

Four-Year B.Ed. Course Manual

Mathematics: Teaching and Assessing









GOVERNMENT OF GHANA









FOREWORD

These Initial Teacher Education course manuals were developed by a team consisting of members from Colleges of Education and four universities namely the University of Ghana, Kwame Nkrumah University of Science and Technology, University of Education, Winneba, and University for Development Studies. This team was originally constituted by the National Council for Tertiary Education (now the Ghana Tertiary Education Commission) in 2019 to support the delivery of the new B.Ed. curriculum with assistance from T-TEL and UK Aid. The revision, finalization and printing of these manuals took place in 2021 with support from T-TEL and Mastercard Foundation.

The course manuals have been produced for use as general guides for the delivery of the new four-year B.Ed. curriculum in Colleges of Education in collaboration with their affiliated universities. They are designed to support student teachers, tutors, and lecturers in delivering a complete B.Ed. course for training student teachers which meets the requirements of the National Teachers' Standards, enabling them to teach effectively in basic schools.

The first section of the manuals is focused on the course information and vision for the B.Ed. curriculum. The second section presents the course details, goal for the subject or learning area, course description, key contextual factors as well as core and transferable skills and cross-cutting issues, including equity and inclusion. The third section is a list of course learning outcomes and their related learning indicators. The fourth section presents the course content which is broken down into units for each week, the topic and sub-strands and their related teaching and learning activities to achieve the learning outcomes and the teaching and learning strategies. This is followed by course assessment components in section five. Each manual contains a list of required reading and references as well as teaching and learning resources. The final section presents course related professional development for tutors and lecturers to be able to use each section of the manual.

Field instructions to guide Supported Teaching in School are integrated into the course manuals to provide the student teacher with guidance in developing teaching throughout the entire period of study to be able to meet the requirements of the National Teachers' Standards (NTS) and the National Teacher Education Curriculum Framework (NTECF). To ensure maximum benefit the course manuals should be used in addition to other resources such as the NTS, NTCEF, National Teacher Education & Assessment Policy and the National Teacher Education Gender Equality and Social Inclusion (GESI) Strategy and Action Plan.. This will help to ensure that student teachers' learning is integrated within the wider teacher education policy framework.

Professor Mohammed Salifu

Director General, Ghana Tertiary Education Commission

ACKNOWLEDGEMENTS

The course manuals were developed through the collaborative efforts of a team of individuals from Colleges of Education, University of Ghana, Kwame Nkrumah University of Science and Technology, University of Education, Winneba, and University for Development Studies. They were produced in association with the Ghana Tertiary Education Commission of the Ministry of Education, Ghana.

A participatory team approach was used to produce this set of resources for tutors/lecturers, mentors, and student teachers. We are grateful to the specialists who contributed their knowledge and expertise.

Special thanks to Professor Jophus Anamuah-Mensah - T-TEL Key Advisor, Dr. Eric Daniel Ananga - T-TEL Key Advisor for Curriculum reform and Beatrice Noble-Rogers who provided key editorial, review and content input and facilitated the process of drafting and finalising the course manual.

Patricia Appiah-Boateng and Gameli Samuel Hahomene, served as typesetting and formatting coordinators and designed and produced the illustrations, tables, and other graphics which appear in the pages. They spent time and effort designing and redesigning the graphic layout and producing the camera-ready copy resulting in a set of materials that are easy to use, read, and reference.

Thanks also goes to all T-Tel staff members who worked to support production of these course manuals, particularly Beryl Opong-Agyei and Gideon Okai. Their frankness and co-operative attitude complimented the team approach used to produce this manual.

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INTRODUCTION TO COURSE MANUALS

Welcome to this B.Ed. Course manual.

Following the accreditation of the B.Ed. by the national accreditation Board with its recognition as a world class teacher education curriculum, the decision was taken to support effective implementation through the development of course manuals. the course manuals provide tutors and lecturers with the materials necessary to support teaching each of the B.Ed. courses. The manuals adhere directly to, and emphasise, the principles and standards set out in the NTS, NTECF and in the B.Ed. and will help ensure operationalising the Government's teacher education reform Policy.

The manuals serve the following purposes:

- they are the key educational agreements between the training institution and the student teachers. In this way student teachers know what the expectations are for them and for the training they will receive.
- they lay out the course outcomes, content, strategies, and assessment, thereby providing direction to and consistency in training and B.Ed. implementation among tutors across the country.
- they are explicit documents that provide other institutions with information on which to base transfer/ articulation decisions.

Specifically, they also:

- support coherent lesson planning and teaching which will enable student teachers to achieve the NTS and become good teachers who ensure all pupils' learning whilst offering tutors the flexibility for adaptation for local needs and contexts.
- Provide a lesson by lesson overview of the course, building on and developing the material in the course specifications.
- Inform tutors, student teachers and others working with student teachers about:
 - 1. What is to be taught and why.
 - 2. how it can be taught.
 - 3. how it should be assessed.
- Provide opportunities for student teachers to develop and apply knowledge during supported teaching in school, creating a strong bond between learning in school and in the training institution.
- Reflect the stage of student teacher development, set out in the model for progress across the four years of the B.Ed.
- Can be used as self-study tools by student teachers.
- Ensure that all information necessary to inform teacher training is in one place (serves as reference document).
- The manuals are the basis of the codes and university professional development sessions to ensure Principals, tutors, lecturers and heads of department are fully familiar with the details of: courses, outcomes, content, approaches, assessments and lessons.

Who are course manuals for:

- College of Education Tutors
- Teacher Education University Lecturers
- Student Teachers
- Mentors and Lead Mentors
- All Those with An Interested In Teacher Education.

USING THIS MANUAL

Writers of the manuals engaged widely with colleagues in each subject area at each stage of development. Besides, writers envisaged themselves in varied contexts as they wrote, to suggest methodologies and strategies for teaching the strands which would ensure student teachers are enabled to achieve the learning outcomes. In view of our commitment to creativity, problem solving, collaboration and to lifelong learning, we expect that individual tutors will "own" their manuals and become user-developers. lessons in the manuals will be strands for weekly Pd meetings where tutors/lecturers will situate the lessons in the contexts of their colleges and their student teachers, to maximize the benefits.

It is also expected that tutors will model the best pedagogic practices for student teachers. Key among such practices is the communication of the importance of having a personal teaching philosophy. We expect that tutors and lecturers will explicitly communicate their personal teaching philosophies to their student teachers during the first meeting of every course. in preparation for this, we suggest you set out your personal teaching philosophy and how it will be demonstrated in your teaching using, or adapting, the sample sentence introductions below.

My teaching philosophy is	
n view of this philosophy, I will facilitate this course by/through	

Mathematics Course Manual

Resources for Course Manual Writing

- Soft copies of the CWG, New Four-Year B.Ed. Curriculum introduction
- Soft and hard copies of the course specifications for the subject for year one and two
- Soft and hard Course Manual Writing Guide (CMWG)
- Relevant subject texts

Target Audience

College of Education Tutors

Teacher Education University Lecturers

- Student Teachers
- Mentors

The purpose of course manuals

- To provide a lesson by lesson overview of the course, building on, adapting and developing the material in the course specifications
- To provide a resource to support professional development sessions for tutors/lecturers on how to plan for and teach courses from the New Four-Year B.Ed. Curriculum
- To inform tutors /lecturers, student teachers and others working with student teachers about:
 - what is to be taught and why
 - how it can be taught
 - how it should be assessed
- To support consistency in the implementation of the New Four-Year B.Ed. across institutions who train teachers
- To ensure that all **training** information on skills, processes, and other information necessary to perform the teaching taskare together in one place.
- To operationalize the Teacher Education Reform Policy; the requirements of the NTS & NTECF and the Four-Year B.Ed.

Guiding principles of course manual writing

- 1. They are written with the learner, the student teacher, in mind: what they will *be able* to cope with and only include what student teachers need to know, understand, be able to do and be as a basic school teacher
- 2. They take in to consideration the learner's, the student teacher's, context and possible barriers to, and enablers for, learning
- 3. They are written with the tutors /lecturers who are going to teach the course in mind. Tutors must be able to adapt and develop the plans in course manuals to fit the context they are teaching in and to support their teaching
- 4. They are aligned to the key principles and practices of the Teacher Education Reform Policy: the NTS, the NTECF and the New Four-Year B.Ed.
- 5. They are written to provide opportunities for student teachers to develop and apply knowledge during supported teaching in school
- 6. They are written to reflect the stage of student teacher development, set out in the model for progress in the New Four-Year B.Ed.
- 7. They are written to support progress in student teacher learning, including building on prior learning from the previous programme or course/s and supporting progress to the next course.
- 8. They are to be used as self-study tools.
- 9. They are written to have the following characteristics: easy to read; uses active voice and avoids jargon; uses bullet points to offset text; uses images

What a teacher educator needs to know, understand and use to inform what they do

- The aims and structure of the education system and Education strategic Plan
- The Basic School Curriculum
- The Inclusion Policy
- The teacher education system: The National Teacher's Standards, the vision for teacher education and the core principles of the New Four-Year B.Ed.
- Andragogy, effective methods and practices for teaching adult learners
- Assessment Literacy. Assessment for, of and as learning -Educative Assessment

Guidance for completing the mathematics course manual writing

A. Course Information

Title Page

i. Course name: as in course specification unless important reason why not

ii. The vision for the New Four-Year B.Ed. Curriculum

"To transform initial teacher education and train highly qualified, motivated new teachers who are effective, engaging and fully prepared to teach the basic school curriculum and so improve the learning outcomes and life chances of all learners they teach as set out in the National Teachers' Standards. In doing this to instil in new teachers the Nation's core values of honesty, integrity, creativity and responsible citizenship and to achieve inclusive, equitable, high quality education for all learners. "

iii.	iii. Course Details: as in course specification unless important reason why not								
Pre-	The programme / previous s	The programme / previous semester courses studied.							
requisite/s									
Co-	Links to other courses being	Links to other courses being taught, support coherence in student experience and avoid duplication							
Requisites									
Course		Course Code		Credit Value	3				
Level									

Table of contents

Each manual will include:

- 1. The goal for the subject or learning area
- 2. Course description
- 3. Key contextual factors
- 4. Core and cross cutting issues, including equity and inclusion
- 5. Course Learning outcomes
- 6. Course content
- 7. Teaching and learning strategies
- 8. Course Assessment components
- 9. Reading and reference list
- 10. Handouts, power points and other resources for lessons
- 11. Plans for each lesson in the semester

A. Course information

1. Goal for the Subject or Learning Area

This can be found in subject goal document. It should be a short statement which captures what new teachers will know, understand and be able to do in this subject at the end of their training. This statement should be linked to achieving the vision for the curriculum.

2. Key contextual factors

This can be found in the course specification. It should address what needs are to be considered to reflect the Ghanaian context at local and national levels.it includes potential knowledge and skills gaps and any specific: gender, cultural, linguistic, conceptual, infrastructural issues, for example, that might be barriers to learning forstudent teachers and eventually basic school children? E.g. issues of subject related bias that need addressing. Potential barriers to learning must be explicitly addressed to enable student teachers to achieve the learning outcomes.

3. Course Description

This can be found in the course specification. This brief statement should provide a clear understanding of what studying this course involves, what student teachers will get out of studying this course.

