.

- Creativity and innovation – as the teacher trainee models various methods of facilitating reading and writing numbers in words.

Values:

- Unity is enhanced as teacher trainees harmoniously work together and exchange ideas on designing materials appropriate for learning the concept of number recognition.
- Respect is enhanced as teacher trainee handles peer responses with tolerance decorum.

Suggested Formative Assessment Rubric

Level / Indicators	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below Expectations
Ability to examine best practices in teaching and learning number recognition concept	Examines best practices in teaching and learning number recognition concept comprehensively.	Examines best practices in teaching and learning number recognition concept.	Examines some of the best practices in teaching and learning number recognition concept reasonably comprehensive.	Examines a few best practices in teaching and learning number recognition concept superficially.
Ability to design innovative materials appropriate for learning and teaching concept of number recognition.	Designs innovative materials appropriate for learning and teaching concept of number recognition innovatively.	Designs safe Innovative materials appropriate for learning and teaching concept of number recognition.	Designs some innovative materials appropriate for learning and teaching concept of number recognition moderately innovative.	Designs a few innovative materials appropriate for learning and teaching concept of number recognition with difficulties minimal innovativeness.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
2.0 Numbers	**2.4 Counting Concrete Objects** **(3 Hours)**	By the end of the sub strand, the teacher trainee should be able to: a) outline ways of teaching and learning counting concrete objects in pre-primary education, b) match concrete objects with counting numbers in real life situations, c) model activities appropriate for teaching counting concrete objects in real life situations, d) match numerals with concrete objects to illustrate the concept of one to one correspondence, e) recognise the importance of counting concrete objects in daily life.	The teacher trainee to: • carry out research on teaching and learning counting concrete objects in preprimary education and present to the peers, • Search for information on importance of counting concrete objects in mathematics activities, • model counting concrete objects activities through, games, songs, poems, rhymes and body actions, • compose and present songs, poems, rhymes appropriate for teaching and learning counting concrete objects, • record videos on mathematical activities appropriate for teaching and learning counting concrete objects in ascending and descending order at pre-primary education, • model activities for matching numerals with concrete objects to illustrate the concept of one to one correspondence.	1. How can counting concrete objects be taught demonstrating pedagogy content knowledge? 2. How can you use counting in real life?

Core Competencies to be Developed:

- Citizenship and Leadership - as teacher trainee participate and guides discussion on teaching and learning counting concrete objects in pre-primary education.
- Creativity and Innovation – as teacher trainees model activities appropriate for counting concrete objects in ascending and descending order.

Values:

Love is enhanced as teacher trainees work together and assist one another in groups to model activities appropriate for counting concrete objects in ascending and descending order.

Suggested Formative Assessment Rubric

Level / Indicators	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below Expectations
Ability to outline ways of teaching and learning counting concrete objects in pre-primary education.	Outlines ways teaching and learning counting concrete objects in pre-primary education exhaustively.	Outlines ways teaching and learning counting concrete objects in pre-primary education.	Outlines some ways teaching and learning counting concrete objects in pre-primary education fairly exhaustively.	Outlines a few ways teaching and learning counting concrete objects in pre-primary education with difficulties with minimal details.
Ability to match concrete objects with counting numbers.	Matches concrete objects with counting numbers exhaustively.	Matches concrete objects with counting numbers.	Matches concrete objects with counting numbers moderately exhaustive.	Matches concrete objects with counting numbers least exhaustive.

Ability to model activities appropriate for counting concrete objects in ascending and descending order.	Models activities appropriate for counting concrete objects in ascending and descending order innovatively.	Models activities appropriate for counting concrete objects in ascending and descending order.	Model some activities appropriate for counting concrete objects in ascending and descending order considerately innovative.	Models a few activities appropriate for counting concrete objects in ascending and descending order with minimal innovativeness.
Ability to match numerals with concrete objects to illustrate the concept of one to one correspondence.	Matches numerals with concrete objects to illustrate the concept of one to one correspondence creatively.	Matches numerals with concrete objects to illustrate the concept of one to one correspondence.	Matches some numerals with concrete objects to illustrate the concept of one to one correspondence fairly creatively.	Match a few numerals with concrete objects to illustrate the concept of one to one correspondence with minimal creativity.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
2.0 Numbers	**2.5 Number Sequencing** **(3 Hours)**	By the end of the sub strand, the teacher trainee should be able to: a) explain methods of teaching and learning of the concept number sequence in primary education, b) model activities appropriate for learning of number sequencing, c) develop materials for teaching and learning the concept of number sequencing, d) form patterns of numbers in ascending and descending order, e) examine strategies for linking number sequencing to games and sports, f) create number patterns involving addition,	The teacher trainee to: • carry out research on teaching and learning of the concept number sequence in pre-primary education, and make presentations to peers, • model activities appropriate for teaching and learning number sequencing in pre- primary education, • use locally available materials to develop resources for teaching and learning the concept of number sequencing, • identify and play games and sport integrate the concept of number sequence, • compose songs, poems and rhymes appropriate for teaching and learning number sequencing concept, • conduct number sequencing activities using games, songs,	1. How can digital literacy be used in number sequencing? 2. How is number sequencing applied in real life?

		subtraction, multiplication and division, g) generate activities for creating number patterns involving addition, subtraction, multiplication and division, h) recognise the value of number sequencing in real life.	poems, rhymes and body actions, • develop number patterns involving addition, subtraction, multiplication and division, • models activities for creating number patterns involving addition, subtraction, multiplication and division, • use digital devices to search for interactive digital games appropriate for learning number sequence in pre-primary education.	
Core Competencies to be Developed: • Self-Efficacy – as teacher trainee is equipped with skills on teaching and learning number sequencing. • Pedagogy Content Knowledge - as teacher trainees models appropriate materials and activities for teaching and learning the concept of number sequence.				
Values: Respect is enhanced as teacher trainees respectively handle one another's responses when modeling materials and activities for teaching and learning number sequence.				

Suggested Formative Assessment Rubric				
Level / **Indicators**	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to explain teaching and learning of the concept number sequence in pre-primary education.	Explains teaching and learning of the concept number sequence in pre-primary education coherently.	Explains teaching and learning of the concept number sequence in pre-primary education.	Explains teaching and learning of the concept number sequence in pre-primary education moderately coherent.	Explains teaching and learning of the concept number sequence in pre-primary education superficially.
Ability to model activities appropriate for teaching and learning number sequencing.	Models activities appropriate for teaching and learning number sequencing creatively.	Models activities appropriate for teaching and learning number sequencing.	Models some activities appropriate for teaching and learning number sequencing passably creative.	Models a few activities appropriate for teaching and learning number sequencing with minimal creativity.
Ability to developing materials for teaching and learning the concept of number sequencing.	Develops materials for teaching and learning the concept of number sequencing innovatively.	Develops materials for teaching and learning the concept of number sequencing.	Develops some materials for teaching and learning the concept of number sequencing moderately innovative.	Develops few materials for teaching and learning the concept of number sequencing with minimal innovativeness.
Ability to forming ascending and descending patterns using number	Forms ascending and descending patterns using number sequencing	Forms ascending and descending patterns using number	Forms ascending and descending patterns using number sequencing	Forms ascending and descending patterns using number sequencing with minimal

sequencing.	innovatively.	sequencing.	moderately innovative.	innovativeness.
Ability to examine strategies for linking number sequence to games and sports.	Examines strategies for linking number sequence to games and sports comprehensively.	Examines strategies for linking number sequence to games and sports	Examines some strategies for linking number sequence to games and sports fairly comprehensive.	Examines a few strategies for linking number sequence to games and sports superficially.
Ability to create number patterns involving addition, subtraction, multiplication and division	Creates number patterns involving addition, subtraction, multiplication and division innovatively.	Creates number patterns involving addition, subtraction, multiplication and division.	Creates some number patterns involving addition, subtraction, multiplication and division moderately innovative.	Creates a few number patterns involving addition, subtraction, multiplication and division with minimal innovativeness.
Ability to generate activities for creating number patterns involving addition, subtraction, multiplication and division.	Generates activities for creating number patterns involving addition, subtraction, multiplication and division creatively.	Generates activities for creating number patterns involving addition, subtraction, multiplication and division.	Generates some activities for creating number patterns involving addition, subtraction, multiplication and division fairly creative.	Generates a few activities for creating number patterns involving addition, subtraction, multiplication and division with minimal creativity.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
2.0 Numbers	**2.6 Number Value** **(3 Hours)**	By the end of the sub strand, the teacher trainee should be able to: a) discuss the concept of number value in pre-primary education, b) design activities appropriate for developing number value in given cases, c) model materials for teaching and learning concept of number value in given cases, d) illustrate the placing value to numbers using concrete objects, e) appreciate application number value in real life.	The teacher trainee to: • engage in guided discussions on the concepts of number values in pre-primary education, • participate in activities for developing the concept of placing value to numbers using concrete objects, • collect and use locally available materials to make resources • appropriate for teaching and learning the concept of number value, • apply pedagogical content knowledge in developing the concept of placing value to numbers using concrete objects, • composes songs, poems, rhymes and body actions that explains number value, • **Project:** collect locally available counters and manila papers to make resources for teaching and learning	1. How can you introduce number value to preprimary education? 2. How is number value applied in real life?

			number value, • facilitate guided group discussions on importance of number value in real life situations.	

Core Competencies to be Developed:
Learning to Learn and Reflective Practice – as trainee reflects, think and share ideas on how to model materials for teaching and learning concept of number value.

Values:
Unity as they share resources and collaborate with others and as they show case different ways of modeling materials for teaching and learning concept of number value.

Suggested Formative Assessment Rubric

Levels / Indicators	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below Expectations
Ability to discuss the concept of number value in pre-primary education.	Discusses the concept of number value in pre-primary education coherently.	Discusses the concept of number value in pre-primary education.	Discusses the concept of number value in pre-primary education moderately coherent.	Discusses the concept of number value in pre-primary education superficially.
Ability to design activities appropriate for developing number value in	Designs activities appropriate for developing number value in given cases	Designs activities appropriate for developing number value in given	Designs some activities appropriate for developing number value in given cases	design activities appropriate for developing number value in given cases shal-

given cases.	comprehensively.	cases.	somewhat comprehensive.	lowly.
Ability to model materials and activities appropriate for developing number value concept.	Models materials and activities appropriate for developing number value concept creatively.	Models materials and activities appropriate for developing number value concept.	Models some materials and activities appropriate for developing number value concept with considerable creativity.	Models a few materials and activities appropriate for developing number value concept with minimal creativity.
Ability to illustrate the placing value to numbers using concrete objects.	Illustrates the placing value to numbers using concrete objects coherently.	Illustrate the placing value to numbers using concrete objects.	Illustrate the placing value to numbers using concrete objects moderately coherent.	Illustrate the placing value to numbers using concrete objects with a lot of difficulties superficially.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
2.0 Numbers	**2.7 Number Writing and Numeration systems** **(6 Hours)**	By the end of the sub strand, the teacher trainee should be able to: a) examine the concept of number writing in pre-primary education, b) model appropriate materials for learning symbolic number representation in pre-primary education, c) model appropriate activities for learning reading and writing numbers in words, d) select appropriate activities that engage learners to enhance communication and collaboration in the learning of symbolic number representation, e) examine types of	The teacher trainee to: • Carryout desktop research on the concepts of number writing in pre-primary education, • search for information on appropriate materials for developing the concept of symbolic representation of numbers using print and electronic media, • compose songs, poems, dances and rhymes on number symbols, • associate numbers in words to their respective symbols in a variety of ways, • compose songs, poems, dances and rhymes to facilitate concept development in symbolic representation of numbers sub strand in pre-primary 2 mathematical activities curriculum design, • model activities to represent numbers in symbols and in words, • design appropriate activities for learning reading and writing numbers in words,	1. What ways can symbolic representation of numbers be taught as learning to learn and reflective practice is displayed? 2. How do you write the number symbols in different numeration systems? 3. How can you use different numeration systems in real life?

		numeration systems in different situations, f) create learning experiences appropriate for learning numeration systems in given cases, g) outline to the principles of symbolic representation of numbers, h) appreciate use of different numeration systems in real life.	• carry out online research on Tally, Roman, and Hindu Arabic numeration systems, read and write the different numeration systems, • formulate learning experiences for the specific learning outcomes of division sub strand in grade 5 mathematics curriculum design, • use digital devices to search and select appropriate content for learning numeration systems write numbers in tally system.	