4. Core and transferable skills and cross cutting issues, including equity and inclusion

This can be found in the course specification. Which core and transferable skills or cross cutting issues will be applied or developed through this course? This needs to be made explicit to student teachers. Are there specific issues to do with equity and inclusion which must be addressed so that all student teachers can fully take part? For example, issues related to gender and mathematics or science.

5. Course Learning Outcomes	6. Learning indicators
These are in the course specification. The course	• Measurable/assessable/observable performances that
learning outcomes should specify the expectations of	provide evidence of learning or other changes taking
what the student teachers will know, understand and	place in student teachers' behaviour which
be able to do at the end of the course not what	demonstrate that they have met the learning

student teachers will do **on** the course. They must be appropriate and realistic to the learner's abilities, experience, the identified level of the course and *content*. They must be measurable – allowing assessment of student teacher achievement

outcome/s.

 What the student teacher will need to do to show they have achieved the learning outcome. (in an inclusive lesson, this should vary and be responsive to student teacher's individual characteristic)

7. Course content

In the course specification. This should provide an outline of the academic and / or practical content of the course. It should be clear how this content relates to the achievement of the intended learning outcomes. The name of each unit in the course should be *briefly* set out – the name should make it clear what the unit is about.

Unit	Topic	Sub-topic (lf	Teaching	a	nd lea	rning
		any)		activities	to	achieve	the
				learning o	utcon	ne	

8. Course Assessment Components

In the course specification. The NTS and the NTECF require a move away from largely examination-based assessment to strategies to enable assessment of student teachers' skills, knowledge and understanding against the learning outcomes and through these the against the NTS

- There should be a maximum of 3 assessment components per 3 credit-course; to avoid over loading student and tutors/ lecturers
- The learning outcomes to be assessed by each assessment component should be identified.
- Each assessment component should explicitly reference the NTS or aspects of the NTS it will assess.
- Each assessment component should include:
 - The category or type, for example: written, coursework or practical, teaching, examination, collaborative project or presentation, poster, TLM
 - The type of assessment: of, for and /or as.
 - o An indication of the size of each assessment component (e.g. duration of exams, word limit of written submissions, length of presentations; whether presentations have an individual or group etc.).
 - The weighting of each assessment component should be expressed as a % of total course mark (overall in each course: 60% continuous assessment of course work, 40% examination of course work).
- Each assessment should be manageable and relevant to supporting the student teachers' development.

The guidance on assessing student teachers from the NTS, the NTECF the CWG and the New Four Year B.Ed. should be used.

9. Teaching and learning strategies

Detail in this section should show how the total learning hours will be used to achieve the intended learning outcomes, to provide a guide to the teaching and learning strategies to be used. Each teaching strategy should be selected as most appropriate to achieving the learning outcomes. This may include team teaching or additional tutors. As stated in the B.Ed. experiential learning and interactive teaching approaches are encouraged

10. Required Reading and reference list

One or two compulsory texts which must be made available to the student teachers and a SHORT list of 5 relevant references. These lists should be annotated with the key value of each text. Use APA style of writing.

11. Teaching and Learning Resources

Instructional resources required to support learning during the course e.g.: TLMs, lab and workshop equipment, videos, projectors

Course related professional development for tutors/lecturers

This is not included the course manual but professional development needs must be identified to ensure all tutors / lecturers are prepared to teach the course identify any specific topics or issues which may be challenging for tutors / lecturers.

Year of B.Ed.	3	Semester	1	Place of lesson in semester	1 2 3 4 5 6 7 8 9 10 11 12
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Title of Lesson	Counting, Assessing)		l Relationship	s (Teaching and	I	esson Duration	3 Hours		
Lesson description	Mathemat mathemat Relationsh mathemat covers chi School Ma that is con teachers a	This lesson focuses on developing an understanding of Teaching and Assessing Primary School Mathematics and about how people think about mathematics and how an understanding of mathematics develops. It provides an in-depth knowledge of place value, fractions, Patterns and Relationships and explores student teachers' beliefs about mathematics and philosophies of mathematics implicit in the official mathematics curriculum and current classroom practice. It also covers children's developmental stages, how children learn mathematics with respect to the Basic School Mathematics curriculum, and other psychological factors influencing learning. Another area that is considered essential is developing awareness of equity and diversity issues. Here, student teachers are reminded that this is one of the courses that seek to prepare them to become well- groomed professional teachers in the PRIMARY SCHOOL mathematics specialism							
Previous student teacher			_		_	d learning of mathe			
knowledge, prior learning (assumed)	number a mathemat mathemat This first le	and numera ics during th ics courses. esson introdu	tion systems eir basic and	as well as has esecondary educates to the contact of the contact o	andling dad tion period	d maturation; they a; they have exp as well as their prev	erienced some rious semester's		
Possible barriers to	Different	entry behavi	iours, Socio-c	ultural issues, di		ning needs, miscon			
learning in the lesson			hods of teach nd after the le	-	. Conscious	efforts should be m	nade to address		
Lesson Delivery – chosen	Face-to-	Practical	Work-	Seminars	Independ	e-learning	Practicum		
to support students in achieving the outcomes	face	Activity 🖂	Based Leaning		ent Study	opportunities			
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes. • Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.	 Face-to-face and e-learning opportunities The face-to-face mode will include lecturer/tutor-initiated class discussions, small group in class exploration, group presentations, think-pair-share moments, lecture, etc., The e-learning opportunities will include exploring number games and activities to develop properties of numbers and relationships between and among sets of numbers Independent study would include writing self-assessment and presenting reflective papers or journals. The purpose of the lesson is to; Introduce student teachers to the course manual to enable them develop awareness of what they are expected of in this lesson. develop student teachers' understanding of the nature and importance of mathematics, as well as, how to teach mathematics to Primary School learners. Introduce the student teachers to prepare and model interactive, and innovative ways of teaching mathematics, especially School Mathematics curriculum to Primary Schoollearners. Prepare the student teacher for a future mathematics classroom 						areness of what nathematics, as evative ways of noollearners.		
 Learning Outcome for the lesson, picked and developed from the course specification 	Learning Outcomes Learning Indicators Identify Which cross-cutting issues- core and transferable skills, inclusivity, equity and addressing diversity. How will these be addressed or developed?								
Learning indicators for each learning outcome	and skills o		n ind	Produce well-prepared Inclusion and Equity: by					

WEEK 1 Counting, Patterns and Relationships	Introduction	20 mins	Introduce theUpper Primary Mathematics	Listen attentively to the tutor or lecturer's verbal exposition and to supply responses to Teaching and		
(Teaching and Assessing)			curriculum, and relate it to Teaching and Assessing	Assessing Primary School Mathematics 1		
	Counting and representing numbers in multiple of ways and		Primary School Mathematics 1; (PD Themes 1 & 3) Engage student	Engage in counting activities to		
	indifferent bases	30 mins	teachers in counting and representing numbers in multiple	represent numbers in multiple of ways and in different bases		
	Number patterns and relationships; numerical and non-numerical patterns;		of ways and indifferent bases (PD Themes 1 & 3)			
		30 mins	Assign student teachers to explore Number patterns	Engage in a think-pair-share session to explore Number patterns and relationships; numerical and non-		
	Investigations with numbers; sets of numbers – odd, even,	20 miles	and relationships; numerical and non- numerical patterns;	numerical patterns such as triangular, square, calendar, figurative, etc.		
	composite, prime,	30 mins	(PD Themes 3 & 4) Monitor student			
	Multiples, factors, LCM, HCF, relatively prime numbers, etc.		teachers as they investigations with numbers; sets of	1 1+2 1+2+3 1+2+3+4 Use variety of tools and strategies		
	(e.g. 10 ones = 1 ten 10 tens = 1 hundred, etc.)	30 mins	numbers – odd, even, composite, prime;	to investigations with numbers; sets of numbers – odd, even, composite, prime		
			(PD Theme 1 Engage student teachers in groups	eg use of pairing of objects and rectangular designs, sieve of Eratosthenes, etc.		
			to explore multiples, factors, LCM, HCF, relatively prime numbers, etc. (e.g. 10 ones = 1 ten 10 tens = 1 hundred, etc.) (PD Themes 1 & 3)	Engage in a group discussion to explore the multiples, factors, LCM, HCF, relatively prime numbers, etc. using Cuisenaire rods, counters (through repeated addition), Multibase Arithmetic Blocks. Use investigations to explore relationships among the properties of prime and composite numbers		
				(by using divisibility rules);		
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	Subject Portfolio Summary Assessment Method: reflective paper presentation Student teachers to write a reflective paper on the figurative numbers, using different but concrete based approaches to be presented the following week in groups. To be included their portfolio					
	Related CLOs: 1, 3 and 6 NTS:	ly roflocts t	improve teaching and	loarning		
	 1a) Critically and collectively reflects to improve teaching and learning. 2 b) Has comprehensive knowledge of the official school curriculum, including learning outcomes. 2b) Has comprehensive knowledge of the official school curriculum, including learning outcomes 3l) Listens to learners and gives constructive feedback 					

	[]
	3m) Identifies and remediates learners' difficulties or misconceptions, referring learners whose
	needs lie outside the competency the teacher.
	Advance Preparation
	Student teachers to read on the principles for the selection of objectives, concepts and learning
	activities or experiences, using variety of resources including ICT tools as a preparation for the next
	lesson.
Instructional Resources	Posters; video clips; downloads; cardboards, models,PRIMARY SCHOOL curriculum, etc.
Required Text (core)	Arthur, J., Grainger, T. & Wray, D. (2006). Learning to Teach in the Primary School. Canada: Taylor &
	Francis e-Library. https://www.pdfdrive.com/learning-to-teach-in-the-primary-school-
	d20209294.html
	Confer, C. (2005). Teaching Number Sense. Sausalito: Math Solutions Publications.
	https://www.pdfdrive.com/teaching-number-sense-grade-1-d184198309.html.
	Manitoba Education, Citizenship and Youth (2006). Rethinking classroom assessment with purpose
	in mind: assessment for learning, assessment as learning, assessment of learning.
	https://www.pdfdrive.com/assessment-for-learning-assessment-as-learning-assessment-of-
	learning-d6259529.html.
	Roy, G. J. (2014). Developing Prospective Teachers' Understanding of Addition and Subtraction with
	Whole Numbers. Issues in the Undergraduate Mathematics Preparation of School Teachers, 2.
Additional Reading List	Lakoff, G. & Núñez, R. E. (2000). Where Mathematics comes from. New York: Basic Books.
	Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Tutor notes. Accra: Unimax
	Publishers.
	Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Students activities. Accra:
	Unimax Publishers.
CPD Needs	How to design and/or use some innovative materials and ideas for teaching selected
	conceptsbased on themeaning, aims and course learning outcomes of the mathematics curriculum.
	Standards-based curriculum.
	How to manage content and methods of teaching maths at the same time.
	Understand the various characteristics and uniqueness of Primary School curriculum.
	· · · · · · · · · · · · · · · · · · ·
	How to design tasks for assessment procedures for assessment of, as and for learning.
	Instructional strategies needed to consciously engage student teachers on how to design
	and produce portfolios, journals and STS reports based on Learning Objectives of the
	PRIMARY SCHOOL Mathematics curriculum.

Year of B.Ed.	3 Semester	1 Place of lesson in semester	1 2 3 4 5 6 7 8 9 10 11 12
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Title of Lesson	Place value: (Teachin	g and Asse	ssing)	L	esson Duration	3 Hours			
Lesson description	This lesson focuses on developing an understanding of Teaching and Assessing Primary School Mathematics and about how people think about mathematics and how an understanding of mathematics develops. It provides an overview of philosophies of mathematics and mathematics education and explores student teachers' beliefs about mathematics and philosophies of mathematics implicit in the official mathematics curriculum and current classroom practice. It also covers Teaching and Assessing Place value and outlined in the basic school curriculum. Another area that is								
Previous student teacher knowledge, prior learning (assumed)	Student-teachers ha and are familiar with exposed to number a some mathematics d	considered is developing awareness of equity and diversity issues. Student-teachers have been thought theories in the teaching and learning of mathematics, and are familiar with concepts based on child growth, development, and maturation; they are exposed to number and numeration systems as well as handling dada; they have experienced some mathematics during their basic and secondary education period as well as their previous semester' mathematics courses.							
Possible barriers to learning in the lesson	Different entry beha about mathematics a to address them before	and metho	ds of teaching	g mathematics	_	•			
Lesson Delivery – chosen to support students in achieving the outcomes	Face- to-face Activity	Work- Based Leaning	Seminars	Independen t Study	e-learning opportunities	Practicum			
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes. • Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the	 Face-to-face and e-learning opportunities The face-to-face mode will include lecturer/tutor-initiated class discussions, small group in class exploration, group presentations, think-pair-share moments, lecture, etc., The e-learning opportunities will include exploring number games and activities to develop properties of numbers and relationships between and among sets of numbers Independent study would include writing self-assessment and presenting reflective papers or journals. The purpose of the lesson is to; Introduce student teachers to the course manual to enable them develop awareness of what they are expected of in this lesson. develop student teachers' understanding of the nature and importance of mathematics, as well as, how to teach mathematics to Primary School learners. Introduce the student teachers to prepare and model interactive, and innovative ways of teaching mathematics, especially, School Mathematics curriculum to Primary School learners. Prepare the student teacher for a future mathematics classroom 								
 description. Learning Outcome for the lesson, picked and developed from the 	Learning Outcomes Learning Indicators Identify Which cross-cutting issuescore and transferable skills, inclusivity, equity and addressing diversity. How will these be								
course specification • Learning indicators for each learning outcome	Demonstrate knowledge and skills of observation and reporting on class teaching and wider school activities (in School 1) College & School Produce well-prepared induction schedule and procedures Inclusion and Equity: by suppor student teachers to recognize institutional and personal source barriers to leaning and making conscious efforts to address the Digital literacy: can afford stude teachers the opportunity to developed? Inclusion and Equity: by suppor student teachers to recognize institutional and personal source barriers to leaning and making conscious efforts to address the Digital literacy: can afford stude teachers the opportunity to developed?								

	induction by tutors, school heads, lead mentors and mentors) Carry out action research and classroom enquiry to improve practice in the upper primary classroom and reflect on their teaching practices for continuous professional development (CPD) (NTS 1a, pg.12,NTS 3b, pg.14) Develop and use age appropriate TLMs from locally available materials for upper primary (NTS 3j, pg. 14)	student teachers during observations Show records of specific observations from wider school environment and induction Make oral presentations of knowledge gained to apply to age appropriate TLMs from locally available materials in their groups.		 Managing transitions: by giving orientation to student teachers to have an ability to incorporate/ integrate subjects (Knowledge of the PRIMARY SCHOOL curriculum) to approaches to T and L in SHS between subjects subject. Characteristics and uniqueness of upper primary learners: By encouraging student teachers to develop awareness of how Knowledge and understanding of child growth, development and maturation support young children's learning Communicative skills of student teachers: can be enhanced through the examination, interrogation and presentation to identify the specific literacy and language of the subject/s taught as well as supporting pupils in acquiring these and in their ability to use language for academic purposes 			
Topic	Sub-topic(s)	Stage/ Teaching and learning outcomes depending		_			ng
		Teacher-lead collabo Teacher Activity		orative group work or independent. Student Activity			ent.
	Review	10mins	Review the previous lesson by asking student teachers to present their reflective paper on the importance of mathematics to society; (PD Theme 1)	Participate review the		discussion to us lesson;	
WEEK 2 Place Value (Teaching and Assessing)	Concept of place value; Children's knowledge	40 mins	Introduce the lesson by reviewing children background knowledge on place value and use it to establish the concept of place value. (PD Themes 1 & 3)	enquiry a necessary	nd to asl , e of a dig	unit 5 3 4 3=3 4=4 5=5	

			1	le		
	of and misconceptions			Engage in think-pair-share		
	of place value;	40	France street	strategies to discuss the		
		mins	Engage student	misconceptions of the learners with		
			teachers in a	respect to place value. Eg. If the		
			discussion to	numeral 5 is greater than numeral		
			unravel their	3, why is 3 greater than 5 in the		
	Meaning of and		knowledge of and	number 35 ?		
	relationship between		misconceptions of			
	operations; mental		place value;	Use interactive collaborative group		
	strategies and other		(PD Themes 1 & 3)	work to explore the place value		
	problem solving	40		structure of the base ten number		
	strategies;	mins	Assign student	system, to represent and compare		
			teachers to explore	whole numbers		
			Meaning of and	Use manipulatives and/or		
			relationship	technology related strategies in a		
			between	variety of ways to establish the		
	Dealing with		operations; mental	relationships between addition and		
	operations on numbers		strategies and	subtraction, as well as		
	up to 10,000,000.		other problem	multiplication and division		
			solving strategies;			
		50	(PD Themes 3 & 4)	Explore the appropriate strategies		
		mins		for solving place value up to		
			Engage student	10,000,000 and to discuss their		
			teachers to design	findings in groups of five or six.		
			appropriate	Engage in a think-pair-share session		
			manipulatives for	to outline strategies for teaching		
			dealing with	place value		
			operations on	·		
			numbers up to			
			10,000,000			
			(PD Theme 1			
Lesson assessments –	Subject Portfolio		1 -			
evaluation of learning:	_			on how to establish the relationship		
of, for and as learning				next lesson period. This will also serve as		
within the lesson	advance preparation for the		on (Assessment as learni	ng)		
	Related CLOs: 1, 3, 5					
	NTS:	knowloda	a of the official school si	urriculum, including learning outcomes.		
				inclusion in the mathematics classroom		
	(knowledge)					
	3k) Integrates a variety	of assessm	nent modes into teaching	g to support learning.		
	1. Note: The assessment p	rocedures s	hould make room for dif	ferentiation - gender, equity, SEN, and		
	inclusivity.					
Instructional Resources	Posters; video clips; dowr	nloads; mo	odels, etc.			
Required Text (core)	Arthur, J., Grainger, T. &	Wray, D	. (2006). Learning to	Teach in the Primary School. Canada:		
	Taylor & Francis e-Li	ibrary. <u>h</u>	ttps://www.pdfdrive.c	com/learning-to-teach-in-the-primary-		
	school-d20209294.html					
	Confer, C. (2005). Tea	aching N	umber Sense. Sausa	alito: Math Solutions Publications.		
	https://www.pdfdrive.co	m/teachir	ng-number-sense-grad	e-1-d184198309.html.		
	Manitoba Education, Cit	izenship	and Youth (2006). Re	ethinking classroom assessment with		
	purpose in mind: assess	ment for	learning, assessment	as learning, assessment of learning.		
	https://www.pdfdrive.co	m/assessr	ment-for-learning-asse	essment-as-learning-assessment-of-		
	learning-d6259529.html.					
	Roy, G. J. (2014). Develop	oing Prosp	ective Teachers' Unde	rstanding of Addition and Subtraction		
	with Whole Numbers. I	ssues in	the Undergraduate	Mathematics Preparation of School		
	Teachers, 2.					
-						

Additional Reading List	Lakoff, G. & Núñez, R. E. (2000). Where Mathematics comes from. New York: Basic Books. Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Tutor notes. Accra: Unimax Publishers. Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Students activities. Accra: Unimax Publishers.
CPD Needs	 How to design and/or use some innovative materials and ideas for teaching selected concepts based on theories of learning in Primary School mathematics. How to manage transition of home to school. Understand the various characteristics and uniqueness of Primary School learners. How to design tasks for assessment procedures for assessment of, as and for learning. Instructional strategies needed to consciously engage student teachers on how to design and produce portfolios, journals and STS reports.

Year of B.Ed.	3	Semester	1	Place of lesson in semester	12 3 456789101112
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							_		
Title of Lesson		concepts (Tea				Lesson Duration	3 Hours		
Lesson description Previous student	think about overview of teachers' mathematic equivalent factors informations in the considered over the co	This lesson focuses on developing an understanding offractional concepts and about how people think about mathematics and how an understanding of mathematics develops. It provides an overview of philosophies of mathematics and mathematics education and explores student teachers' beliefs about mathematics and philosophies of mathematics implicit in the official mathematics curriculum and current classroom practice. It also covers common fractions, equivalent, decimal numbers, and percent and how they are related, and other psychological factors influencing learning of fractions in the upper primary school. Another area that is considered is developing awareness of equity and diversity issues. Student-teachers have been thought theories in the teaching and learning of							
teacher knowledge,	mathema	atics, and are	familiar	with concep	ots based or	child growth, deve	lopment, and		
prior learning			-			ntion systems as we	_		
(assumed)						uring their basic ar	nd secondary		
Darethia hamianaka		•				thematics courses.			
Possible barriers to				, Socio-cul			ning needs,		
learning in the lesson		-				teaching mathemati and after the lesson.			
Lesson Delivery –	Face-		Vork-	Seminars	Independe		Practicum		
chosen to support	to-face		ased		Study	opportunities			
students in achieving		🗵 L	<u>e</u> aning						
the outcomes									
Lesson Delivery – main									
mode of delivery	_	ace and e-lea							
chosen to support						nitiated class discussi			
student teachers in	0.00	-	oration,	group prese	ntations, thi	nk-pair-share mome	nts, lecture,		
achieving the learning	1								
outcomes.	deve	lop properties				number games and a etween and among s			
				nclude writii	ng self-asses	sment and presentir	g reflective		
Purpose for the		se of the lessor							
lesson, what you					nanual to ena	ble them develop awa	reness of what		
want the students		are expected of			6.1				
to achieve, serves				_		and importance of m	athematics, as		
as basis for the		is, how to teach				rners. interactive, and inno	vative wave of		
learning outcomes.						urriculum to Primary So			
An expanded		re the student							
version of the									
description.	Loornin	Outcomes	Lagran	ing Indiant-	uro lala	atifu Mhich anges	utting issues		
Learning Outcome for the lesson	Learning	Outcomes	Learr	ning Indicato	core	ntify Which cross-co e and transfer	_		
for the lesson, picked and						e and transfer usivity, equity and	•		
developed from the						ersity. How will			
course specification						ressed or developed			
Learning indicators	Demonst	rate	• P	roduce well-		nclusion and Equity: by			
for each learning		ge and skills of		repared indu		tudent teachers to rec			
outcome	observati	=		chedule and	i	nstitutional and persor	nal sources of		
	reporting		р	rocedures		parriers to leaning and			
	-	and wider				conscious efforts to add	dress them.		