Core Competencies to be Developed:

- Learning to learn and reflective practice – as teacher trainee exhibits specialized academic and technical knowledge and skills on the concept of symbolic number representation.
- Communication and collaboration - as teacher trainees search reading and writing of numbers in different numeration systems.

Values:

- Love is enhanced as teacher trainees harmoniously work together and share ideas while modeling materials and activities for teaching and learning the concept of symbolic number representation.
- Unity is enhanced as teacher trainees harmoniously together use digital devices to search and select appropriate content for learning numeration systems.

Suggested Formative Assessment Rubric				
Level **Indicators**	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to examine the concept of number writing in pre-primary education.	Examines the concept of number writing in pre-primary education comprehensively.	Examines the concept of number writing in pre-primary education.	Examine the concept of number writing in pre-primary education fairly comprehensive.	Examines the concept of number writing in pre-primary education superficially.
Ability to model appropriate materials for learning symbolic Number representation in pre-primary education.	Models appropriate materials for learning symbolic number representation in pre-primary education creatively.	Models appropriate materials for developing the concept of symbolic number representation in pre-primary education.	Models some appropriate materials for developing the concept of symbolic number representation in pre-primary education with moderate creativity.	Models a few appropriate materials for developing the concept of symbolic number representation in pre-primary education with minimal creativity.
Ability to model appropriate activities for learning reading and writing numbers in words.	Models appropriate activities for learning reading and writing numbers in words innovatively.	Models appropriate activities for learning reading and writing numbers in words.	Model some appropriate activities for learning reading and writing numbers in words fairly innovative.	Models a few appropriate activities for learning reading and writing numbers in words with minimal innovativeness.

Ability to select appropriate activities that engage learners to enhance communication and collaboration in the learning of symbolic number representation.	Selects appropriate activities that engage learners to enhance communication and collaboration in the learning of symbolic number representation objectively.	Selects appropriate activities that engage learners to enhance communication and collaboration in the learning of symbolic number representation.	Selects some appropriate activities that engage learners to enhance communication and collaboration in the learning of symbolic number representation somewhat objectively.	Selects a few appropriate activities that engage learners to enhance communication and collaboration in the learning of symbolic number representation with a lot of difficulties somewhat objectively.
Ability to examine types of different numeration systems.	Examines different types of numeration systems thoroughly.	Examines different types of numeration systems.	Examines different types of numeration systems moderately thorough.	Examines types of different numeration systems shallowly.
Ability to create learning experiences appropriate for learning numeration systems in middle school mathematics.	Creates learning experiences appropriate for learning numeration systems in middle school mathematics innovatively.	Create learning experiences appropriate for learning numeration systems in middle school mathematics.	Create some learning experiences appropriate for learning numeration systems in middle school mathematics fairly innovative.	Creates a few learning experiences appropriate for learning numeration systems in middle school mathematics with minimal innovativeness.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
2.0 Numbers	**2.8 Whole Numbers** **(5 hours)**	By the end of the sub strand, the teacher trainee should be able to: a) identify natural numbers and integers as used in daily life, b) perform the combined operations on whole numbers and integers in real life situations, c) read and write numbers up to millions in words and in symbols, d) perform divisibility test of numbers from 1 to 13 in given cases, e) determine Lowest Common Multiples and Greatest Common Divisor of whole numbers in different	The teacher trainee to: • research on the meaning of natural numbers and integers, • solve problems involving combined operations on whole numbers and Integers, • develop activities of reading and writing numbers up to millions in symbols and words using number cards and place value charts, • model activities of determining activities to test divisibility of numbers from 1 to 13, • use factors of numbers to determine Lowest Common Multiple (LCM) and Greatest Common Divisor (GCD) of whole numbers. • work our exercises involving application of the concepts of LCM and GCD in real life	1. How can you introduce the concept of the whole number? 2. Which strategies can you use to teach the concept of whole numbers? 3. How can you use whole numbers in real life?

		situations, f) compute squares and square roots of whole numbers in different situations, g) appreciate use of whole numbers in real life.	situations, • use different numerical approaches to calculate squares and square roots of whole numbers, • use games and digital devices for learning whole numbers and for enjoyment.	

Core Competencies to be developed:

- Self-efficacy - as teacher trainees model activities on place value, classification of whole numbers, GCD, LCM, divisibility tests, number patterns and squares and square roots of whole numbers.
- Digital Literacy - as teacher trainee uses internet to search for information on natural numbers and integers.

Values:
Respect is enhanced as teacher trainees work together in groups and regards each other opinions.

Suggested Formative Assessment Rubric

Level / Indicators	Exceeds Expectations	Meets Expectations	Approaches	Exceeds Expectations
Ability to identify natural numbers and integers as used in daily life.	Identifies natural numbers and integers as used in daily life	Identifies natural numbers and integers as used in daily life.	Identifies natural numbers and integers as used in daily life	Identifies natural numbers and integers as used in dai-ly life superficially.

	exhaustively.		moderately exhaustive.	
Ability to read and write numbers up to millions in words and in symbols.	Reads and writes numbers up to millions in words and in symbols fluently.	Reads and writes numbers up to millions in words and in symbols	Reads and writes some numbers up to millions in words and in symbols fairly fluent	Reads and writes a few numbers up to millions in words and in symbols with minimal fluency.
Ability to perform divisibility test of numbers from 1 to 13.	Performs divisibility test of numbers from 1 to 13 thoroughly.	Performs divisibility test of numbers from 1 to 13.	Performs some divisibility test of numbers from 1 to 13 somewhat thorough.	Performs a few divisibility tests of numbers from 1 to 13 superficially.
Ability to determine Lowest Common Multiples and Greatest Common Divisor of whole numbers.	Determines Lowest Common Multiples and Greatest Common Divisor of whole numbers precisely.	Determines Lowest Common Multiples and Greatest Common Divisor of whole numbers.	Determines Lowest Common Multiples and Greatest Common Divisor of whole numbers reasonably precisely.	Determines Lowest Common Multiples and Greatest Common Divisor of whole numbers with minimal precision.
Ability to compute squares and square roots of whole numbers.	Computes squares and square roots of whole numbers precisely.	Computes squares and square roots of whole numbers.	Computes some squares and square roots of whole numbers reasonably precisely.	Computes a few squares and square roots of whole numbers with minimal precision.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
2.0 Numbers	**2.9 Addition of Whole Numbers** **(8 hours)**	By the end of the sub strand, the teacher trainee should be able to: a) create activities for learning putting together by combining sets of similar objects, b) model activities for learning addition of whole numbers, c) perform addition of up to 6- digit numbers with and without regrouping in different situations, d) examine plausible errors in addition operation and their remedies, e) develop lesson learning outcomes from the specific learning outcomes in in addition or any other sub strand	The teacher trainee to: • assemble variety of materials to be used in putting together learning activities, • compose songs and poems on putting together, • come up with activities to show addition of whole numbers as putting together using concrete objects • model a lesson to introduce the "+"," =" signs from word addition sentences, elaborate on how to carry out addition of up to 6- digit numbers with and without regrouping, • discuss the errors that occur during addition and their remedies, • model a micro lesson on putting together learning activities, and addition of whole numbers,	1. How can you introduce the concept of putting together/ addition? 2. Which strategies can you use to teach the concept of putting together/ addition? 3. How can you use the concept of putting together/ addition in real life?

		curriculum design for mathematical activities, f) embrace addition of whole in real life.	• study the specific learning outcomes in primary mathematics curriculum designs to identify its components then use it to generate lesson learning outcomes.	

Core Competencies to be developed:

- Pedagogy Content Knowledge - as teacher trainees demonstrate the processes of developing the concept of putting together by combining sets of similar concrete objects into one big group.
- Communication and collaboration as teacher trainees model activities for putting together and addition of whole numbers.
- Citizenship and leadership competency - as teacher trainees select appropriate digital content for use by Kenyan learner.
- Learning to learn and reflective practice - as teacher trainees work collaboratively with peers to identify errors in addition operation.

Values:
Responsibility is enhanced as teacher trainees take care of the apparatus.

Suggested Formative Assessment Rubric

Levels / Indicators	Exceeds Expectations	Meets Expectations	Approaches	Exceeds Expectations
Ability to create activities appropriate for developing the concept of putting together by	Creates activities appropriate for developing the concept of putting together by	Creates activities appropriate for developing the concept of putting together by	Create activities appropriate for developing the concept of putting together by	Creates activities appropriate for developing the concept of putting together by

combining sets of similar objects .	combining sets of similar objects innovatively.	combining sets of similar objects.	combining sets of similar objects mod-erately innovative.	combining sets of similar objects with minimal innovativeness.
Ability to model activities appropriate for learning addition of whole numbers.	Models activities appropriate for learning addition of whole numbers innovatively.	Models activities appropriate for learning addition of whole numbers.	Models some activities appropriate for learning addition of whole numbers moderately innovative.	Model a few activities appropriate for learning addition of whole numbers with minimal innovativeness.
Ability to perform addition of up to 6-digit numbers with and without regrouping.	Performs addition of up to 6- digit numbers with and without regrouping thoroughly.	Performs addition of up to 6- digit numbers with and without regrouping.	Performs some addition of up to 6-digit numbers with and without regrouping somewhat thorough.	Performs a few addition of up to 6-digit numbers with and without regrouping with minimal thorough-ness.
Ability to examine plausible errors in addition operation and their remedies.	Examines plausible errors in addition operation and their remedies thoroughly.	Examines plausible errors in addition operation and their remedies.	Examines plausible errors in addition operation and their remedies somewhat thorough.	Examines plausible errors in addition operation and their remedies with minimal thoroughness.
Ability to examine specific learning outcomes for	Examines specific learning outcomes for addition sub	Examines specific learning outcomes for addition sub strand in	Examines specific learning outcomes for addition sub	Examines specific learning outcomes for addition sub

addition sub strand in grade 5 mathematics	strand in grade 5 mathematics exhaustively.	grade 5 mathematics.	strand in grade 5 mathematics moderately exhaustive.	strand in grade 5 mathematics shallowly.
Ability to develop lesson learning outcomes from the specific learning outcomes in in addition or any other sub strand curriculum design for mathematical activities.	Develops lesson learning outcomes from the specific learning outcomes in in addition or any other sub strand curriculum design for mathematical activities comprehensively	Develops lesson learning outcomes from the specific learning outcomes in in addition or any other sub strand cur-riculum design for mathematical activities	Develops lesson learning outcomes from the specific learning outcomes in in addition or any other sub strand curriculum design for mathematical activities somewhat comprehensive.	Develops lesson learning outcomes from the specific learning outcomes in in addition or any other sub strand curriculum design for mathematical activities superficially.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
2.0 Numbers	**2.10 Subtraction of Whole Numbers** **(8 hours)**	By the end of the sub strand, the teacher trainee should be able to: a) model appropriate activities for developing the concept of take away by removing some concrete objects from a group, b) formulate learning experiences appropriate for learning subtraction of whole numbers, c) generate activities appropriate learning subtraction of whole numbers in primary school education, d) perform subtraction of whole numbers up to 6-digit numbers with and without regrouping in	The teacher trainee to: • assemble a variety of materials that can be used for taking away learning activities, • generate activities that enhance the concept of taking away by removing concrete objects from a group and demonstrate instructional leadership competency, • perform taking away activities using real objects, games, songs, poems, stories and rhymes, • model learning experiences for specific learning outcomes on subtraction of whole numbers in grade 5 curriculum design, • model activities for subtracting whole numbers as taking away using concrete objects and introduce the '–' and '=' sign from word subtraction sentences, • use place value chart and	1. How can you introduce the concept of taking away/ subtraction? 2. Which strategies can you use to teach the concept of taking away/ subtraction? 3. How can you use taking away/subtraction in real life?

		given cases, e) create patterns on subtraction of up to 6-digit numbers in given cases, f) evaluate the difference between subtrahend and minuend of up to 6-digit number in real life situations , g) appreciate the use of subtraction in real life.	Abacus for subtracting of whole numbers up to 6- digit numbers with and without regrouping, • brainstorm on appropriate activities for generating number patterns in Subtraction, • study and determine the rule on different subtraction patterns, • estimate and calculate the difference between subtrahend and minuend of up to 6-digit number.	

Core Competencies to be developed:

- Communication and collaboration - as the teacher trainee interact with peers and discusses and brainstorms brainstorm on appropriate activities for generating number patterns in subtraction.
- Creativity and Innovation – as teacher trainees study and determine the rule on different subtraction patterns
- Pedagogical content knowledge - as teacher trainees identify and use a range of methodologies and model activities for learning subtraction of whole numbers.
- Citizenship and leadership - as teacher trainees design and develop appropriate activities and materials harmoniously to facilitate teaching and learning the concept of taking away in at pre-primary mathematical activities education in Kenya.