	school activities /:=		• •	rovide records of	• (Characteristics and uniqueness of
	school activities (in School 1) (College & School induction by tutors, school heads, lead mentors and mentor and mentor and mentor and mentor subject knowledge, pedagogical knowledge teach the Basic Schourriculum in a brobalanced, relevant creative manner (N 2c, pg. 13, 3e & 3g, 14) [NTECF P1 (3), pg. 13, and specification of the basic school curriculum and their associated expected learning outcomes	e edge to ool ad, and TS pg. Dg.	P P O tt lead to the transfer of the transfer	rovide records of roup work activities nd/or cooperative earning for student eachers during bservations rovide a write-up of the developing eacher's self-wareness, beliefs, and values of eaching and eaching and eaching philosophy) Make oral resentations of nowledge gained uring induction and bservation by tudent teachers in neir groups.	k cc r l	characteristics and uniqueness of apper primary learners: By encouraging student teachers to develop awareness of how anowledge and understanding of shild growth, development and naturation support young children's earning Communicative skills of student teachers: can be enhanced through the examination, interrogation and presentation to identify the specific literacy and language of the subject/s taught as well as supporting pupils in acquiring these and in their ability to use language for academic purposes Diversity: Support student teachers with the opportunities to explore diversity within the class/subject and potential barriers to inclusion (including personal bias, stereotypes and institutional discrimination).
	(NTS, 2a).					
Topic	Sub-topic(s)	Stag		_	_	to activities to achieve learning on delivery mode selected.
			_	•	_	tive group work or independent.
				Teacher Activity		Student Activity
	Review			Review the previo	ous	Participate in the discussion to
		10m	ins	lesson by asking student teachers		review the previous lesson;
				questions on basi	С	$\frac{1}{6}$ (One-sixth)
				fractional concept		6 (0110 5),(11)
				(PD Theme 1)		Chudont to share surely at
	Meaning of fractions;			Engage student teachers in a		Student-teachers explore the meaning and interpretations of
	machons,			discussion toward	ls	fractions through small group
	Building an	20	mins	building an		activities and presentations. Eg.
WEEK 3	understanding of			understanding of common fractions		Fraction as equal shares or
Fraction concepts	common fractions,			using variety of TI		sized portions (Van de Walle, 2007) and represented as
(Teaching and				(PD Themes 1 & 3		• part of a unit or whole,
Assessing)						• a sport on the number line,
						• part of a group, or
		40	mins			comparing two sets, and a ration of two integers,
						a ration of two integers,

Instructional Resources	Posters; video clips; downloads; models, etc. Canada: Taylor & Francis e-Library. https://www.pdfdrive.com/learning-to-te: in-the-primary-school-d20209294.html Confer, C. (2005). Teaching Number Sense. Sausalito: Math Solutions Publication https://www.pdfdrive.com/teaching-number-sense-grade-1-d184198309.htm Manitoba Education, Citizenship and Youth (2006). Rethinking classroom assessment in mind: assessment for learning, assessment as learn					
evaluation of learning: of, for and as learning within the lesson	Assign student teachers to develop equivalent fractions from locally available resources to be shared among colleagues in their small group presentation. Related CLOs: 1, 2					
	Application of fractions in re life situations.		Group student teachers to brainstorm and outline real life situations.	and percent. Use knowledge equivalent fractions to compare and order fraction $\frac{1}{2} \equiv \frac{2}{4}$ Engage in a think-pair-share session to outline the strategies and materials (TL suitable for teaching fractio They list real life activities the contribute to the		
	Comparing an ordering fractions. Decimal fractiand percent	30 mins	discussion to develop and order common fractions Engage student teachers in a discussion based on decimal fractions and percent	develop the concept of equivalent fractions using models and multi-purpose chart (multiplication table), fractional boards, sets, etc. Use area model or any simil manipulative to explore the relationships among common fractions, decimal fractions,		
	Finding equivalent fractions;	40 min	teachers in groups to explore equivalent fractions (PD Themes 3 & 4) Engage student teachers in a	using variety of manipulative such as paper folding, Cuisenaire rods (see CPD needs), linoleum, etc to represent fractions as ration numbers, equivalent, and/o operator, Engage student-teachers to		

	T						
Additional Reading List	Lakoff, G. & Núñez, R. E. (2000). Where Mathematics comes from. New York: Basic Books.						
	Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Tutor notes. Accra:						
	Unimax Publishers.						
	Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Students						
	activities.Accra: Unimax Publishers.						
CPD Needs	How to design and/or use some innovative materials and ideas for teaching						
	selected concepts based on theories of learning in Primary School mathematics.						
	How to manage transition of home to school.						
	Understand the various characteristics and uniqueness of Primary School						
	learners.						
	 How to design tasks for assessment procedures for assessment of, as and for 						
	learning.						
	Instructional strategies needed to consciously engage student teachers on how						
	to design and produce portfolios, journals and STS reports.						
	Cuisenaire Rods						
	White =1,						
	Red = 2,						
	Lime/Light Green =3						
	Purple = 4						
	Yellow = 5						
	Dark Green =6						
	Black = 7						
	Brown = 8						
	Blue = 9						
	Orange = 10						
	Orange - 10						

Year of B.Ed. 3	Semester	1	Place of lesson in semester	1 2 3 4 5 6 7 8 9 10 11 12
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Title of Lesson	Operatio	ns on fraction	ns: (Teacl	ning and Asse	ssment)	Lesson Duration	3 Hours	
	Орегино		13. (1000)	mig arra 7.55c		2000011 2 41 411011	3110413	
Previous student teacher knowledge, prior learning (assumed)	This lesson focuses on developing an understanding of Operations on fractions: (Teaching and Assessment) with respect to operations on fraction within the basic school curriculum. It provides an overview of philosophies of mathematics and mathematics education and explores student teachers' beliefs about fractions in real life implicit in the official mathematics curriculum and current classroom practice. It also areas such as mental strategies for adding, subtracting, multiplying and dividing by fractions; Basic applications of fractions to real life. Another area that is considered is developing awareness of equity and diversity issues. Student-teachers have been thought theories in the teaching and learning of mathematics, in relation to common concepts of fractions. They are exposed to basic concepts of sharing; they have experienced some mathematics during their basic and secondary education period and the previous semester of the B. Ed. Programme.							
Possible barriers to		•		-	-		•	
learning in the lesson		-				aching mathematic	cs. Conscious	
Lesson Delivery –	Face-		e to addi Work-	Seminars	Independen	d after the lesson. e-learning	Practicum	
chosen to support	to-face		Based	Jenninars	t Study	opportunities		
students in achieving			Leaning					
the outcomes								
Lesson Delivery - main	Face-to-f	ace and e-le	arning op	portunities	ı			
mode of delivery	_							
chosen to support	grou	p in class exp	loration,	group presen	tations, think	-pair-share momer	nts, lecture,	
student teachers in	etc.,							
achieving the learning	• The	e-learning op	portuniti	es will include	e exploring nu	mber games and a	ctivities to	
outcomes.	deve	lop propertie	es of num	bers and rela	tionships betv	veen and among so	ets of	
	num	bers						
	• Inde	pendent stud	dy would	include writin	g self-assessn	nent and presentin	g reflective	
	раре	ers or journal	s.					
 Purpose for the 		se of the lesso						
lesson, what you					anual to enable	them develop awa	reness of what	
want the students		are expected c						
to achieve, serves		•		_	r the nature a ry School learne	nd importance of m	atnematics, as	
as basis for the						teractive, and inno	vative ways of	
learning outcomes.						iculum to Primary Sc		
An expanded		-						
version of the	Prepare the student teacher for a future mathematics classroom							
description.		0 .						
Learning Outcome	Learning Outcomes Learning Indicators Identify Which cross-cutting							
for the lesson,	issues- core and transferable							
picked and								
dougland for see H						skills, inclusivity,	equity and	
developed from the						skills, inclusivity, addressing divers	equity and ity. How will	
course specification						skills, inclusivity, addressing divers these be add	equity and	
course specificationLearning indicators	a Dom:	onetrate		lootify and		skills, inclusivity, addressing divers these be add developed?	equity and ity. How will dressed or	
course specificationLearning indicators for each learning		onstrate		lentify and ex	plain the	skills, inclusivity, addressing divers these be addeveloped? • Assessment lit	equity and ity. How will dressed or eracy:	
course specificationLearning indicators	know	ledge and	V	arious forms o	plain the of fractions	skills, inclusivity, addressing divers these be add developed? • Assessment lit through mode	equity and ity. How will dressed or eracy:	
course specificationLearning indicators for each learning	know unde		v: a	-	plain the of fractions basic	skills, inclusivity, addressing divers these be addeveloped? • Assessment lit	equity and ity. How will dressed or eracy: Illing the use for, as, and	

	Basic applications of fractions to real life.	60 mins	Engage student teachers in a discussion to outline the various forms of assessment tool – observation guide, questionnaire, interview protocol, tests (PD Themes 1 & 3) Assign student teachers to explore various test by working at each of the following steps: purpose,	 assessment of learning (AoL) and assessment as learning (AaL) as well as syllabus guidelines for classroom assessment; Discuss (supported with video clips where applicable) the various forms of assessment tool – 		
			format, test blue-print, writing well-defined questions one after the other with answers. (PD Themes 3 & 4) Monitor student teachers to evaluate some teacher made tests to see if they meet the following five criteria of a good test (PD Theme 1	observation guide, questionnaire, interview protocol, tests (e.g. BECE, performance assessment.) - one-on-one tests (viz. multiple choice, constructed response), group tests, focus group interview protocol, etc.) as well as how they are administered. Design a test by working at each of the following steps: purpose, format, test blue-print, writing well-defined questions one after the other with answers. Use interactive and collaborative group work to develop strategies for adding and subtracting fractions. Student-teachers are engaged in using manipulatives and other models to develop strategies for multiplication and division of fractions.		
				Evaluate some teacher made tests to see if they meet the following five criteria of a good test: clarity, validity, practicality, efficiency and fairness		
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	Subject Project Student teachers are assigned a project on place value, equivalent fractions, decimal number and their applications. The various forms of assessment procedures and practices and its responsiveness to equity and inclusivity and to produce reports (in groups)					

	 review past BECE mathematics questions for clarity, correctness, and
	completeness, as well as, write assessment tasks based on
	Related CLOs: 1, 4
	NTS:
	2f) Demonstrate value as well as respect for equity and inclusion in the
	mathematics classroom (knowledge)
	3j) Produces and uses a variety of teaching and learning resources including ICT, to
	enhance learning
	N/B: To be submitted in the 7 th week of the semester.
Instructional Resources	Posters; video clips; downloads; models, etc.
mstructional resources	Tosters, video crips, downloads, moders, etc.
Required Text (core)	Arthur, J., Grainger, T. & Wray, D. (2006). Learning to Teach in the Primary School. Canada: Taylor
	& Francis e-Library. https://www.pdfdrive.com/learning-to-teach-in-the-primary-school-
	<u>d20209294.html</u>
	Confer, C. (2005). Teaching Number Sense. Sausalito: Math Solutions Publications.
	https://www.pdfdrive.com/teaching-number-sense-grade-1-d184198309.html.
	Manitoba Education, Citizenship and Youth (2006). Rethinking classroom assessment with purpose
	in mind: assessment for learning, assessment as learning, assessment of learning.
	https://www.pdfdrive.com/assessment-for-learning-assessment-as-learning-assessment-of-
	learning-d6259529.html.
	Roy, G. J. (2014). Developing Prospective Teachers' Understanding of Addition and Subtraction
	with Whole Numbers. Issues in the Undergraduate Mathematics Preparation of School
	Teachers, 2.
Additional Reading List	Lakoff, G. & Núñez, R. E. (2000). Where Mathematics comes from. New York: Basic Books.
7	Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Tutor notes. Accra: Unimax
	Publishers.
	Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Students activities. Accra:
	Unimax Publishers.
CPD Needs	How to design and/or use some innovative materials and ideas for teaching selected
Ci Directus	concepts based on Classroom assessment in mathematics in PRIMARY SCHOOL1-3.
	·
	How to manage transition of home to school. He deprived the available plants in the product of Private Calculations and the second of Private Calculations and the secon
	Understand the various characteristics and uniqueness of Primary School learners.
	How to design tasks for assessment procedures for assessment of, as and for learning.
	Instructional strategies needed to consciously engage student teachers on how to design
	and produce portfolios, journals and STS reports.

Year of B.Ed.	3	Semester	1	Place of lesson in semester	1234 5 6789101112
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Title of Lesson				nology across Pri	mary school	Lesson Duration	3 Hours			
Lancau decemention		cy: (Teaching			- dia f0 4: 1		ha alamu a anasa			
Lesson description						Lessons and use of tec an understanding of n				
						hilosophies of mather				
	-									
		mathematics education and explores student teachers' beliefs about mathematics and philosophies of mathematics implicit in the official mathematics curriculum and current classroom								
						cross Primary school r				
						ng learning. Another a	•			
				eness of equity a						
Previous student teacher	Studen	t-teachers	have b	een thought	theories in	the teaching and	l learning of			
knowledge, prior learning	mather	matics, and a	are fami	iliar with conce	pts based on	child growth, deve	elopment, and			
(assumed)					-	ition systems as we	-			
		-	-			uring their basic a	_			
		ion period.	скрепсі	icea some ma	circinatios de	aring their basic a	na secondary			
Possible barriers to	_	nt entry	hohavio	ours, Socio-cu	ultural issue	es, different lear	ning needs,			
learning in the lesson		•				teaching mathemat	•			
		=				and after the lesson				
Lesson Delivery		Practical		Seminars			Practicum			
Lesson Delivery –	Face-		Work-	Seminars	Independe	_	Practicum			
chosen to support	to-	Activity	Based		Study	opportunities				
students in achieving	face		Leanin	g ∟						
the outcomes										
	1									
Lesson Delivery – main		face and a lo								
mode of delivery chosen	Face-to-	-face and e-le			r/tutor initiato	ad alace dispussions, so	nall group in			
mode of delivery chosen to support student	Face-to-	e face-to-face	mode w	ill include lecture		ed class discussions, sn				
mode of delivery chosen to support student teachers in achieving the	Face-to- ● The class	e face-to-face ss exploration	mode wi	ill include lecture presentations, thi	nk-pair-share r	moments, lecture, etc.	.,			
mode of delivery chosen to support student	• The	e face-to-face ss exploration e e-learning o	mode w , group p pportuni	ill include lecture presentations, thi ties will include e	nk-pair-share r xploring numb	moments, lecture, etc. er games and activitie	.,			
mode of delivery chosen to support student teachers in achieving the	• The class	e face-to-face ss exploration e e-learning op operties of nui	mode win, group p pportuni mbers an	ill include lecture presentations, thi ties will include e nd relationships b	nk-pair-share r xploring numb etween and an	moments, lecture, etc. er games and activitie nong sets of numbers	es to develop			
mode of delivery chosen to support student teachers in achieving the	 Face-to- The class The pro Ind 	e face-to-face ss exploration e e-learning op operties of nui lependent stu	mode win, group p pportuni mbers an	ill include lecture presentations, thi ties will include e nd relationships b	nk-pair-share r xploring numb etween and an	moments, lecture, etc. er games and activitie	es to develop			
mode of delivery chosen to support student teachers in achieving the learning outcomes.	Face-to- The class The pro Ind	e face-to-face ss exploration e e-learning op operties of nui lependent stu irnals.	mode wing group portunited and models and models and mould models and model	ill include lecture presentations, thi ties will include e id relationships b I include writing s	nk-pair-share r xploring numb etween and an	moments, lecture, etc. er games and activitie nong sets of numbers	es to develop			
mode of delivery chosen to support student teachers in achieving the learning outcomes. • Purpose for the	Face-to- The class The pro Ind jou	e face-to-face ss exploration e e-learning operties of nui lependent stu irnals. pose of the le	mode wing group gr	ill include lecture presentations, thi ties will include end relationships but include writing so	nk-pair-share r xploring numb etween and an self-assessmen	moments, lecture, etc er games and activitie mong sets of numbers t and presenting refle	es to develop ctive papers or			
mode of delivery chosen to support student teachers in achieving the learning outcomes.	Face-to- The class The pro Ind jou The pur Intr	e face-to-face ss exploration e e-learning operties of nui lependent stu irnals. pose of the le	mode w n, group p pportuni mbers an dy would sson is to	ill include lecture presentations, thi ties will include e id relationships but include writing so; rs to the course i	nk-pair-share r xploring numb etween and an self-assessmen	moments, lecture, etc. er games and activitie nong sets of numbers	es to develop ctive papers or			
mode of delivery chosen to support student teachers in achieving the learning outcomes. • Purpose for the lesson, what you	Face-to- The class The pro Ind jou The pur Intre the	e face-to-face ss exploration e e-learning operties of nu- lependent stu- irnals. pose of the le roduce studen y are expected	mode win, group proportunity mbers and dy would sson is to teached of in the	ill include lecture presentations, thi ties will include end relationships but include writing so; rs to the course it is lesson.	nk-pair-share r xploring numb etween and an self-assessmen manual to enal	moments, lecture, etc er games and activitie mong sets of numbers t and presenting refle	es to develop ctive papers or areness of what			
mode of delivery chosen to support student teachers in achieving the learning outcomes. • Purpose for the lesson, what you want the students to	Face-to- The class The pro Ind jou The pur Intre the dev	e face-to-face ss exploration e e-learning operties of nui lependent stu irnals. pose of the le roduce studen y are expected	mode with group proportion in the group proportion in	ill include lecture presentations, thi ties will include end relationships but include writing so; rs to the course it is lesson.	nk-pair-share r exploring numb etween and an self-assessmen manual to enal	moments, lecture, etc. er games and activitie mong sets of numbers t and presenting refle ble them develop awa and importance of n	es to develop ctive papers or areness of what			
mode of delivery chosen to support student teachers in achieving the learning outcomes. • Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An	Face-to- The class The pro Ind jou The pur Intr	e face-to-face ss exploration e e-learning of perties of nui lependent stu irnals. pose of the le roduce studen y are expecter relop student Il as, how to te	mode wing group gr	ill include lecture oresentations, thi ties will include e id relationships by include writing so; or to the course is lesson.	nk-pair-share r exploring numb etween and an self-assessmen manual to enal of the nature ary School lear	moments, lecture, etc. er games and activitie mong sets of numbers t and presenting refle ble them develop awa and importance of n	es to develop ctive papers or areness of what mathematics, as			
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	Demonstrate known and understandlikey features of the school curriculum and specifically for mathematics cur and their associal expected learnin outcomes (NTS, 2). Demonstrate skill preparing and writing a per teaching philosophy states (NTS, 1f).	ng of the he basic n (BSC); occusing on riculum ted g 2a).	•	teachers during observations Report on small group discussions with mentors and peers on the key features of the official basic school curriculum List identified key features in the BSC. Provide a write-up of the developing teacher's self-awareness, beliefs, and values of teaching and learning (personal teaching philosophy) Make oral presentations of knowledge gained during induction and observation by student	 Communication skills: through critiquing and presentations Personal development: Through developing and presentation of records Social and communication skills: consciously develop presentation skills during classroom instructions to support student teachers to develop mathematical language
				teachers in their groups.	
Topic	Sub-topic(s)	Stage/ Time			to activities to achieve learning n delivery mode selected. Teacher-
				lead collaborative group	work or independent.
				Teacher Activity	Student Activity
	Review	10mins		Review the previous lesson by asking student teachers relevant questions on the need for planning micro lessons. (PD Theme 1)	Participate in the discussion on the need for classroom assessment in mathematics during micro planning and teaching.
	Importance of lesson planning	50 mins		Introduce the lesson on verbal exposition and discussion on purposes of different forms of assessment in mathematics learning in PRIMARY SCHOOL1-3; (PD Themes 1 & 3)	initiate verbal exposition and discussions on importance of lesson planning, micro lesson planning formats and technology use in teaching mathematics at the Primary School level.
WEEK 5 Micro Lessons and use of technology across Primary school numeracy 1	Micro lesson planning formats Design of micro lessons	120 mins		Micro lesson planning formats Engage student teachers in planning and carrying out micro teaching with peers. Guide student teachers in planning micro lessons based on using mathematical learning pedagogy	Engage in small group preparation using variety of locally available TLMs (observing and/or watching video clips} on teaching mathematics in the PrimarySchool and doing a critic based on using verbal exposition and discussions on lesson planning, micro lesson planning formats and technology use in teaching mathematics across upper primary

			I a
		and resources to	Read teaching scenarios
		critique a	(and/or watching video clips)
		mathematics lesson	on teaching numeracy in the
		(PD Themes 1 & 3)	upper primary and doing a
			critic based on using
		Engage students in	mathematical learning theory
		post-lesson	
		discussions using	Engage in post-lesson
		prepared guidelines	discussion with colleagues to
		for micro teaching.	establish good practices in
			teaching mathematics in the
			Primary School.
Lesson assessments –	Subject Portfolio		
evaluation of learning: of,	_	eachers to plan, design, and prepare	
for and as learning within	teach selected co	oncepts in Primary Schoolmathemat	ics using locally available and/or IT
the lesson	resources		
			of teaching mathematics, including,
	_		phasis on multiple teaching strategies
		uity and inclusivity.	
	Related CLOs: 1, 3 NTS:	3, 4	
		nprehensive knowledge of the officia	al school curriculum including
	learning out		in school curricularii, including
	-		school curriculum, including learning
	outcomes	, 3 , 3,	, 3
	3m) Identifies an	d remediates learners' difficulties or	misconceptions, referring learners
	whose needs lie outside t	he competency of the to	eacher.
Instructional Resources	Posters; video clips; dov	wnloads; models, etc.	
Required Text (core)	Arthur, J., Grainger, T. & V	Wray, D. (2006), Learning to Teach i	n the Primary School. Canada: Taylor
	& Francis e-Library		ning-to-teach-in-the-primary-school-
	d20209294.html		
	Confer, C. (2005). Te	eaching Number Sense. Sausali	to: Math Solutions Publications.
		m/teaching-number-sense-grade-1-o	
			g classroom assessment with purpose
		_	earning, assessment of learning.
		m/assessment-for-learning-assessmo	ent-as-learning-assessment-of-
	learning-d6259529.html.	uning Prospective Teachers' Unders	tanding of Addition and Subtraction
			athematics Preparation of School
	Teachers, 2.	issues in the ondergradate in	attrematics Preparation of School
	•	E. (2000). Where Mathematics co.	mes from. New York: Basic Books.
_		Mathematics for teacher training	= -
	Unimax Publish	- · · · · · · · · · · · · · · · · · · ·	
		Mathematics for teacher training	a in Ghana: Students
	activities.Accra: Unimax	- · · · · · · · · · · · · · · · · · · ·	g ea eta aente
CPD Needs			
			and ideas for teaching selected
	How to design ar	nd/or use some innovative materials	
	How to design ar concepts based of		
	 How to design are concepts based of the How to manage 	nd/or use some innovative materials on Classroom assessment in mathem	natics in PRIMARY SCHOOL1-3.
	 How to design are concepts based of the how to manage of the how to design are concepts. 	nd/or use some innovative materials on Classroom assessment in mathen transition of home to school.	natics in PRIMARY SCHOOL1-3.
	 How to design are concepts based of the work of managers. Understand the work of the wor	nd/or use some innovative materials on Classroom assessment in mathem transition of home to school. various characteristics and uniquene isks for assessment procedures for a	natics in PRIMARY SCHOOL1-3.