Values:

- Unity is enhanced as teacher trainees work as a team determine the rule on different subtraction patterns.
- Responsibility is enhanced as teacher trainee guide and assign roles to peers as they study and identify determine the rule subtraction patterns.

Suggested Formative Assessment Rubric				
Level / **Indicators**	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Exceeds Expectations**
Ability to model appropriate activities for teaching and learning taking away by removing concrete objects from a group.	Models appropriate activities for teaching and learning taking away by removing concrete objects from a group innovatively.	Models appropriate activities for teaching and learning taking away by removing concrete objects from a group.	Models some appropriate activities for teaching and learning taking away by removing concrete objects from a group fairly innovative.	Models a few appropriate activities for teaching and learning taking away by removing concrete objects from a group with minimal innovativeness.
Ability to formulate learning experiences appropriate for learning subtraction of whole numbers.	Formulates learning experiences appropriate for learning subtraction of whole numbers innovatively.	Formulates learning experiences appropriate for learning subtraction of whole numbers.	Formulates some learning experiences appropriate for learning subtraction of whole numbers moderately innovative.	Formulates a few learning experiences appropriate for learning subtraction of whole numbers with minimal innovativeness.

Ability to generate activities appropriate for teaching and learning subtraction of whole numbers in primary school education.	Generates activities appropriate for teaching and learning subtraction of whole numbers in primary school education creatively.	Generate activities appropriate for teaching and learning subtraction of whole numbers in primary school education.	Generates some activities appropriate for teaching and learning subtraction of whole numbers in primary school education considerably creative.	Generate a few activities appropriate for teaching and learning subtraction of whole numbers in primary school education with minimal creativity.
Ability to perform subtraction of whole numbers up to 6-digit numbers with and without regrouping.	Performs subtraction of whole numbers up to 6-digit numbers with and without regrouping precisely.	Performs subtraction of whole numbers up to 6-digit numbers with and without regrouping.	Performs some subtractions of whole numbers up to 6-digit numbers with and without regrouping with considerable precision.	Performs a few subtraction of whole numbers up to 6-digit numbers with and without regrouping with difficulties even when assisted with minimal precision.
Ability to create patterns on subtraction of up to 6-digit numbers.	Creates patterns on subtraction of up to 6-digit numbers creatively.	Create patterns on subtraction of up to 6-digit numbers.	Create some patterns on subtraction of up to 6-digit numbers considerably creative.	Creates a few patterns on subtraction of up to 6-digit numbers with minimal creativity.
Ability to evaluate the difference between subtrahend and minuend of up to 6-digit number.	Evaluates the difference between subtrahend and minuend of up to 6-digit number systematically.	Evaluates the difference between subtrahend and minuend of up to 6-digit number.	Evaluates the difference between subtrahend and minuend of up to 6-digit number moderately systematic.	Evaluates the difference between subtrahend and minuend of up to 6-digit superficially.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
2.0 Numbers	**2.11 Multiplication of Whole Numbers** **(6 hours)**	By the end of the sub strand, the teacher trainee should be able to: a) model activities appropriate for learning multiplication of whole numbers as repeated addition using concrete objects, b) identify resources appropriate for developing the concept of multiplication in primary mathematical activities, c) multiply up to a five-digit number by up to four-digit number in different situations, d) appreciate the use of multiplication in real life.	The teacher trainee to: • activities to show multiplication of whole numbers as repeated addition using concrete objects and introduce the 'x' and '=' sign from word, multiplication sentences, • assemble a variety of locally available materials appropriate for developing the concept of multiplication in the mathematical activities, • use digital devices to search and select digital content for learning multiplication of whole numbers in grade 5 mathematics curriculum design, • use different strategies to multiply whole numbers,	1. How can you introduce the concept of multiplication ? 2. Which strategies can you use to teach the concept of multiplication? 3. How can you use multiplication in real life?

			Project: prepare a micro-lesson from primary mathematical curriculum design on multiplication and present to peers for critique and improvement.	

Core Competencies to be developed:

- Learning to learn and reflective practice - as teacher trainees work collaboratively with peers to identify errors made by learners and their appropriate remedies in multiplication of whole numbers.
- Pedagogical content knowledge - as teacher trainees models variety of activities model activities appropriate for learning multiplication of whole numbers as repeated addition using concrete objects.

Values:

Responsibility is enhanced as teacher trainees take care responsibly uses use digital devices to search and select digital content for learning multiplication of whole numbers.

Suggested Formative Assessment Rubric				
Levels / **Indicators**	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to modeling activities appropriate for learning multiplication of whole numbers as repeated addition using concrete objects.	Models activities appropriate for learning multiplication of whole numbers as repeated addition using concrete objects innovatively.	Models activities appropriate for learning multiplication of whole numbers as repeated addition using concrete objects.	Models some activities appropriate for learning multiplication of whole numbers as repeated addition using concrete objects moderately innovative.	Models a few activities appropriate for learning multiplication of whole numbers as repeated addition using concrete objects with minimal innovativeness.
Ability to identify resources appropriate for developing the concept of multiplication in primary mathematical activities.	Identifies resources appropriate for developing the concept of multiplication in primary mathematical activities thoroughly.	Identifies resources appropriate for developing the concept of multiplication in primary mathematical activities.	Identifies resources appropriate for developing the concept of multiplication in primary mathematical activities fairly thorough.	Identifies resources appropriate for developing the concept of multiplication in primary mathematical activities shallowly.

Ability to multiply up to a five-digit number by up to four-digit number involving whole numbers in different situations	Multiplies up to a five-digit number by up to four-digit number involving whole numbers in different situations precisely and exceptionally.	Multiplies up to a five-digit number by up to four-digit number involving whole numbers in different situations.	Multiplies up to a five-digit number by up to four-digit number involving whole numbers in different situations with moderate precision.	Multiplies up to a five-digit number by up to four-digit number involving whole numbers in different situations with minimal precision.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
2.0 Numbers	**2.12 Division of Whole Numbers** **(6 hours)**	By the end of the sub strand, the teacher trainee should be able to: a) create activities to illustrate division as repeated subtraction using real objects, b) divide single digit numbers using concrete objects in given cases, c) perform division of whole numbers using the long method in given situations, d) generate activities appropriate for learning the concept of division in different situation, e) develop materials appropriate for learning division of whole numbers at primary level,	The teacher trainee to: ● come up with activities that can be used in division to show division as repeated subtraction and present in class, ● use real objects to illustrate division of single digit numbers, ● carryout division of whole number using concrete objects, ● estimate the dividend and divisor to get the quotient, ● Use games and digital devices for learning and enjoyment, ● conduct desk research on inquiry based learning and present the findings to peers, ● assemble a variety of materials that can be used to illustrate division in mathematical activities, ● create patterns on division using real objects,	1. How can you introduce the concept of division? 2. Which strategies can be used to teach the concept of division? 3. How can you use division in real life?

		f) compute the quotient by estimating the dividend and divisor, g) generate patterns involving division using real objects in given cases, h) formulate key inquiry questions appropriate for learning mathematics in primary school education, i) appreciate the use of division in real life.	• come up with key inquiry questions appropriate for division of whole numbers sub strand in any grade from up to grade 6, • organise peers in discussion groups to deliberate on characteristics of key inquiry questions. **Project:** develop the concept of division as repeated addition by pasting locally available counters on Manila paper and mounting it on class wall.	

Core Competencies to be developed:

- Learning to learn and reflective practice - as teacher trainees conduct online research on best strategies for integrating pertinent and contemporary issues in learning mathematics.
- Pedagogical content knowledge - as teacher trainees identify and use a range of strategies for estimating the dividend and divisor to get the quotient.

Values:

Unity is enhanced as teacher trainees learn division of whole numbers harmoniously together.

Suggested Formative Assessment Rubric				
Level / Indicators	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to create activities for illustrating division as repeated subtraction using real objects.	Creates activities for illustrating division as repeated subtraction using real objects innovatively.	Creates activities for illustrating division as repeated subtraction using real objects.	Creates some activities for illustrating division as repeated subtraction using real objects reasonably innovative.	Creates a few activities for illustrating division as repeated subtraction using real objects with minimal innovativeness.
Ability to divide single digit numbers using concrete objects in given cases.	Divides single digit numbers using concrete objects in given cases precisely and exceptionally.	Divides single digit numbers using concrete objects in given cases.	Divides single digit numbers using concrete objects in given cases fairly precise.	Divides single digit numbers using concrete objects in given cases with minimal precision.
Ability to perform division of whole numbers in the lower primary school curriculum using long method.	Performs division of whole numbers in the lower primary school curriculum using long method precisely and exceptional.	Performs division of whole numbers in the lower primary school curriculum using long method.	Performs some division of whole numbers in the lower primary school curriculum using long method fairly precise.	Performs few division of whole numbers in the lower primary school curriculum using long method with minimal precision.

Ability to generate activities appropriate for learning the concept of division in different cases.	Generates activities appropriate for learning the concept of division in different cases creatively.	Generates activities appropriate for learning the concept of division in different cases.	Generates some activities appropriate for learning the concept of division in different cases moderately creative	Generates a few activities appropriate for learning the concept of division in different cases with minimal creativity.
Ability to develop materials appropriate for learning division of whole numbers at upper primary level.	Develops materials appropriate for learning division of whole numbers at upper primary level innovatively.	Develops materials appropriate for learning division of whole numbers at upper primary level.	Develops some materials appropriate for learning division of whole numbers at upper primary level moderately innovative.	Develops a few materials appropriate for learning division of whole numbers at upper primary level with minimal creativity.
Ability to compute the quotient by estimating the dividend and divisor.	Computes the quotient by estimating the dividend and divisor precisely.	Compute the quotient by estimating the dividend and divisor.	Computes some quotient by estimating the dividend and divisor with considerable precision.	Computes few the quotient by estimating the dividend and divisor with minimal precision.
Ability to generate patterns involving division using real objects in given cases.	Generates patterns involving division using real objects in given cases innovatively.	Generates patterns involving division using real objects in given cases.	Generates some patterns involving division using real objects in given cases comparatively creative.	Generates a few patterns involving division using real objects in given cases with minimal creativity.

Ability to formulate key inquiry questions appropriate for learning mathematics in primary school education.	Formulates key inquiry questions appropriate for learning mathematics in primary school education concisely.	Formulates key inquiry questions appropriate for learning mathematics in primary school education.	Formulate some key inquiry questions appropriate for learning mathematics in primary school education with considerable conciseness.	Formulates a few key inquiry questions appropriate for learning mathematics in primary school education with minimal conciseness.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Question(s)
2.0 Numbers	**2.13 Combined Operations on Whole Numbers (2 hours)**	By the end of the sub strand, the teacher trainee should be able to; a) perform combined operation involving multiplication, division, addition and subtraction of whole numbers, b) design materials for teaching and learning combined operations of whole numbers, c) integrate value based education in learning primary school mathematics, d) embrace combined operations in real life.	The teacher trainee to: • discuss different orders of operations used in mathematics and identify the order used in the primary mathematics curriculum designs, • discuss plausible errors in combined operations on whole numbers and their remedies, • model a micro lesson to address a selected PCI in combined operations on whole numbers, • conduct class discussion on strategies of integrating value-based education in teaching and learning combined operations of whole numbers in the grade 5 mathematics curriculum design.	How do you work combined operations on numbers?

Core Competencies to be developed:

- Self-efficacy – as teacher trainee is equipped with skills on teaching and learning combined operations.
- Communication and collaboration; as teacher trainees discuss plausible errors in combined operations of whole numbers.

Values:

Responsibility is enhanced as teacher trainees take turns in working out combined operations.

Suggested Formative Assessment Rubric

Level / Indicators	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below Expectations
Ability to perform combined operations involving division and multiplication of whole numbers.	Performs combined operations involving division and multiplication of whole numbers thoroughly.	Performs combined operations involving division and multiplication of whole numbers.	Performs some combined operations involving division and multiplication of whole numbers somewhat thorough.	Performs a few combined operations involving division and multiplication of whole numbers superficially.
Ability to Design materials for teaching and learning combined operations of whole numbers.	Designs materials for teaching and learning combined operations of whole numbers creatively.	Design materials for teaching and learning combined operations of whole numbers.	Designs some materials for teaching and learning combined operations of whole numbers with considerable creativity.	Design a few materials for teaching and learning combined operations of whole numbers with minimal creativity.