Year of B.Ed.

Title of Lesson	Diagrapia		-4:			occon Duration	3 Hours
little of Lesson		and remedia				esson Duration	3 Hours
			a monitorii	ng progress: (Te	eacning		
Lancar de contrattan	and Asses				11 (5)		<u> </u>
Lesson description						nosis and remed	
						eaching and Asse	
		_		-	-	s an overview of	
					-	tudent teachers'	
					•	cit in the official r	
				-		icro Lessons and	
	technolog	gy across Prir	nary schoo	I numeracy and	l associated	theories, and ot	her
	psycholog	gical factors i	nfluencing	learning. Anoth	ner area tha	it is considered is	developing
		s of equity a					
Previous student teacher			_		_	nd learning of matl	
knowledge, prior learning						ent, and maturat	
(assumed)						ng dada; they have	e experienced
				c and secondary			
Possible barriers to		•				ng needs, misconc	•
learning in the lesson				-	ics. Conscic	ous efforts should	be made to
Lesson Delivery – chosen	Face-to-	em before, du	iring and aπ Work-	Seminars	Independ	e-learning	Practicum
to support students in	face		Based	Seminars	ent Study	opportunities	Practicum
achieving the outcomes	lace	K 7	Leaning				
demoting the outcomes							
Lesson Delivery – main	Face-to-fa	ce and e-leari	ning opporti	ınities			1
mode of delivery chosen	-				r-initiated cl	ass discussions, sm	nall group in
to support student	class	exploration, g	roup presen	tations, think-pa	ir-share mor	nents, lecture, etc.	,
teachers in achieving the			ortunities wi	II include explori	ng number g	games and activitie	s to develop
learning outcomes							•
learning outcomes.	prope	erties of numb	ers and rela	tionships betwee	en and amon	g sets of numbers	•
icarining outcomes.							·
	• Indep or jou	endent study Irnals.	would inclu			g sets of numbers	·
Purpose for the	Indep or jou The purpo	endent study irnals. se of the lesso	would inclu on is to;	de writing self-as	sessment ar	g sets of numbers nd presenting reflec	ctive papers
Purpose for the lesson, what you	Indep or jouThe purpoIntrod	endent study urnals. se of the lesso luce student to	would inclu on is to; eachers to t	de writing self-as	sessment ar	g sets of numbers	ctive papers
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	Demonstrate competencies in using differential instructional strategies, with a focus on a thema approach and wh promotes learne centred to cater the needs of all learners, includir those with SEN (i 3f, pg. 14) Demonstrate knowledge and understanding of key features of the basic school curriculum (BSC) specifically focus on mathematics curriculum and the associated expecifically focus on mathematics curricu	ted a atic hich or- for ng NTS f the he ; and sing heir cted es	•	Show obser school induction Report discussions the Provide development of t	t on small group ssions with mentors eers on the key res of the official basic curriculum lentified key features	Soo skil ob: skil ins stu thi: Re: de: lea lea Col thr	espect and diversity: esigning lesson for diverse arners with different arning styles cial and communication els: consciously develop servation and presentation els during classroom tructions to support dent teachers to transfer es to STS spect and diversity: esigning lesson for diverse erners with different erning styles mmunication skills: espect and essentations
	philosophy statement (NTS,	1f)					
Topic	Sub-topic(s)	Stage Time			outcomes dependin	g on c	vities to achieve learning delivery mode selected. oup work or independent.
					Teacher Activity		Student Activity
	Review	10mi	ins		Review the previous le asking student teache relevant questions on planning (PD Theme 1)	rs	Participate in the discussion on micro lesson planning
	Introduction	20 m	ins		Introduce the lesson of exposition and discuss micro lessons (PD Themes 1 &3)		Discusses feedback of previous micro lesson for feedback and application.
WEEK 6 Diagnosis and remediation; assessment resources/records, and monitoring progress:	Misconception diagnosis,	50 m	ins		Engage student teached discussion to outline to various forms of lesso planning in mathemate (PD Themes 1 & 3)	he ns :ics	Design tools to diagnose misconceptions and designing/implementing
(Teaching and Assessing)	Classroom assessment resources and records	60 m	ins		Assign student teache groups to prepare less plans, discuss and mormicro teaching in the (PD Themes 3 & 4)	son del	remediation from the discussion of the various forms of lessons planning in mathematics