Ability to Integrate value based education in learning primary school mathematics.	Integrates value based education in learning primary school mathematics innovatively.	Integrates value based education in learning primary school mathematics.	Integrates value based education in learning primary school mathematics fairly innovative.	Integrate value based education in learning primary school mathematics with minimal innovativeness.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
2.0 Numbers	**2.14 Fractions** **(7 hours)**	By the end of the sub strand, the teacher trainee should be able to: a) generate activities appropriate for learning concept of fractions in upper primary mathematics, b) illustrate the concept of fraction as part of whole in real life object, c) generate activities appropriate for learning the concept of fractions as part of a group, d) evaluate combined	The teacher trainee to: • Show fractions whose denominators do not exceed 12 as part of a whole using circular and rectangular cut outs, citing real life situations, • model activities to show types of fractions as proper, improper and mixed fractions using number cards, • use real life symmetrical objects to illustrate fractions as part of whole, • model activities suitable for learning fractions as part of a group using locally available materials, • compare fractions using paper cut outs, groups of objects and Worksheets, • display stages of development of operations on fractions. • ● Workout exercises involving	1. How can you introduce the concept of fractions? 2. Which strategies can you use to teach the concept of fractions? 3. How can you use fractions in real life?

		operations involving fractions in given cases, e) identify where fractions are used in real life, f) select appropriate digital content for learning fractions in primary mathematics, g) appreciate the use of fractions in real life.	• combined operation. Prove the • reciprocal of a fraction using paper cut-outs, • Brainstorm on situations where fractions are used in real life situation, • ● Use games and digital devices for learning and for enjoyment. **Project**: *Use locally available materials prepare learning resources appropriate developing the concept of fractions in primary school. Write a project report on prepared learning resource.*	

Core Competencies to be developed:

- Communication and collaboration - as teacher trainees discuss activities in identifying fractions as part of a whole and as part of a group, identifying different types of fractions, comparing fractions, converting fractions.
- Critical thinking and problem solving – as teacher trainees prove the reciprocal of a fraction using paper cut-outs.
- Pedagogical content knowledge - as teacher trainees prove the reciprocal of a fraction using different approaches.

Values:

Unity is enhanced as teacher trainee work together to while compare fractions using concrete objects.

Suggested Formative Assessment Rubric				
Level / Indicators	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to generate activities appropriate for learning concept of fractions in upper primary mathematics.	Generates activities appropriate for learning concept of fractions in upper primary mathematics creatively.	Generates activities appropriate for learning concept of fractions in upper primary mathematics.	Generate some activities appropriate for learning concept of fractions in upper primary mathematics with comparable creativity.	Generates a few activities appropriate for learning concept of fractions in upper primary mathematics with minimal creativity.
Ability to illustrating the concept of fraction as part of whole in real life object	Illustrates the concept of fraction as part of whole in real life object innovatively.	Illustrates the concept of fraction as part of whole in real life object.	Illustrates the concept of fraction as part of whole in real life object somewhat innovatively.	Illustrate the concept of fraction as part of whole in real life object with minimal innovativeness.
Ability to generate activities appropriate for learning the concept of fractions as part of a group.	Generates activities appropriate for learning the concept of fractions as part of a group creatively.	Generate activities appropriate for learning the concept of fractions as part of a group.	Generate some activities appropriate for learning the concept of fractions as part of a group with considerable creativity.	Generates a few activities appropriate for learning the concept of fractions as part of a group with minimal creativity.
Ability to evaluate combined operations involving fractions.	Evaluates combined operations involving fractions comprehensively.	Evaluates combined operations involving fractions.	Evaluates some combined operations involving fractions moderately comprehensive.	Evaluates a few combined operations involving fractions superficially.

Ability to identify where fractions are used in real life	Identifies where fractions are used in real life thoroughly.	Identifies where fractions are used in real life.	Identifies where fractions are used in real life fairly thorough.	Identifies where fractions are used in real life shallowly.
Ability to select appropriate digital content for learning fractions in primary mathematics.	Selects appropriate digital content for learning fractions in primary mathematics objectively.	Selects appropriate digital content for learning fractions in primary mathematics	Selects some appropriate digital content for learning fractions in primary mathematics somewhat objectively.	Selects a few appropriate digital content for learning fractions in primary mathematics somewhat objectively.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
2.0 Numbers	**2.15 Decimals** **(5 hours)**	By the end of the sub strand, the teacher trainee should be able to: a) illustrate the place value of decimal numbers using different place value apparatus, b) carry out combined operations on decimal numbers in real life situations, c) convert common fractions to decimals, decimal numbers and vice versa in real life situations, d) create activities appropriate for learning combined operations of decimal numbers, e) select appropriate digital content for learning decimal operations in	The teacher trainee to: • prepare place value charts of for decimal numbers, • work out combined operations involving combined operations in decimals, • brainstorm on different approaches to converting common fractions to decimals and vice versa, • model activities for teaching and learning decimals in grade 6 curriculum design, • use digital devices to search and select appropriately digital content for learning operations on decimal numbers, • Study categories of PCIs under Citizenship education, Health education, life skills and human	1. How can you introduce the concept of decimals? 2. How can you use decimals in real life?

		primary school education, f) integrate pertinent and contemporary issues in learning od decimals in mathematics, g) appreciate the use of decimals in real life.	sexuality and education for sustainable development, • Conducts online research on best strategies for integrating PCIs in learning mathematics in primary school.	

Core Competencies to be developed:

- Self-efficacy - as teacher trainees model activities to show addition, subtraction, multiplication and division of decimals.
- Critical thinking and problem solving – as teacher trainees brainstorm on different approaches to converting common fractions to decimals and vice versa.

Values:
Unity is enhanced as teacher trainees harmonious work as a team while model activities for teaching and learning decimal numbers.

Suggested Formative Assessment Rubric

Level / Indicators	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below Expectations
Ability to illustrate the place value of decimal numbers using different place value	Illustrates the place value of decimal numbers using different place value apparatus	Illustrates the place value of decimal numbers using different place value	Illustrates the place value of decimal numbers using different place value	Illustrates the place value of decimal numbers using different place value apparatus superficially.

apparatus.	comprehensively.	apparatus.	apparatus moderately comprehensive.	
Ability to carry out combined operations on decimal numbers.	Carries out combined operations on decimal numbers precisely.	Carries out combined operations on decimal numbers.	Carries out some combined operations on decimal numbers somewhat precisely.	Carries out a few combined operations on decimal numbers with minimal precision.
Ability to convert common fractions to decimals decimal numbers and vice versa.	Converts common fractions to decimals decimal numbers and vice versa accurately.	Converts common fractions to decimals decimal numbers and vice versa.	Converts some common fractions to decimals decimal numbers and vice versa somewhat accurately.	Converts a few common fractions to decimals decimal numbers and vice versa with minimal accuracy.
Ability to create activities appropriate for learning combined operations of decimal numbers.	Create activities appropriate for learning combined operations of decimal numbers innovatively.	Creates activities appropriate for learning combined operations of decimal numbers.	Creates some activities appropriate for learning combined operations of decimal numbers with considerable innovativeness.	Create a few activities appropriate for learning combined operations of decimal numbers with minimal innovativeness.
Ability to select appropriate digital content for learning decimal operations in primary school education.	Selects appropriate digital content for learning decimal operations in primary school education objectively.	Selects appropriate digital content for learning decimal operations in primary school education	Selects some appropriate digital content for learning decimal operations in primary school education somewhat objectively.	Selects a few appropriate digital content for learning decimal operations in primary school education somewhat objectively.

Ability to integrate pertinent and contemporary issues in learning mathematics in primary school.	Integrates pertinent and contemporary issues in learning mathematics in primary school coherently.	Integrates pertinent and contemporary issues in learning mathematics in primary school.	Integrates some pertinent and contemporary issues in learning mathematics in primary school passably coherent.	Integrates a few pertinent and contemporary issues in learning mathematics in primary school superficially.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
2.0 Numbers	**2.16 Ratio, Proportion and Percentage** **(3 hours)**	By the end of the sub strand, the teacher trainee should be able to: a) distinguish between ratio, proportion and percentage, b) compute direct and inverse proportions tasks using unitary and ratio methods, c) formulate activities and materials for learning ratio, proportion and percentage in primary school, d) embrace the use of ratio, proportion and percentage.	The teacher trainee to: • Use digital devices or any other resources to find the difference between ratio, proportion and percentage, • work out tasks involving ratios, proportions, compound proportions and rates of work, • design an activity to promote community service learning in the learning of ratios, proportions and percentages, • use games and digital devices for learning ratio, rates, proportion and percentages.	1. How can you introduce percentage? 2. How can you use percentage in real life?

Core Competencies to be developed:

- Self-efficacy – as teacher trainee is equipped with skills on teaching ratio, proportion and percentage.
- Critical thinking and problem solving - as teacher trainees creatively model activities and materials for learning ratio, proportion and percentage.

Values:
Integrity is enhanced as the teacher trainee observes internet ethics while conducting online research on the difference between ratio, proportion and percentage.

Suggested Formative Assessment Rubric

Level / Indicators	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below Expectations
Ability to distinguish between ratio, proportion and percentage.	Distinguishes between ratio, proportion and percentage meticulously.	Distinguishes between ratio, proportion and percentage.	Distinguishes between ratio, proportion and percentage somewhat meticulously.	Distinguishes between ratio, proportion and percentage superficially.
Ability to compute direct and inverse proportions tasks using unitary and ratio methods	Computes direct and inverse proportions tasks using unitary and ratio methods precisely.	Computes direct and inverse proportions tasks using unitary and ratio methods.	Computes direct and inverse proportions tasks using unitary and ratio methods with considerable precision.	Computes direct and inverse proportions tasks using unitary and ratio methods with minimal precision.
Ability to formulate activities and materials for learning ratio, proportion and percentage in primary school.	Formulates activities and materials for learning ratio, proportion and percentage in primary school creatively.	Formulates activities and materials for learning ratio, proportion and percentage in primary school.	Formulates some activities and materials for learning ratio, proportion and percentage in primary school with moderate creativity.	Formulates a few activities and materials for learning ratio, proportion and percentage in primary school with difficulties with minimal creativity.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
2.0 Numbers	**2.17** **Algebraic Expressions** **(3 hours)**	By the end of the sub strand, the teacher trainee should be able to: a) explain the concept of algebraic expressions in mathematics, b) form simple algebraic expressions in real life situations, c) formulate equations from algebraic expressions in real life situations, d) embrace use of algebra in real life, e) formulate activities for teaching algebraic expressions.	The teacher trainee to: • conduct online research on the meaning of algebraic expression, • brainstorm on strategies of forming simple algebraic expressions, • identify variables and constant from mathematical statement to form and solve equation.	1. How can you introduce the concept of algebraic expression? 2. How can you use algebraic expressions in real life?
Core Competencies to be developed: • Self-efficacy - as teacher trainees acquire skills in formulating and solving equations from algebraic expressions. • Critical thinking and problem solving – as teacher trainee form simple algebraic expressions in real life.				
Values: Responsibility is enhanced as take charge of identifying variables and constant from mathematical statement to form and solve equation.				

Suggested Formative Assessment Rubric				
Level / **Indicators**	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to explain the meaning of algebraic expressions.	Explains the meaning of algebraic expressions comprehensively.	Explains the meaning of algebraic expressions.	Explains the meaning of algebraic expressions fairly comprehensive.	Explains the meaning of algebraic expressions superficially.
Ability to form simple algebraic expressions in real life.	Forms simple algebraic expressions in real life coherently.	Forms simple Algebraic expressions in real life	Forms some simple algebraic expressions in real life somewhat coherent.	Forms a few simple algebraic expressions in real life superficially.
Ability to Formulate equations from algebraic expressions	Formulates equations from algebraic expressions coherently.	Formulate equations from Algebraic expressions.	Formulate some equations from algebraic expressions moderately coherent.	Formulates few equations from algebraic expressions superficially.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
2.0 Numbers	**2.18** **Linear Equations (3 hours**)	By the end of the sub strand, the teacher trainee should be able to: a) examine the features of equations in two unknowns in real life situations, b) form and solve equations in two unknowns in real life, c) model materials and activities appropriate learning linear equation in given cases, d) appreciate the use of linear equations in real life.	The teacher trainee to: • study simultaneous equation and make notes on the features, • form and solve equations in two unknowns from mathematical statement I real life, • brainstorm on appropriate materials and activities for learning linear equation.	1. How can you introduce the concept of linear equations? 2. How can you use linear equations in real life?
Core Competencies to be developed: Creativity and innovation - as teacher trainees form and solve equations in two unknowns in real life				
Values: Responsibility is enhanced as teacher trainees model materials and activities appropriate learning linear equation.				