	1.	1	1	T
	Interpreting			Identify resources
	data/reports on	40 mins		that should be
	performance and		Monitor student teachers	available in the
	providing		teaching skills	classroom for
	feedback		(PD Theme 1	effective assessment
	. coalous.			in specialism -
				including examples of
	Frankrations			- '
	Evaluating			standardised tests
	performance and			(NEA), teacher made
	monitoring			tests, record sheets,
	Progress,			cumulative records
				forms, report forms,
				etc.,
				Study and complete
				student's cumulative
				record form
				Tecord Torrir
				Analyse learners'
				performance (or
				assessment data) to
				provide feedback to
				stakeholders –
				students, colleagues
				and parents, PTA
				and role playing a
				School Performance
				Appraisal Meeting
				(SPAM)
Lesson assessments –	Subject Portfolio		<u> </u>	(SI 7 (IVI)
evaluation of learning: of,	Assign stude	ent teachers to cri	tique the new lesson format and	duse it to prepare a
evaluation of learning: of, for and as learning within			tique the new lesson format and teaching selected mathematics t	
for and as learning within the lesson	sample lesso	on plan meant for	tique the new lesson format and teaching selected mathematics t um through small group activity	opics in the PRIMARY
for and as learning within	sample lesso	on plan meant for thematics curricul	teaching selected mathematics t	opics in the PRIMARY
for and as learning within	sample lesso SCHOOL mat	on plan meant for thematics curricul	teaching selected mathematics t	opics in the PRIMARY
for and as learning within	sample lesso SCHOOL mat Related CLOs NTS:	on plan meant for thematics curricul s: 1, 2, 3	teaching selected mathematics t	opics in the PRIMARY for peer review
for and as learning within	sample lesso SCHOOL mat Related CLOs NTS: 2 b) Has	on plan meant for thematics curricul s: 1, 2, 3	teaching selected mathematics t um through small group activity	opics in the PRIMARY for peer review
for and as learning within	sample lesso SCHOOL mat Related CLOs NTS: 2 b) Has learning	on plan meant for thematics curricul s: 1, 2, 3 s comprehensive g outcomes.	teaching selected mathematics t um through small group activity	opics in the PRIMARY for peer review curriculum, including
for and as learning within	sample lesso SCHOOL mat Related CLOs NTS: 2 b) Has learning 2b) Has learning	on plan meant for thematics curricul s: 1, 2, 3 s comprehensive g outcomes. comprehensive k g outcomes	teaching selected mathematics t um through small group activity knowledge of the official school convoledge	opics in the PRIMARY for peer review curriculum, including
for and as learning within	sample lesso SCHOOL mat Related CLOS NTS: 2 b) Has learning 2b) Has learning 3m) Identifie	on plan meant for thematics curricul s: 1, 2, 3 s comprehensive g outcomes. comprehensive k g outcomes es and remediate	teaching selected mathematics t um through small group activity knowledge of the official school co nowledge of the official school co s learners' difficulties or misconce	opics in the PRIMARY for peer review curriculum, including
for and as learning within	sample lesso SCHOOL mat Related CLOs NTS: 2 b) Has learning 2b) Has learning 3m) Identifie whose needs lie outs	on plan meant for thematics curricul s: 1, 2, 3 s comprehensive g outcomes. comprehensive k g outcomes es and remediate ide the competer	teaching selected mathematics to um through small group activity knowledge of the official school conowledge of the official school constant in the selection of the teacher.	opics in the PRIMARY for peer review curriculum, including urriculum, including eptions, referring learners
for and as learning within	sample lesso SCHOOL mat Related CLOs NTS: 2 b) Has learning 2b) Has learning 3m) Identifi whose needs lie outs Note: The assessmen	on plan meant for thematics curricul s: 1, 2, 3 s comprehensive g outcomes. comprehensive k g outcomes es and remediate ide the competer	teaching selected mathematics t um through small group activity knowledge of the official school co nowledge of the official school co s learners' difficulties or misconce	opics in the PRIMARY for peer review curriculum, including urriculum, including eptions, referring learners
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for and as learning within the lesson Instructional Resources	sample lessor SCHOOL mate Related CLOs NTS: 2 b) Has learning 2b) Has learning 3m) Identifit whose needs lie outs Note: The assessment inclusivity. Posters; video clips; of Arthur, J., Grainger, T. & Francis e-Lib d20209294.html Confer, C. (2005). https://www.pdfdriv	on plan meant for thematics curricules: 1, 2, 3 as comprehensive to goutcomes. The comprehensive to goutcomes and remediate aide the competer of procedures should be completed for the complete of the comple	teaching selected mathematics to the complete selected mathematics to the through small group activity when we have a selected mathematics to the through small group activity when we have a selected for the official school considered and the complete selected for the teacher. The selected for the teacher when the teacher when the teacher we have a selected for the teach in the Primary way of the teach in the Pr	opics in the PRIMARY for peer review curriculum, including eptions, referring learners - gender, equity, SEN, and eary School. Canada: Taylor ach-in-the-primary-school- Solutions Publications. 09.html.
for and as learning within the lesson Instructional Resources	sample lessor SCHOOL mat Related CLOs NTS: 2 b) Has learning 2b) Has learning 3m) Identifit whose needs lie outs Note: The assessment inclusivity. Posters; video clips; of Arthur, J., Grainger, Table & Francis e-Lib d20209294.html Confer, C. (2005). https://www.pdfdriv Manitoba Education	on plan meant for thematics curriculars: 1, 2, 3 as comprehensive to goutcomes. Comprehensive to goutcomes and remediate aide the competer of procedures shown to the complete of the complete	teaching selected mathematics to the turn through small group activity when we have a considered as learners' difficulties or misconcing of the teacher. If the teacher is learning to Teach in the Primary memory of the teach in the Primary memory of the teach in the Primary in the Primary in the teach in the Primary in the Primary in the teach in the Primary	opics in the PRIMARY for peer review curriculum, including eptions, referring learners - gender, equity, SEN, and eary School. Canada: Taylor ach-in-the-primary-school- Solutions Publications. 09.html. essroom assessment with
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for and as learning within the lesson Instructional Resources	sample lessor SCHOOL mate Related CLOs NTS: 2 b) Has learning 2b) Has learning 3m) Identifit whose needs lie outs Note: The assessment inclusivity. Posters; video clips; control of the Arthur, J., Grainger, Table & Francis e-Lib d20209294.html Confer, C. (2005). https://www.pdfdriv Manitoba Education purpose in mind: a https://www.pdfdriv	on plan meant for thematics curriculars: 1, 2, 3 s comprehensive last comprehensive last comprehensive last comprehensive last comprehensive last poutcomes est and remediate last competer last procedures should be competer last procedures should last last last last last last last last	teaching selected mathematics to the turn through small group activity when we have a considered as learners' difficulties or misconcing of the teacher. If the teacher is learning to Teach in the Primary memory of the teach in the Primary memory of the teach in the Primary in the Primary in the teach in the Primary in the Primary in the teach in the Primary	opics in the PRIMARY for peer review curriculum, including eptions, referring learners - gender, equity, SEN, and eary School. Canada: Taylor ach-in-the-primary-school- Solutions Publications. 09.html. essroom assessment with assessment of learning.
for and as learning within the lesson Instructional Resources	sample lessor SCHOOL mate Related CLOs NTS: 2 b) Has learning 2b) Has learning 3m) Identifit whose needs lie outs Note: The assessment inclusivity. Posters; video clips; continued a Francis e-Lib d20209294.html Confer, C. (2005). https://www.pdfdriv Manitoba Education purpose in mind: a https://www.pdfdriv learning-d6259529.html	on plan meant for thematics curriculars: 1, 2, 3 s comprehensive last comprehensive last comprehensive last comprehensive last comprehensive last poutcomes end remediate last procedures should be completed for last comprehensive last procedures should last last complete last procedures last procedures last last last last last last last las	teaching selected mathematics to um through small group activity who will be actively small group activity who will be actively small group activity who will be actively of the official school constant of the teacher. The active of the teacher will be actively of the teacher. The active of the teacher will be actively of the teacher. The active of the teacher of the teacher of the teacher of the active of the teacher of the active of the teacher of the	opics in the PRIMARY for peer review curriculum, including eptions, referring learners - gender, equity, SEN, and eary School. Canada: Taylor ach-in-the-primary-school- Solutions Publications. 09.html. essroom assessment with assessment of learning. rning-assessment-of-
for and as learning within the lesson Instructional Resources	sample lesson SCHOOL mate Related CLOs NTS: 2 b) Hasted learning 2b) Hasted learning 3m) Identifit whose needs lie outs Note: The assessment inclusivity. Posters; video clips; of Arthur, J., Grainger, Table & Francis e-Lib d20209294.html Confer, C. (2005). https://www.pdfdriv Manitoba Education purpose in mind: a https://www.pdfdriv learning-d6259529.h	on plan meant for thematics curriculars: 1, 2, 3 s comprehensive is g outcomes. comprehensive k g outcomes es and remediate ide the competer it procedures should be completed in the competer in the compete	teaching selected mathematics to um through small group activity who will be active to the official school of the official school of the official school of the official school of the selection of the teacher. The selection of the teacher of the teacher. The selection of the teacher of the t	opics in the PRIMARY for peer review curriculum, including eptions, referring learners - gender, equity, SEN, and ary School. Canada: Taylor ach-in-the-primary-school- Solutions Publications. 09.html. assroom assessment with assessment of learning. rning-assessment-of-
for and as learning within the lesson Instructional Resources	sample lesson SCHOOL mate Related CLOs NTS: 2 b) Hasted learning 2b) Hasted learning 3m) Identifities whose needs lie outs Note: The assessment inclusivity. Posters; video clips; compared to the service of the serv	on plan meant for thematics curriculars: 1, 2, 3 s comprehensive is g outcomes. comprehensive k g outcomes es and remediate ide the competer it procedures should be completed in the competer in the compete	teaching selected mathematics to um through small group activity who will be actively small group activity who will be actively small group activity who will be actively of the official school constant of the teacher. The active of the teacher will be actively of the teacher. The active of the teacher will be actively of the teacher. The active of the teacher of the teacher of the teacher of the active of the teacher of the active of the teacher of the	opics in the PRIMARY for peer review curriculum, including eptions, referring learners - gender, equity, SEN, and ary School. Canada: Taylor ach-in-the-primary-school- Solutions Publications. 09.html. assroom assessment with assessment of learning. rning-assessment-of-
Instructional Resources Required Text (core)	sample lesson SCHOOL mate Related CLOs NTS: 2 b) Hasted learning 2b) Hasted learning 3m) Identifities whose needs lie outs Note: The assessment inclusivity. Posters; video clips; control of the second learning deceased lie outs Note: The assessment inclusivity. Posters; video clips; control of the second learning deceased learning	on plan meant for thematics curriculars: 1, 2, 3 as comprehensive to goutcomes. It comprehensive to goutcomes and remediate aide the competer of the procedures should be a com/teaching of the com/assessment for lege.com/assessment for legers. Issues in the company of t	teaching selected mathematics to um through small group activity who will be active to the official school of the official school of the official school of the selection of the teacher. The selection of the teacher of the teacher. The selection of the teacher o	opics in the PRIMARY for peer review curriculum, including eptions, referring learners - gender, equity, SEN, and eary School. Canada: Taylor ach-in-the-primary-school- Solutions Publications. 09.html. essroom assessment with assessment of learning. rning-assessment-of- Addition and Subtraction s Preparation of School
for and as learning within the lesson Instructional Resources	sample lesson SCHOOL math Related CLOst NTS: 2 b) Hast learning 2b) Hast learning 3m) Identified whose needs lie outs Note: The assessment inclusivity. Posters; video clips; of Arthur, J., Grainger, T. & Francis e-Lib d20209294.html Confer, C. (2005). https://www.pdfdriv. Manitoba Education purpose in mind: a https://www.pdfdriv.learning-d6259529.h Roy, G. J. (2014). Dewith Whole Numb Teachers, 2. Lakoff, G. & Núñez, R.	on plan meant for thematics curricularies: 1, 2, 3 s comprehensive of goutcomes. comprehensive key outcomes es and remediate dide the competer of procedures show the procedures show the procedures of the proced	teaching selected mathematics to um through small group activity when we have a complete and the activity of the official school of the official school of the official school of the selection of the teacher. The selection of the teacher of the teacher. The selection of the teacher of the te	opics in the PRIMARY for peer review curriculum, including eptions, referring learners - gender, equity, SEN, and ary School. Canada: Taylor ach-in-the-primary-school- Solutions Publications. 09.html. assroom assessment with assessment of learning. rning-assessment-of- Addition and Subtraction s Preparation of School York: Basic Books.
Instructional Resources Required Text (core)	sample lesson SCHOOL math Related CLOst NTS: 2 b) Hast learning 2b) Hast learning 3m) Identified whose needs lie outs Note: The assessment inclusivity. Posters; video clips; of Arthur, J., Grainger, T. & Francis e-Lib d20209294.html Confer, C. (2005). https://www.pdfdriv. Manitoba Education purpose in mind: a https://www.pdfdriv.learning-d6259529.h Roy, G. J. (2014). Dewith Whole Numb Teachers, 2. Lakoff, G. & Núñez, R.	on plan meant for thematics curricularies: 1, 2, 3 s comprehensive of goutcomes. comprehensive key outcomes es and remediate dide the competer of procedures show the procedures show the procedures of the proced	teaching selected mathematics to um through small group activity who will be active to the official school of the official school of the official school of the selection of the teacher. The selection of the teacher of the teacher. The selection of the teacher o	opics in the PRIMARY for peer review curriculum, including eptions, referring learners - gender, equity, SEN, and ary School. Canada: Taylor ach-in-the-primary-school- Solutions Publications. 09.html. assroom assessment with assessment of learning. rning-assessment-of- Addition and Subtraction s Preparation of School York: Basic Books.

	Martin, J. et. al. (1994). <i>Mathematics for teacher training in Ghana: Students activities</i> . Accra: Unimax Publishers.
CPD Needs	 How to design and teach mathematics using the new B. ED. Curriculum, NTS, NTECF, etc How to design and/or use some innovative materials and ideas for teaching selected concepts based on Classroom assessment in mathematics in PRIMARY SCHOOL1-3. How to manage transition of home to school. Understand the various characteristics and uniqueness of Primary School learners. How to design tasks for assessment procedures for assessment of, as and for learning. Instructional strategies needed to consciously engage student teachers on how to design and produce portfolios, journals and STS reports.

Year of B.Ed. 3	Semester	1	Place of lesson in semester	123456 7 89101112
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Title of Lesson	Shape, Spa	ace and Meas	urement: (Te	eaching and Asse	ssment)	Lesson Duratio	n 3 Hours		
Lesson description	This lesson focuses on developing an understanding of Teaching and Assessing Primary School Mathematics especially, Shape, Space and Measurement: (Teaching and Assessment) and how an understanding of mathematics develops. It provides an overview of philosophies of mathematics and mathematics education and explores student teachers' beliefs about mathematics and philosophies of mathematics implicit in the official mathematics curriculum and current classroom practice. It also covers Spatial visualization; the concept of space; line segments, angles and shapes; 3-D (faces, vertices, edges and their relationships) and 2-D shapes (types and properties). Another area that is considered is developing awareness of equity and diversity issues. Student-teachers have been thought theories in the teaching and learning of mathematics, and								
Previous student teacher			_		_	_			
knowledge, prior learning							n; they are exposed		
(assumed)					_		experienced some		
		_	neir basic a	nd secondary e	ducation p	eriod, as we	ell as the previou		
Possible barriers to	semester's		urc Cocio c	ultural issues dit	fforent lear	ning poods mi	sconceptions abou		
learning in the lesson						-	be made to addres		
icarring in the resson		re, during an		-	. conscious	criores silouiu i	se made to address		
Lesson Delivery – chosen	Face-to-	Practical	Work-	Seminars	Independ	e-learning	Practicum		
to support students in	face	Activity	Based		ent Study	opportunitie	es		
achieving the outcomes			Leaning						
Lesson Delivery – main	Face-to-fa	ce and e-lear	ning opport	unities		•	-		
mode of delivery chosen	• The fa	ace-to-face m	ode will incl	ude lecturer/tuto	or-initiated o	lass discussion	s, small group in		
to support student	class	exploration, g	group presen	tations, think-pa	ir-share mo	ments, lecture,	etc.,		
teachers in achieving the					-	-	vities to develop		
learning outcomes.				tionships betwee		-			
	 Indep journ 		would inclu	de writing self-as	ssessment a	nd presenting r	reflective papers or		
Purpose for the	The purpo	se of the less	on is to;						
lesson, what you	• Introd	luce student	teachers to t	he course manua	al to enable	them develop	awareness of wha		
want the students to		are expected							
achieve, serves as							of mathematics, a		
basis for the learning				tics to Primary Sc					
outcomes. An expanded version of							innovative ways o		
the description.	learne	_	tics, especia	ily, reaching int	egers in th	e Basic Scrioor	to Primary Schoo		
and decomposition			t teacher for	a future mathe	matics class	room			
Learning Outcome for	Learning C			g Indicators		dentify Wh	ich cross-cutting		
the lesson, picked						•	and transferable		
and developed from						skills, inclusiv	vity, equity and		
the course						_	versity. How wil		
specification						these be	addressed o		
Learning indicators	Danis	-	- 0.1			developed?			
for each learning outcome		ate knowledg standing of		ect and use elopmentally	•		values of teaching: pporting student		
outcome		of integers an		ropriate models	and		understand and		
		can be taugh		tegies for teachi			te the ethics of the		
		RY SCHOOL		gers that empha	-				
	to PRIMAF	NI SCHOOL	inte	gers maremph	13120 1110	profession	bearing in mind the		
	to PRIMAR pupils (pro			sical, cognitive,	13120 1110		bearing in mind the racteristics of the		
	pupils (pro values, kno	ofessional owledge &	phy			unique cha	-		
	pupils (pro	ofessional owledge &	phy emo dev	sical, cognitive, otional and social elopment of the	I	unique cha	racteristics of the		
	pupils (pro values, kno	ofessional owledge &	phy emo dev	sical, cognitive, otional and social	I	unique cha	racteristics of the		