Suggested Formative Assessment Rubric				
Level / **Indicators**	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to examine the features of equations in two unknowns.	Examines the features of equations in two unknowns thoroughly.	Examines the features of equations in two unknowns.	Examine some features of equations in two unknowns somewhat thorough.	Examines a few the features of equations in two unknowns shallowly.
Ability to form and solving equations in two unknowns in real life	Forms and solves equations in two unknowns in real life precisely.	Forms and solves equations in two unknowns in real life.	Forms and solves equations in two unknowns in real life with little assistance with some moderate precision.	Forms and solves equations in two unknowns in real life with minimal precision.
Ability to model materials and activities appropriate learning linear equation	Models materials and activities appropriate learning linear equation creatively.	Models materials and activities appropriate learning linear equation.	Models some materials and activities appropriate learning linear equation with comparable creativity.	Models a few materials and activities appropriate learning linear equation with minimal creativity.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
2.0 Numbers	**2.19 Linear Inequalities** **(4 hours)**	By the end of the sub strand, the teacher trainee should be able to: a) discuss the inequality symbols used in mathematics, b) formulate linear inequalities from statements in real life situations, c) perform operations on linear inequalities in one unknown, d) represent linear inequalities in one unknown graphically, e) appreciate use of linear inequalities in real life.	The teacher trainee to: • discuss the concept of inequalities and identify the inequality symbols, • formulate linear inequalities from mathematical statements, • carry out addition, subtraction, multiplication and division of linear inequalities, • perform combined operations on linear inequalities, • formulate linear inequalities from mathematical statement and plot the inequalities on a graph paper to illustrate different shaded regions.	1. How can you introduce the concept of linear inequalities? 2. How can you use linear inequalities in real life?
Core Competencies to be developed: • Critical thinking and problem solving - as teacher trainees represent linear inequalities solution graphically. • Creativity and innovation - as teacher trainees inventively formulate linear inequalities from mathematical statements.				
Values: Responsibility is enhanced as teacher trainee conducts guided discussions on the difference between linear equations and linear inequalities.				

Suggested Formative Assessment Rubric				
Level / **Indicators**	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to discuss the inequality symbols used in mathematics.	Discusses the inequality symbols used in mathematics comprehensively.	Discusses the inequality symbols used in mathematics.	Discusses the inequality symbols used in mathematics fairly comprehensive.	Discusses the inequality symbols used in mathematics superficially.
Ability to formulate linear inequalities from mathematical statements.	Formulates linear inequalities from mathematical statements precisely and correctly.	Formulates linear inequalities from mathematical statements.	Formulates some linear inequalities from mathematical statements with little assistance with moderate precision and correctness.	Formulates a few linear inequalities from mathematical statements with minimal precision and correctness.
Ability to perform operations on linear inequalities in one unknown.	Performs operations on linear inequalities in one unknown precisely.	Performs operations on linear inequalities in one unknown.	Performs some operations on linear inequalities in one unknown with considerable precision.	Performs few operations on linear inequalities in one unknown with minimal precision.

Ability to represent linear inequalities in one unknown graphically.	Represents linear inequalities in one unknown graphically accurately and creatively.	Represents linear inequalities in one unknown graphically.	Represents linear inequalities in one unknown graphically with little assistance reasonably creative.	Represents linear inequalities in one unknown graphically with minimal creativity.

STRAND 3.0 MEASUREMENT

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
3.0 Measurement	**3.1 Length** **(6 hours)**	By the end of the sub strand, the teacher trainee should be able to; a) model activities appropriate for developing the concept of length using real life experiences, b) model activities of determining length by direct comparison, converting units of length , using arbitrary, fixed and standard units, c) measure ones height to promote self-awareness and self-efficacy, d) measure horizontal and vertical length of regular objects using arbitrary units, fixed units and standard units,	The teacher trainee to; ● conduct desk research on meaning and importance of length using print and electronic media, ● creating activities that involve actual measurement of length from one point to another and compare lengths directly to illustrate the concept of length, ● model activities of estimating and measuring one's height to promote self-awareness and self-efficacy, ● demonstrate relationship between different units of length practically, ● measure the horizontal and vertical length of regular objects like Tetra packs, boxes, crates and classroom using standard units,	1. How can you introduce the concept of length? 2. How can you measure length? 3. How can you use length in real life?

		e) model nets of regular shapes appropriate for learning the concept of perimeter and circumference in primary school mathematics, f) derive the formula of perimeter and circumference of regular objects, g) embrace the use of standard units in measuring length.	• use Manila paper to model the nets for pyramids, prisms, cubes, cuboids cones and spheres, • estimate and measure horizontal and vertical length using standard units, • use the dimensions of regular objects to derive their perimeter and circumference formula, • use digital devices to search and select appropriate digital content for learning length in pre-primary and primary.	

Core Competencies to be developed:

- Self-efficacy; as teacher trainees, demonstrate activities in measuring length using arbitrary units, fixed units and standard units.
- Digital literacy - as teacher trainees use digital devices to search for regular objects and generate pattern using the shapes.

Values:

Integrity is enhanced as teacher trainees take and record correct measurements of regular objects.

Suggested Formative Assessment Rubric				
Level / **Indicators**	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to model activities appropriate for developing the concept of length using real life experiences.	Models activities appropriate for developing the concept of length using real life experiences innovatively.	Models activities appropriate for developing the concept of length using real life experiences.	Models some activities appropriate for developing the concept of length using real life experiences with comparable innovativeness.	Models a few activities appropriate for developing the concept of length using real life experiences with minimal innovativeness.
Ability to model activities of determining length by direct comparison, using arbitrary, fixed and standard units.	Models activities of determining length by direct comparison, using arbitrary, fixed and standard units creatively.	Models activities of determining length by direct comparison, using arbitrary, fixed and standard units.	Models some activities of determining length by direct comparison, using arbitrary, fixed and standard units fairly creative.	Model a few activities of determining length by direct comparison, using arbitrary, fixed and standard units with minimal creativity.
Ability to measure one's height to promote self-awareness and self- efficacy.	Measures one's height to promote self-awareness and self- efficacy precisely and innovatively.	Measures one's height to promote self awareness and self efficacy.	Measures one's height to promote self awareness and self -efficacy somewhat innovatively.	Measures one's height to promote self-awareness and self- efficacy with minimal innovativeness.

Ability to measure horizontal and vertical length of regular objects using arbitrary units, fixed units and standard units.	Measures horizontal and vertical length of regular objects using arbitrary units, fixed units and standard units precisely.	Measures horizontal and vertical length of regular objects using arbitrary units, fixed units and standard units.	Measures some horizontal and vertical length of regular objects using arbitrary units, fixed units and standard units with considerable precision.	Measures a few horizontal and vertical length of regular objects using arbitrary units, fixed units and standard units with minimal precision.
Ability to model nets of regular shapes appropriate for learning the concept of perimeter and circumference in primary school mathematics.	Models nets of regular shapes appropriate for learning the concept of perimeter and circumference in primary school mathematics creatively.	Models nets of regular shapes appropriate for learning the concept of perimeter and circumference in primary school mathematics.	Models nets of regular shapes appropriate for learning the concept of perimeter and circumference in primary school mathematics fairly creative.	Models nets of regular shapes appropriate for learning the concept of perimeter and circumference in primary school mathematics with minimal creativity.
Ability to derive the formula of perimeter and circumference of regular objects.	Derives the formula of perimeter and circumference of regular objects precisely.	Derives the formula of perimeter and circumference of regular objects.	Derives the formula of perimeter and circumference of regular objects moderately precise.	Derives the formula of perimeter and circumference of regular objects with minimal precision.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
3.0 Measurement	**3.2 Area** **(6 hours)**	By the end of the sub strand, the teacher trainee should be able to: a) create activities appropriate for developing the concept of area using actual surfaces, b) compare area directly and measure it using arbitrary units, fixed and standard units in different ways, c) measure the area of rectangles, squares and triangles using different techniques, d) model activities to illustrate area as the size of a surface in a 2-dimensional object, e) determine surface area of rectangle triangles and circles in different situations,	The teacher trainee to: • model and present to peers activities for developing the concept of area using actual surfaces, • compare area directly, conserve area, measure area using arbitrary units, fixed and standard units in a variety of ways, • demonstrate relationship between different units of area practically (square centimetres, square metres), • use unit square to practically estimate and measure the area of rectangles, squares and triangles practically, • model activities to show area as size of a surface in a 2-dimensional object,	1. How can you introduce the concept of area? 2. How can you measure area? 3. How can you use the concept of area in real life?

		f) examine different approaches to determining the area of shapes g) appreciate the use of the cm^2 as a standard unit in measuring area in real life.	• use games and digital devices in learning about the concept area and for enjoyment, • conduct research on different approaches for determining the areas of shapes,	

Core Competencies to be developed:

- Self-efficacy - as teacher trainees estimate and measure the area of rectangles, squares and triangles practically.
- Critical thinking and problem – as teacher trainees model activities to illustrate area as the size of a surface in a 2-dimensional object, and, as teacher trainees, come up with ways of measuring area practically.

Values:

Responsibilities; as teacher trainees take care of the measuring tools and ICT gadgets.

Suggested Formative Assessment Rubric				
Level / Indicators	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to create activities appropriate for developing the concept of area using actual surfaces.	Creates activities appropriate for developing the concept of area using actual surfaces innovatively.	Creates activities appropriate for developing the concept of area using actual surfaces.	Create some activities appropriate for developing the concept of area using actual surfaces with comparable innovativeness.	Creates a few activities appropriate for developing the concept of area using actual surfaces with minimal innovativeness.

Ability to compare area directly, conserve area, measure area using arbitrary units, fixed units and standard units in a variety of ways.	Compares area directly, conserves area, measures area using arbitrary units, fixed units and standard units in a variety of ways accurately.	Compares area directly, conserves area, measures area using arbitrary units, fixed units and standard units in a variety of ways.	Compares area directly, conserves area, measures area using arbitrary units, fixed units and standard units in a variety of ways somewhat accurately.	Compares area directly, conserving area, measuring area using arbitrary units, fixed units and standard units in a variety of ways with minimal accuracy.
Ability to measure the area of rectangles, squares and triangles using different techniques.	Measures the area of rectangles, squares and triangles using different techniques with precision.	Measures the area of rectangles, squares and triangles using different techniques.	Measures the area of rectangles, squares and triangles using different techniques with considerable precision.	Measures the area of rectangles, squares and triangles using different techniques with minimal precision.
Ability to model activities to illustrate area as the size of a surface in a 2-dimensional object.	Models activities to illustrate area as the size of a surface in a 2-dimensional object creatively.	Models activities to illustrate area as the size of a surface in a 2-dimensional object.	Models some activities to illustrate area as the size of a surface in a 2-dimensional object with reasonable creativity.	Models a few activities to illustrate area as the size of a surface in a 2-dimensional object with minimal creativity.

Ability to determine the surface area of pyramids, prisms, cones and spheres using different approaches.	Determines surface area of pyramids, prisms, cones and spheres using different approaches accurately.	Determines the surface area of pyramids, prisms, cones and spheres using different approaches.	Determines surface area of pyramids, prisms, cones and spheres using different approaches somewhat accurately.	Determines the surface area of pyramids, prisms, cones and spheres using different approaches with minimal accuracy.
Ability to examine different approaches to determining the area of shapes.	Examine different approaches to determining the area of shapes critically.	Examine different approaches to determining the area of shapes.	Examines different approaches to determining the area of shapes somewhat critically.	Examines different approaches to determining the area of shapes superficially.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
3.0 Measurement	**3.3 Volume** **(6 hours)**	By the end of the sub strand, the teacher trainee should be able to: a) explain the meaning of volume of an object, b) model activities appropriate for developing the concept of volume of solids, c) determine the volumes of cubes, cuboids and cylinders, d) compute the volume of composite solids involving cubes, cuboids and cylinders, e) relate cm^3 and m^3 as units of volume in different situations, f) appreciate the use of standard units in measuring volume.	The teacher trainee to: • discuss the meaning of volume as used in solids, • use cube piling approach to illustrate the concept of volume, • create models of solid to logically explain their volume, • discuss strategies for determining the volume of cubes, cuboids, and cylinders using formula, • model activities to show volume as the amount of space occupied by an object, • model activities appropriate illustrating concept of volume through piling of cube blocks, • use digital devices to search and select appropriate digital content for learning volume.	1. How can you introduce the concept of volume? 2. How can you teach the concept of volume? 3. How can you use volume in real life?

Core Competencies to be developed:

- Critical thinking and problem solving - as teacher trainees design activities to derive the formula for volume of cubes and cuboids.
- Learning to learn and reflective practice - as the teacher trainee research on the concept of volume use cube piling approach to illustrate the concept of volume.

Values:

Respect is enhanced as the teacher trainee appreciate the views of peers during discuss strategies for determining the volume of solids

Suggested Formative Assessment Rubric				
Level / Indicators	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to explain the concept of volume of an object.	Explains the concept of volume of an object coherently.	Explains the concept of volume of an object.	Explain the concept of volume of an object considerably coherent.	Explains the concept of volume of an object superficially.
Ability to model activities appropriate for developing the concept of volume	Models activities appropriate for developing the concept of volume meticulously.	Models activities appropriate for developing the concept of volume.	Models some activities appropriate for developing the concept of volume somewhat meticulous.	Models a few activities appropriate for developing the concept of volume shallowly.
Ability to determine the volumes of	Determines the volumes of cubes,	Determines the volumes of	Determines the volumes of cubes,	Determines the volumes of cubes, cuboids and

cubes, cuboids and cylinders.	cuboids and cylinders accurately and precisely.	cubes, cuboids and cylinders.	cuboids and cylinders with moderate precision.	cylinders with minimal precision.
Ability to compute the volume of composite solids in the environment.	Computes the volume of solids in the environment accurately.	Computes the volume of composite solids in the environment.	Computes the volume of composite solids in the environment fairly accurate.	Computes the volume of composite solids in the environment with minimal accuracy.
Ability to relate cm^3 and m^3 as units of volume in different situations.	Relates cm^3 and m^3 as units of volume in different situations accurately.	Relates cm^3 and m^3 as units of volume in different situations.	Relates cm^3 and m^3 as units of volume in different situations moderately accurate.	Relates cm^3 and m^3 as units of volume in different situations with minimal accuracy.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
3.0 Measurement	**3.4 Capacity** **(6 hours)**	By the end of the sub strand, the teacher trainee should be able to: a) explain the meaning of capacity as used in measurement, b) explain techniques for estimating and measuring capacity of different containers, c) generate activities to estimate and measure capacity using arbitrary and standard units, d) determine capacity of a container using different containers of known capacity units, e) convert capacity from one unit to the other, f) prepare schemes of work in the sub strand capacity in upper primary schools, g) model activities appropriate for learning the concept of	The teacher trainee to: • creatively and innovatively estimate and measure capacity using available containers with different capacities, • model activities to estimate and measure capacity using standard units, • compare capacity of containers directly, conserve capacity, use arbitrary units, fixed and standard units to measure capacity, • demonstrate relationship between litre and litre practically, • conduct desk research on the concept of capacity as applied in measurement,	1. How can you introduce the concept of capacity? 2. How can you measure capacity? 3. How can you use capacity in real life? 4. Why is it necessary to incorporate core competences in mathematics learning?

		capacity, h) relate volume to capacity using the units cm^3, m^3 and litres, i) model activities appropriate for converting centimetre cubed (cm^3) into litres in real life situations, j) determine the capacity of composite containers in the environment, k) appreciate measuring, capacity to ascertain accuracy of amounts in real life.	• create activities appropriate for illustrating the concept of capacity using real containers, • create activities for establishing the relationship between volume and capacity ($1000cm^3 = 1$ litre), • calculate the capacity of different composite containers.	

Core Competencies to be developed:

- Citizenship and leadership competency - as teacher trainees work in groups to measure capacity and reflect on the use of capacity in real life.
- Creativity and innovation - as teacher trainees establish the relationship between metric system units of measuring capacity practically.

Values:

- Responsibility is enhanced as teacher trainees take care and safely stores the containers using in establish the relationship between volume and capacity practically.
- Integrity is enhanced as teacher trainees prudently record the correct measurements of different containers in the environment.

Suggested Formative Assessment Rubric				
Level / **Indicators**	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to explain the meaning of capacity as used in measurement.	Explains the meaning of capacity as used in measurement comprehensively.	Explains the meaning of capacity as used in measurement.	Explains the meaning of capacity as used in measurement moderately comprehensive.	Explains the meaning of capacity as used in measurement shallowly.
Ability to explain techniques for estimating and measuring capacity of different containers	Explains techniques for estimating and measuring capacity of different containers exhaustively.	Explains techniques for estimating and measuring capacity of different containers.	Explains techniques for estimating and measuring capacity of different containers somewhat exhaustive.	Explains techniques for estimating and measuring capacity of different containers superficially.
Ability to generate activities to estimate and measure capacity using arbitrary and standard units.	Generates activities to estimate and measure capacity using arbitrary and standard units innovatively.	Generates activities to estimate and measure capacity using arbitrary and standard units.	Generates some activities to estimate and measure capacity using arbitrary and standard units comparably innovative.	Generates a few activities to estimate and measure capacity using arbitrary and standard units with minimal innovativeness.
Determine capacity of a container using different containers of known capacity units.	Determines capacity of a container using different containers of known capacity units	Determines capacity of a container using different containers	Determines capacity of a container using different containers of known capacity units	Determines capacity of a container using different containers of known capacity

	accurately.	of known capacity units.	reasonably accurate.	units with minimal accuracy.
Convert capacity from one unit to the other	Converts capacity from one unit to the other accurately.	Converts capacity from one unit to the other.	Converts capacity from one unit to the other comparably accurate.	Converts capacity from one unit to the other with minimal accuracy.
Prepare schemes of work in the sub strand capacity in upper primary schools	Prepares schemes of work in the sub strand capacity in upper primary schools comprehensively.	Prepares schemes of work in the sub strand capacity in upper primary schools.	Prepares schemes of work in the sub strand capacity in upper primary schools moderately comprehensive.	Prepares schemes of work in the sub strand capacity in upper primary schools superficially.
Ability to model activities appropriate for learning the concept of capacity.	Models activities appropriate for learning the concept of capacity innovatively and accurately.	Models activities appropriate for learning the concept of capacity.	Models some activities appropriate for learning the concept of capacity with moderate innovativeness and accuracy.	Models a few activities appropriate for learning the concept of capacity with minimal innovativeness and accuracy.
Ability to determine the capacity of composite containers in the environment.	Determines the capacity of composite containers in the environment precisely.	Determines the capacity of composite containers in the environment.	Determines the capacity of some composite containers in the environment somewhat precisely.	Determines the capacity of composite containers in the environment with minimal precision.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
3.0 Measurement	**3.5 Mass** **(7 hours)**	By the end of the sub strand, the teacher trainee should be able to: a) design activities appropriate for developing the concept of mass using real life experiences, b) model activities for determining mass of different objects different situations, c) determine the mass of different objects using different approaches d) differentiate between mass and weight using actual measurement tools, e) generate activities to	The teacher trainee to: • model mathematical activities appropriate for developing the concept of mass using real life experiences, • compare mass of objects directly, conserve mass, use arbitrary, fixed and standard units to measure mass, • Model activities to show mass as the amount of matter in an object, • prepare and use 1kg, ½ kg and ¼ kg masses to measure masses of different objects, • distinguish between the units for measuring weight (Newtons) and units for measuring mass (kilograms), • Brainstorm on activities appropriate for estimating and measuring masse.	1. How can you introduce the concept of mass? 2. How can you measure mass? 3. How can you use mass in real life?

		estimate and measure mass using standard units in real life f) create an authentic tasks for assessing mass, g) appreciate the use of standard units in measuring mass.	• Construct a beam balance using locally available resources and use it to estimate and measure mass of different objects, • Use digital device to search and select appropriate content for learning the concept of mass • Discuss the process and come up with authentic assessment (Develop standards, Develop authentic tasks).	

Core Competencies to be developed:

- Critical thinking and problem solving - as teacher trainees construct a beam balance with locally available resources to estimate and measure mass of different objects.
- Creativity and innovation - as teacher trainees prepare and use 1kg, ½ kg and ¼ kg masses to measure masses of different objects.

Values:

- Responsibility is enhanced as teacher trainees construct a beam balance with locally available resources to estimate and measure mass of different objects.
- Respect is enhanced teacher trainees regard each other opinion while brainstorming on activities appropriate for estimating and measuring mass using standard units in real life.

Suggested Formative Assessment Rubrics				
Level / **Indicators**	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to design activities appropriate for developing the concept of mass using real life experiences.	Designs activities appropriate for developing the concept of mass using real life experiences innovatively.	Designs activities appropriate for developing the concept of mass using real life experiences.	Designs some activities appropriate for developing the concept of mass using real life experiences with considerable innovativeness.	Designs a few activities appropriate for developing the concept of mass using real life experiences with minimal innovativeness.
Ability to model activities involving determining mass of different objects.	Models activities involving determining mass of different objects creatively.	Models activities Involving determining mass of different objects.	Models some activities involving determining mass of different Objects comparably creative.	Models a few activities involving determining mass of different objects with minimal creativity.
Ability to determine the mass of different objects using different approaches.	Determines the mass of different objects using different approaches accurately.	Determine the mass of different objects using different approaches.	Determines the mass of different objects using different approaches somewhat accurately.	Determine the mass of different objects using different approaches with minimal accuracy.

Ability to differentiate between mass and weight using actual measurement tools.	Differentiates between mass and weight using actual measurement tools concisely.	Differentiates between mass and weight using actual measurement tools.	Differentiate between mass and weight using actual measurement tools moderately concise.	Differentiates between mass and weight using actual measurement tools with minimal conciseness.
Ability to generate activities to estimate and measure mass using standard units in real life.	Generates activities to estimate and measure mass using standard units in real life innovatively.	Generates activities to estimate and measure mass using standard units in real life.	Generate some activities to estimate and measure mass using standard units in real life with reasonable innovativeness.	Generates a few activities to estimate and measure mass using standard units in real life with minimal innovativeness.
Ability to create an authentic task for assessing mass	Creates an authentic task for assessing mass coherently.	Creates an authentic task for assessing mass.	Creates an authentic task for assessing mass with little assistance comparably coherent.	Creates an authentic task for assessing mass with a lot of assistance superficially.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
3.0 Measurement	**3.6 Time** **(10 hours)**	By the end of the sub strand, the teacher trainee should be able to: a) model activities that relate daily activities to morning, afternoon, evening and night, b) discuss different tools for telling time in daily life, c) establish the relationship between days of the week and months of the year using a calendar, d) conduct research on the best strategies for integrating life skill issues in teaching and learning the concept of time, e) read, tell and write time using the analogue and digital clock in given	The teacher trainee to; • conduct research on the type of techniques used different communities to tell time, • generate activities that relate daily activities to morning, afternoon, evening and night, • relate daily activities to morning, afternoon, evening and night in real life, • relate length of shadow to time at different times of the day, • use different tools in telling time such as mobile phone, clock, and watch, • brainstorm on activities that identify specific days of the week and months of the year, • compose and perform songs poems and use parts of the body to identify and recite number of days in each month of the year,	1. How can you introduce the concept of time? 2. How can you use time in real life?

		cases, f) discuss ways which different communities tell time, g) model activities for measuring time in a learning situation, h) investigate the concepts of Ante Meridiem (am) and Post Meridiem (pm) in 12-hour time system, i) convert time from 12 hour to 24-hour system in real life situation j) perform time related operations in primary school curriculum design, k) appreciate use of time in real life.	• ● hold class guided discussion on appropriate activities for teaching and learning the concept of time, • discuss groups different tools used in measuring / telling time. Present the finding to plenary, • compose and recite songs on number of days in each month of the year, • study and discuss the concepts of Ante Meridiem (am) and Post Meridiem (pm), • practise on converting time from 12 hour to 24-hour system and from 24 hour to 12 hour, • carry out addition, subtraction, multiplication and division operation of time.	

Core Competencies to be developed:

- Self-efficacy - as teacher trainees compose and recite songs on number of days in each month of the year.
- Communication and collaboration - as teacher trainees interact and discuss in groups different tools used in measuring / telling time and present the finding to plenary.

Values:
Unity is enhanced as teacher trainees work as a team while composing and recite songs on number of days in each month of the year.

Suggested Formative Assessment Rubric				
Level / **Indicators**	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to model activities that relate daily activities to morning, afternoon, evening and night.	Models activities that relate daily activities to morning, afternoon, evening and night innovatively.	Models activities that relate daily activities to morning, afternoon, evening and night.	Models some activities that relate daily activities to morning, afternoon, evening and night considerably innovative.	Models a few activities that relate daily activities to morning, afternoon, evening and night with minimal innovativeness.
Discuss different tools for telling time in daily life.	Discusses different tools for telling time in daily life exhaustively.	Discusses different tools for telling time in daily life.	Discusses different tools for telling time in daily life somewhat exhaustive.	Discusses different tools for telling time in daily life shallowly.
Ability to establish the relationship between days of the week and months of the year using a calendar.	Establishes the relationship between days of the week and months of the year using a calendar	Establishes the relationship between days of the week and months of the	Establishes the relationship between days of the week and months of the year using a calendar	Establishes the relationship between days of the week and months of the year using a calendar with minimal

	accurately.	year using a calendar.	moderately accurate.	accuracy.
Ability to conduct research on the best strategies for integrating life skill issues in teaching and learning the concept of time.	Conducts research on the best strategies for integrating life skill issues in teaching and learning the concept of time systematically.	Conducts research on the best strategies for integrating life skill issues in teaching and learning the concept of time.	Conducts research on the best strategies for integrating life skill issues in teaching and learning the concept of time with minimal guidance considerably systematic.	Conducts research on the best strategies for integrating life skill issues in teaching and learning the concept of time with minimal flow.
Ability to read, tell and write time using the analogue and digital clock.	Reads, tells and writes time using the analogue and digital Clock accurately most often.	Reads, tells and writes time using the analogue and digital clock.	Reads, tells and writes time using the analogue and digital clock occasionally.	Reads, tells and writes time using the analogue and digital clock less often.
Ability to discuss ways which different communities tell time in real life situations.	Discusses ways which different communities tell time in real life situations comprehensively.	Discusses ways which different communities tell time in real life situations.	Discusses ways which different communities tell time in real life situations comparably comprehensive.	Discusses ways which different communities tell time in real life situations superficially.
Ability to model	Models activities	Models activities for	Models some	Models a few activities

activities for measuring time in a learning situation.	for measuring time in a learning situation creatively.	measuring time in a learning situation.	activities for measuring time in a learning situation partially accurate	for measuring time in a learning situation with minimal accuracy.
Ability to investigate the concepts of Ante Meridiem (am) and Post Meridiem (pm) in 12 hour time system.	Investigates the concepts of Ante Meridiem (am) and Post Meridiem (pm) in 12 hour time system exhaustively.	Investigates the concepts of Ante Meridiem (am) and Post Meridiem (pm) in 12 hour time system.	Investigates the concepts of Ante Meridiem (am) and Post Meridiem (pm) in 12 hour time system partly exhaustive.	Investigates the concepts of Ante Meridiem (am) and Post Meridiem (pm) in 12 hour time system superficially
Ability to convert time from 12 hour to 24 hour system and from 24 hour to 12 hour system in real life situation.	Converts time from 12 hour to 24 hour system and from 24 hour to 12 hour system in real life situation accurate-ly.	Converts time from 12 hour to 24 hour system and from 24 hour to 12 hour system in real life situation.	Converts time from 12 hour to 24 hour system and from 24 hour to 12 hour system in real life situation partially ac-curate.	Convert time from 12 hour to 24 hour system and from 24 hour to 12 hour system in real life situation with minimal accuracy.
Ability to perform time related operations in primary school curricu-lum design.	Performs time related operations in primary school curriculum de-sign correctly and ac-curately.	Performs time related operations in primary school curriculum de-sign.	Performs time related operations in primary school curriculum de-sign with reasonable accuracy.	Performs time related op-erations in primary school curriculum design with minimal accuracy.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
3.0 Measurement	**3.7 Money** **(10 hours)**	By the end of the sub strand, the teacher trainee should be able to: a) analyse denominations of Kenyan currency in coins and notes, b) distinguish between change and balance in real life situation, c) distinguish between needs and wants in relation to goods and services, d) design materials and activities appropriate for learning money, e) determine simple and compound interest using step by step method, f) compute hire purchase, profit and loss,	The teacher trainee to; • model activities to distinguish needs and wants through games, role play, stories and discussions, • generate a price lists for goods and services, • prepare and use a classroom shop for:*(shopping activities, giving and receiving change and balance,)* • Study the scope of money sub strand in curriculum designs for Early Years Education and upper primary school and make notes on the spiral nature of the content. Illustrate the progress in content depth in the succeeding levels, • distinguish between needs and wants; both goods and services, • use locally available materials to model materials and activities	1. How can you introduce the concept of money? 2. Why do we save money? 3. How can you use money in real life?

		discount and Value Added Tax from real life in real life situations, g) prepare cash book, trading and profit and loss accounts from sample business financial records, h) prepare simple budget using domestic income and expenditure list, i) examine the role of financial institutions in real life situations, j) embrace proper management of financial resources day to day life.	appropriate for learning the concept of money in primary school education, • work out of simple and compound interest using amount, rate of interest, principal and time as variable, • work out hire purchase, profit and loss, discount and VAT in real life situations, • draw a one column cash book, two column cash book, trading and profit and loss accounts from daily life financial records, • Prepare simple budget using classroom shop and price list, • explore services offered by banking institutions, • explore prevalence of cashless transactions in daily life.	
Core competencies to be developed: Self-efficacy: teacher trainee prepares simple budget using classroom shop and price list				
Values: Unity: Teacher trainee engage in preparation and use of classroom shop for learning on the use of money.				

Suggested Formative Assessment Rubric				
Level / Indicators	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to analyse denominations of Kenyan currency in coins and notes.	Analyses denominations of Kenyan currency in coins and notes Comprehensively.	Analyses denominations of Kenyan currency in coins and notes.	Analyse denominations of Kenyan currency in coins and notes partially comprehensive.	Analyses denominations of Kenyan currency in coins and notes superficially.
Ability to distinguish between change and balance in real life situations.	Distinguishes between change and balance in real life situations precisely.	Distinguishes between change and balance in real life situations.	Distinguishes between change and balance in real life situations fairly precise.	Distinguishes between change and balance in real life situations with minimal precision.
Ability to distinguish between needs and wants in relation to goods and services.	Distinguishes between needs and wants in relation to goods and services meticulously.	Distinguishes between needs and wants in relation to goods and services.	Distinguishes between needs and wants in relation to goods and services somewhat meticulously.	Distinguishes between needs and wants in relation to goods and services shallowly.
Ability to design materials and activities appropriate for learning money.	Designs materials and activities appropriate for learning money creatively.	Designs materials and activities appropriate for learning money.	Designs some materials and activities appropriate for learning money moderately creative.	Designs a few materials and activities appropriate for learning money with minimal creativity.
Ability to determine simple and compound interest	Determines simple and compound interest using step by step method pre-	Determines simple and compound interest using step	Determines simple and compound interest using step by step method	Determines simple and compound interest using step by step method with

using step by step method.	cisely.	by step method.	somewhat precisely.	less precision.
Ability to compute hire purchase, profit and loss, discount and Value Added Tax in real life situations.	Computes hire purchase, profit and loss, discount and Value Added Tax in real life situations precisely.	Computes hire purchase, profit and loss, discount and Value Added Tax in real life situations.	Computes hire purchase, profit and loss, discount and Value Added Tax in real life situations somewhat precisely.	Computes hire purchase, profit and loss, discount and Value Added Tax in real life situations with less precision.
Ability to prepare cash book, trading and profit and loss accounts from sample business financial records	Prepares cash book, trading and profit and loss accounts from sample business financial records comprehensively.	Prepares cash book, trading and profit and loss accounts from sample business financial records.	Prepares cash book, trading and profit and loss accounts from sample business financial records somewhat comprehensive.	Prepares cash book, trading and profit and loss accounts from sample business financial records superficially.
Ability to prepare simple budget using domestic income and expenditure list.	Prepares simple budget using domestic income and expenditure list comprehensively.	Prepares simple budget using domestic income and expenditure list.	Prepares simple budget using domestic income and expenditure list moderately comprehensive.	Prepares simple budget using domestic income and expenditure list superficially
Ability to examine the role of financial institutions in real life situations.	Examines the role of financial institutions in real life situations exhaustively.	Examines the role of financial institutions in real life situations	Examines the role of financial institutions in real life situations partially exhaustive.	Examines the role of financial institutions in real life situations superficially.

STRAND 4.0 GEOMETRY

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
4.0 Geometry	**4.1 Lines** **(6 hours)**	By the end of the sub strand, the teacher trainee should be able to: a) examine types of lines in real life situations, b) identify materials for learning the concept of line in pre-primary and primary school education, c) model activities for teaching and learning the concept of line in pre-primary education, d) construct parallel and perpendicular using a ruler and pair of compasses e) construct parallel lines using a ruler and set square in given cases, f) embrace use of lines in real life.	The teacher trainee to: • discuss and illustrate different types of lines, and label them. (*straight lines, line segments, rays, intersecting lines, perpendicular lines, parallel lines, curved lines, zigzag, wavy*), • model and present to peers different types of lines using sticks, ropes and other materials for teaching and learning the concept of lines in preprimary and primary, • generate activities appropriate for constructing parallel lines and , perpendicular lines using a ruler and compasses only, • improvise locally available resources to model ruler and set square and use	1. How can you introduce the concept of lines? 2. How can you use lines in real life?

			them to construct parallel lines, • use digital device to design and model patterns using lines.	

Core Competencies to be developed:

- Self - Efficacy – as teacher trainee is equipped with skills on constructing of parallel, perpendicular and oblique lines using a ruler and pair of compasses.
- Digital literacy - as teacher trainees design digital patterns involving lines.

Values:

Responsibility is enhanced as teacher trainees improvise locally available resources to model ruler and set square for constructing parallel lines.

Suggested Formative Assessment Rubric

Level / Indicators	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below Expectations
Ability to examine types of lines in geometry	Examines types of lines in geometry comprehensively.	Examine types of lines in geometry.	Examines types of lines in geometry somewhat comprehensive.	Examines types of lines in geometry superficially.
Ability to identify materials appropriate for learning the concept of line in primary school education	Identifies materials appropriate for learning the concept of line in primary school education	Identifies materials appropriate for learning the concept of line in primary school education.	Identifies some materials appropriate for learning the concept of line in primary school education partially creative.	Identifies a few materials appropriate for learning the concept of line in primary school education with minimal creativity.

	creatively.			
Ability to model activities for teaching and learning the concept of line in pre-primary education.	Models activities for teaching and learning the concept of line in pre-primary education creatively.	Models activities for teaching and learning the concept of line in pre- primary education.	Models some activities for teaching and learning the concept of line in pre-primary education moderately creative.	Models a few activities for teaching and learning the concept of line in pre-primary education with minimal creativity.
Ability to construct parallel lines and perpendicular lines and using a ruler and pair of compasses.	Constructs parallel lines and perpendicular lines using a ruler and pair of compasses accurately and precisely.	Constructs parallel lines and perpendicular lines using a ruler and pair of compasses	Constructs some parallel lines and perpendicular lines using a ruler and pair of compasses partly accurate and precise.	Constructs a few parallel lines and perpendicular lines using a ruler and pair of compasses with minimal accuracy and precision.
Ability to construct parallel lines using a ruler and set square in given cases.	Constructs parallel lines using a ruler and set square in given cases accurately and precisely.	Constructs parallel lines using a ruler and set square in given cases.	Constructs some parallel lines using a ruler and set square in given cases partly accurate and precise.	Constructs a few parallel lines using a ruler and set square in given cases with minimal accuracy and precision.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
4.0 Geometry	**4.2 Angles and Plane Figures** **(10 hours)**	By the end of the sub strand, the teacher trainee should be able to; a) categorise of angles according to sizes in different situations, b) construct angles multiple of 15^o using a ruler and pair of compasses, c) investigate properties regular polygons by relating sides and angles, d) construct triangles and regular polygons up to hexagon using a ruler and pair of compasses, e) integrate non-formal activities in learning mathematics, f) appreciate use of angles in real life.	The teacher trainee to: • discuss the classification of angles according to sizes (Acute angles, Obtuse angles and Reflex angles) • use a ruler and a pair of compasses only to construct • angles (30^o, 45^o, 75^o, 90^o, 105^0 and 120^0) • brainstorm on the properties of polygon. Relate size of the angles of regular polygon to number of sides. • use a ruler and pair of compasses only to construct triangles and regular polygons • discuss the best approaches for linking the concept of angles physical features in the neighborhood.	1. How can you introduce the concept of angles? 2. How can you use angles in real life?

Core Competencies to be developed:

- Communication and collaboration - as teacher trainees deliberate with peers on classification of angles according to sizes.
- Creativity and innovation - as teacher trainees practically construct angles using a ruler and pair of compasses only.

Values:

Unity is enhanced as teacher trainees share resources and collaborate with others while constructing angles using a ruler and pair of compasses.

Suggested Formative Assessment Rubric

Level / Indicators	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below Expectations
Ability to categorise angles according to sizes.	Categorises angles according to sizes thoroughly.	Categorises angles according to sizes.	Categorises angles according to sizes with somewhat thorough.	Categorises angles according to sizes superficially.
Ability to construct angles using a ruler and pair of compasses	Constructs angles using a ruler and pair of compasses creatively and accurately.	Constructs angles using a ruler and pair of compasses.	Constructs some angles using a ruler and pair of compasses moderately creative and accurate.	Constructs a few angles using a ruler and pair of compasses with minimal creativity and accuracy.
Ability to investigate properties regular polygons by relating	Investigates properties regular polygons by relating sides and angles	Investigate properties regular polygons by relating sides and	Investigates properties regular polygons by relating sides and angles partially exhaustive.	Investigates properties regular polygons by relating sides and angles superficially.

sides and angles.	exhaustively.	angles.		
Ability to construct triangles and regular polygons using a ruler and pair of compasses.	Constructs triangles and regular polygons using a ruler and pair of compasses accurately.	Constructs triangles and regular polygons using a ruler and pair of compasses.	Constructs triangles and regular polygons using a ruler and pair of compasses somewhat accurately.	Constructs triangles and regular polygons using a ruler and pair of compasses with minimal accuracy.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
4.0 Geometry	**4.3 Shapes** **(6 Hours)**	By the end of the sub strand, the teacher trainee should be able to: a) develop resources appropriate for teaching and learning the concept of shapes in mathematics, b) model plane shapes using locally available materials in given cases, c) discuss physical properties of 3-D shapes in real life situation, d) model 3-D shapes using locally available materials for learning concept of shapes, e) design patterns using shapes in the environment, f) establish the relationship between vertices, faces	The teacher trainee to: • use digital devices to model shapes and create patterns with shapes, • discuss and develop shapes using cut-outs of different materials (*Circle, rectangle, Triangle, oval, square, rhombus, parallelogram, trapezium and kite),* • create 3-D shapes using cut-outs of different materials (cube, cuboid, cylinder, sphere, tetrahedron, wedge, cone) and identify their properties, • discuss the relationship between vertices, faces and edges of 3-D shapes, • identify 3-D objects from the environment and establish the	1. How can you introduce the concept of shapes? 2. How can you use shapes in real life?

		and edges of 3-D shapes, g) appreciate the use of 3-D shapes in daily life.	relationship between vertices, faces and edges. • collect objects and use their shapes to create patterns,	

Core Competencies to be developed:

- Self-efficacy - as teacher trainees identify 3-D objects from the environment and establish the relationship between vertices, faces and edges.
- Critical thinking and problem solving - as teacher trainees establish the relationship between vertices, faces and edges of 3-D shapes.
- Pedagogical content knowledge - as teacher trainees model 3-D shapes using locally available materials for learning concept of shapes in primary education.

Values:

Responsibility is enhanced as teacher trainees create 3-D shapes using cut-outs of materials from the environment.

Suggested Formative Assessment Rubric				
Level / **Indicators**	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to develop resources appropriate for teaching and learning the concept of shapes.	Develops resources appropriate for teaching and learning the concept of shapes creatively.	Develops resources appropriate for teaching and learning the concept of shapes.	Develops some resources appropriate for teaching and learning the concept of shapes partly creative.	Develops a few resources appropriate for teaching and learning the concept of shapes with minimal creativity.
Ability to model plane shapes using locally available materials.	Models plane shapes using locally available materials innovatively.	Models plane shapes using locally available materials.	Models some plane shapes using locally available materials with moderate innovativeness.	Models a few plane shapes using locally available materials with minimal innovativeness.
Ability to discuss physical properties of 3-D shapes.	Discusses physical properties of 3-D shapes exhaustively.	Discusses physical properties of 3-D shapes	Discusses physical properties of 3-D shapes somewhat exhaustive.	Discusses physical properties of 3-D shapes superficially.

Ability to model 3-D shapes using locally available materials for learning concept of shapes in primary education.	Models 3-D shapes using locally available materials for learning concept of shapes in primary education innovatively.	Models 3-D shapes using locally available materials for learning concept of shapes in primary education.	Models some 3-D shapes using locally available materials for learning concept of shapes in primary education moderately innovative.	Models a few 3-D shapes using locally available materials for learning concept of shapes in primary education with minimal innovativeness.
Ability to design patterns using shapes in the environment.	Designs patterns using shapes in the environment skillfully and creatively.	Designs patterns using shapes in the environment.	Designs some patterns using shapes in the environment some-what skillfully and creatively.	Designs a few patterns using shapes in the environment with minimal creativity.
Ability to establish the relationship between vertices, faces and edges of 3-D shapes.	Establishes the relationship between vertices, faces and edges of 3-D shapes comprehensively.	Establishes the relationship between vertices, faces and edges of 3-D shapes.	Establishes the relationship between vertices, faces and edges of 3-D shapes partially comprehensive.	Establishes the relationship between vertices, faces and edges of 3-D shapes superficially.

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
4.0 Geometry	**4.4 Position and direction** **(5 hours**	By the end of the sub strand, the teacher trainee should be able to: a) model activities appropriate for developing concepts of position and direction in primary mathematics, b) select appropriate digital content for learning the concepts of position and direction, c) conduct research on the best strategies for linking position and direction to games and sport in creative activities, d) interpret position and direction in real life, e) prepare tools to assess the concept of position and direction in the primary mathematics curriculum, f) embrace the concepts of position and direction in real life.	The teacher trainee to: ● use actual physical locations in the locality to develop the concepts of position and direction, ● use locally available materials to construct coordinate planes, ● study design and prepare Competency Based Assessment tools for primary school mathematics (observation schedules, checklists, assessment rubric, questionnaires projects, journals, different types of portfolios, oral/aural and written tests, anecdotal records).	1. Why is it important to learn about position and direction? 2. How can you introduce the concept of position and direction? 3. How can you use position and direction in real life?

Core Competencies to be developed:

- Citizenship and leadership - as teacher trainees use actual physical locations in the locality to develop the concepts of position and direction.
- Assessment competency – as teacher trainees design and prepare Competency Based Assessment tools for use in primary school mathematics.

Values:

Responsibility is enhanced as teacher trainees use locally available materials to construct coordinate planes.

Suggested Formative Assessment Rubric

Level / Indicators	Exceeds Expectations	Meets Expectations	Approaches Expectations	Below Expectations
Ability to model activities appropriate for developing concepts of position and direction primary mathematics.	Models activities appropriate for developing concepts of position and direction in primary mathematics creatively.	Model activities appropriate for developing concepts of position and direction in primary mathematics.	Models some activities appropriate for developing concepts of position and direction in primary mathematics somewhat creatively.	Models a few activities appropriate for developing concepts of position and direction in primary mathematics with minimal creatively.
Ability to select appropriate digital content for learning the concepts of position and direction.	Selects appropriate digital content for learning the concepts of position and direction objectively.	Selects appropriate digital content for learning the concepts of position and direction with ease.	Selects some appropriate digital content for learning the concepts of position and direction somewhat	Selects a few appropriate digital content for learning the concepts of position and direction somewhat objectively.

			objectively.	
Ability to conduct re-search on the best strategies for linking position and direction to games and sport and creative activities.	Conducts research on the best strategies for linking position and direction to games and sport and creative activities comprehensively.	Conducts research on the best strategies for linking position and direction to games and sport and creative activities.	Conducts research on the best strategies for linking position and direction to games and sport and creative activities partially comprehensive.	Conducts research on the best strategies for linking position and direction to games and sport and creative activities superficially.
Ability to interpret position and direction in real life.	Interpret position and direction in real life thoroughly.	Interpret position and direction in real life.	Interprets position and direction in real life somewhat thorough.	Interprets position and direction in real life superficially.
Ability to prepare tools to assess the concept of position and direction in the primary mathematics curriculum.	Prepares tools to assess the concept of position and direction in the primary mathematics curriculum comprehensively.	Prepares tools to assess the concept of position and direction in the primary mathematics curriculum.	Prepares tools to assess the concept of position and direction in the primary mathematics curriculum partially comprehensive	Prepares tools to assess the concept of position and direction in the primary mathematics curriculum superficially.

STRAND 5.0 DATA HANDLING AND STATISTICS

Strand	Sub Strand	Specific Learning Outcomes	Suggested Learning Experiences	Suggested Key Inquiry Questions
5.0 Data Handling and Statistics	**5.1 Data** **(10 hours)**	By the end of the sub strand, the teacher trainee should be able to; a) Generate data from the immediate school environment b) discuss safe methods of collecting data in the school environment c) collect and organise data in a frequency table in given cases d) determine mean, mode, median and range for discrete data, e) interpret and present data using tables, bar graphs, pie charts, pictograms	The teacher trainee to: ● Collect and group biographical data of teacher trainees in the class such as ages, gender, heights, size of shoes among others, ● collect raw data within and out-side the classroom, ● organize data in a frequency ta-ble and represent data collected using other methods, ● work out the measures of central tendency and measures of distribution, ● study the components of specific learning outcomes in the sub strand sorting and grouping in pre-primary mathematical activities design, ● interpret and present the data in	1. How can you introduce the concept of data handling? 2. How can you collect data? 3. Why is data handling necessary in life and learning situation?

		and line graphs, f) organise and present data using digital platforms, g) relate sorting and grouping in lower grades to statistics, h) appreciate the use of data in real life.	tables, bar graphs, pie charts, pictograms and line graphs, histograms and frequency polygons to represent the da-ta, • use ICT to compute the mean, mode and median and use the results to interpret the data for informed decision.	

Core Competencies to be developed:

- Creativity and innovation - as teacher trainees interpret and present data in real life situation.
- Critical thinking and problem solving - as teacher trainees analyse data using different statistical methods.

Values:

Responsibility is enhanced as teacher trainees collect and organise data in a frequency table from within and outside the classroom.

Suggested Formative Assessment Rubric				
Level / **Indicators**	**Exceeds Expectations**	**Meets Expectations**	**Approaches Expectations**	**Below Expectations**
Ability to generate data from the immediate school environment	Generates data from the immediate school environment comprehensively.	Generates data from the immediate school environment.	Generates data from the immediate school environment fairly comprehensive.	Generates data from the immediate school environment with minimal details.
Ability to discuss safe methods of collecting data in the school environment	Discusses safe methods of collecting data in the school environment exhaustively.	Discusses safe methods of collecting data in the school environment	Discusses safe methods of collecting data in the school environment somewhat exhaustive.	Discusses safe methods of collecting data in the school environment Shallowly.
Ability to collect and organise data in a frequency table in given cases.	Collects and organise data in a frequency table in given cases accurately and creatively.	Collects and organise data in a frequency table in given cases.	Collects and organises data in a frequency table in given cases fairly accurate and creative.	Collects and organise data in a frequency table in given cases with minimal accuracy and creativity.
Ability to determine mean, mode, median and range for discrete data.	Determines mean, mode, median and range for discrete data accurately.	Determines mean, mode, median and range for discrete data.	Determines mean, mode, median and range for discrete data somewhat accurately.	Determines mean, mode, median and range for discrete data with minimal accuracy.

Ability to interpret and present data using tables, bar graphs, pie charts, pictograms and line graphs.	Interprets and presents data using tables, bar graphs, pie charts, pictograms and line graphs with exceptional accuracy and creativity.	Interpret and present data using tables, bar graphs, pie charts, picto-grams and line graphs.	Interprets and presents data using tables, bar graphs, pie charts, pictograms and line graphs fairly accurate and creative.	Interprets and presents data using tables, bar graphs, pie charts, pictograms and line graphs with minimal accuracy and creativity.
Ability to organ-ise and present data using digital platorms,	Organise and present data using digital platforms innovatively.	Organises and present data using digital platforms.	Organises and presents data using digital platforms somewhat innovatively.	Organises and presents data using digital platforms less innovatively.