	Demonstrate competencies in devising and using differentiated instructional strategies, with a focus on a thematic approach and which promotes practical-based learning to cater for the needs of all children in the PRIMARY SCHOOL classroom, including those with SEN (NTS 3f, pg. 14)	strate; learne conce; opera: Use kr earnin mathe appro tasks. Recog develo appro	e and analyse gies early adolescent ers use in developing pts in integers such as tions on integers nowledge gained from ag theories in ematics to design priate problem-solving nise and use opmentally priate and positive iour management	 Problem solving, critical and creative thinking: through objective analysis of facts and concept that will lead to creative thinking Ethics and values of teaching: through supporting student teachers to understand and demonstrate the ethics of the profession bearing in mind the unique characteristics of young children Respect and diversity: designing lesson for diverse learners with different learning styles
Topic	Sub-topic(s)	Stage/ Time		g to activities to achieve learning
		Time	outcomes depending on delivery mode selected. Teacher-lead collaborative group work or independent.	
			Teacher Activity	Student Activity
	Review	10mins	Review the previous lesson by asking student teachers relevant questions lesson planning (PD Theme 1)	Participate in the discussion on micro lesson planning
	Spatial visualization;	20 mins	Introduce the lesson on integers as shape and space. (PD Themes 1 & 3) Lead discussions on concept of shape and space. (PD Themes 1 & 3)	Initiate verbal exposition and discussions on integers and technology use in teaching of shape and space. Provide student-teachers with elearning opportunities to explore the concept of shape and space.
	concept of space;		_	
WEEK 7 Shape, Space and Measurement: (Teaching and Assessment)	line segments, angles and shapes; 3-D (faces, vertices, edges and their relationships) and 2-D	40 mins	Assign student teachers in groups to determine perimeters and areas of 2-D shapes	Use models of 3-D shapes for practical investigation to explore the relationship among the number of faces, edges, and vertices of given shapes. Use guided independent study,
	shapes (types and properties); Measurable attributes of objects including length, angle, area, volume and capacity, mass, weight, time and money	70 mins	Establish individual/group project work to help student teachers develop understanding of such attributes as length, angle, area, volume and capacity, time, and money	student-teachers find areas and perimeters of 2-D shapes. Use individual/group project work to develop understanding of such attributes as length, angle, area, volume and capacity, time, and money.
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	Subject Portfolio Assign student teachers to complete teacher-made worksheets on length, angle, area, volume and capacity, mass, weight, time and money(provide immediate feedback) Related CLOs: 1, 2, 3			

	NTS:
	2 b) Has comprehensive knowledge of the official school curriculum, including
	learning outcomes.
	2b) Has comprehensive knowledge of the official school curriculum, including learning
	outcomes
	3m) Identifies and remediates learners' difficulties or misconceptions, referring learners
	whose needs lie outside the competency of the teacher.
	Subject Project
	Collection and discussion of Project 1to be graded later
	Note: The assessment procedures should make room for differentiation - gender, equity, SEN, and
	inclusivity.
Instructional Resources	Posters; video clips; downloads; models, etc.
Required Text (core)	Arthur, J., Grainger, T. & Wray, D. (2006). Learning to Teach in the Primary School. Canada: Taylor
	& Francis e-Library. https://www.pdfdrive.com/learning-to-teach-in-the-primary-school-
	<u>d20209294.html</u>
	Confer, C. (2005). Teaching Number Sense. Sausalito: Math Solutions Publications.
	https://www.pdfdrive.com/teaching-number-sense-grade-1-d184198309.html
	Manitoba Education, Citizenship and Youth (2006). Rethinking classroom assessment with purpose
	in mind: assessment for learning, assessment as learning, assessment of learning.
	https://www.pdfdrive.com/assessment-for-learning-assessment-as-learning-assessment-of-
	learning-d6259529.html.
	Roy, G. J. (2014). Developing Prospective Teachers' Understanding of Addition and Subtraction with Whole Numbers. <i>Issues in the Undergraduate Mathematics Preparation of School</i>
	Teachers, 2.
Additional Reading List	Lakoff, G. & Núñez, R. E. (2000). Where Mathematics comes from. New York: Basic Books.
Additional Reading List	Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Tutor notes. Accra: Unimax
	Publishers.
	Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Students activities. Accra:
	Unimax Publishers.
CPD Needs	How to design and teach mathematics using the new B. ED. Curriculum, NTS, NTECF, etc.
	 How to design and/or use some innovative materials and ideas for teaching selected
	concepts based on Classroom assessment in mathematics in PRIMARY SCHOOL1-3.
	How to manage transition of home to school.
	Understand the various characteristics and uniqueness of Primary School learners.
	 How to design tasks for assessment procedures for assessment of, as and for learning.
	Instructional strategies needed to consciously engage student teachers on how to design
	and produce portfolios, journals and STS reports.
	Instructional strategies needed to consciously engage student teachers on how to design

Year of B.Ed.	3 S	Semester 1	Place of lesson in semester	1 2 3 4 5 6 7 8 9 10 11 12
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							1		
Title of Lesson	Handling [Data and Cha	nce: <i>(Teachin</i>	g and Assess	ing)	Lesson Duration	3 Hours		
Lesson description	Mathemat mathemat education mathemat covers Har influencing	This lesson focuses on developing an understanding of Teaching and Assessing Primary School Mathematics and about how people think about mathematics and how an understanding of mathematics develops. It provides an overview of philosophies of mathematics and mathematics education and explores student teachers' beliefs about mathematics and philosophies of mathematics implicit in the official mathematics curriculum and current classroom practice. It also covers Handling Data and Chance(Teaching and Assessing), and other psychological factors influencing learning. Another area that is considered is developing awareness of equity and diversity issues.							
Previous student teacher knowledge, prior learning (assumed)	Student-te are familia to numbe mathemat	Student-teachers have been thought theories in the teaching and learning of mathematics, and are familiar with concepts based on child growth, development, and maturation; they are exposed to number and numeration systems as well as handling dada; they have experienced some mathematics during their basic and secondary education period. Different entry behaviours, Socio-cultural issues, different learning needs, misconceptions about							
Possible barriers to learning in the lesson	mathemat	ics and meth		ing mathema		rning needs, misco s efforts should be			
Lesson Delivery – chosen to support students in achieving the outcomes	Face-to- face	Practical Activity	Work- Based Leaning	Seminars	Independent Study	e-learning opportunities	Practicum		
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes. • Purpose for the lesson, what you want the students to achieve, serves as basis for the learning	 Face-to-face and e-learning opportunities The face-to-face mode will include lecturer/tutor-initiated class discussions, small group in class exploration, group presentations, think-pair-share moments, lecture, etc., The e-learning opportunities will include exploring number games and activities to develop properties of numbers and relationships between and among sets of numbers Independent study would include writing self-assessment and presenting reflective papers or journals. The purpose of the lesson is to; Introduce student teachers to the course manual to enable them develop awareness of what they are expected of in this lesson. develop student teachers' understanding of the nature and importance of mathematics, as well as, how to teach mathematics to Primary School learners. 								
outcomes. An expanded version of the description.	teach learne	ing mathemaers.	atics, especia	Illy, Teaching		nteractive, and inn he Basic School to ssroom			
Learning Outcome for the lesson, picked and developed from the course specification Learning indicators for each learning	Demonstra comprehe	Dutcomes ate a	Learnir show	ng Indicators v a good unde	erstanding	Identify Which issues- core ar skills, inclusivity addressing diver these be adeveloped? Problem solvi	nd transferable y, equity and rsity. How will addressed or		
outcome	knowledge PRIMARY S mathemat and learning covering n	e of the offici SCHOOL cics curriculuing outcomes number and ionships, with	al place techn math as a deep thin the control of t	umber relation with a value, as we iniques for properties and means of properties are unabled to the context of mudivision of internal context of c	ell as using actical estimation moting a ense within altiplication	creative think objective ana concept that creative think	lysis of facts and will lead to		

	Demonstrate knowledge of instructional practices for teaching the PRIMARY SCHOOL mathematics curriculum(NTS 3e)	mathen using m are app of integ show ev mathen confide do mati carry out instructic PRIMAR including reinforce engage l mathem justify ar instructic	vidence of enjoying natics and have nce in their abilities to hematics It basic mathematics onal routines for Y SCHOOL pupils, g drill and practice, ement activities and earners in atical discourse and explain one's onal practices and	 Problem solving, critical and creative thinking: through objective analysis of facts and concept that will lead to creative thinking Personal development: Through planning, teaching, and assessing both individually and in small groups, and sharing their experiences with peers Social and communication skills: consciously develop observation and presentation skills during classroom instructions to support student teachers to transfer this to STS
		improve context of integers • plan effer solve produring in	n those practices for ment within the of properties of ective instruction and oblems that arise instruction involving on of integers in real	Respect and diversity: designing lesson for diverse learners with different learning styles
Topic	Sub-topic(s)	Stage/ Time	outcomes depending	g to activities to achieve learning g on delivery mode selected. ative group work or independent. Student Activity
	Review	10mins	Review student teachers knowledge of sets of objects (PD Theme 1)	Participate in the discussion on Data and Chance
	Introduction	20 mins	Introduce student teachers to what Data and Chance are (PD Themes 1 &3)	Initiate verbal exposition and discussions what Data and Chance are
WEEK 8 Handling Data and Chance (Teaching and Assessing)	Collecting, interpreting and presenting data in multiple ways; Measures of central tendencies, Graphical or pictorial, representation (including stem and leaf plots, five number summary, box plots). Chance: sample space; events; basic properties	40 mins 60 mins 30 mins	lead discussions on operation on integers, especially, multiplication and division of integers (PD Themes 1 & 3) Assign student teachers in groups to outline how to Collect, interpret and present data in multiple ways	Use group and individual projects to collect data based on events happening within and out of the school organization. Use group and individual presentations to discuss how to organize, present, and interpret the data collected. Use games and practical activities to introduce the concept of chance. Engage student-teachers through
	of chance.		Lead student	group work to explore the concepts of sample space, events,

	sample space,
	events, and basic
	properties of chance
	through group
1	activities
Lesson assessments –	SubjectProject2
evaluation of learning: of, for and as learning within	 Student teachers are assigned to design appropriate teaching and learning materials for Collecting, interpreting and presenting data and chance
the lesson	10 th week
the lesson	Related CLOs: 3, 5, 6
	NTS:
	2 b) Has comprehensive knowledge of the official school curriculum, including
	learning outcomes.
	2b) Has comprehensive knowledge of the official school curriculum, including learning
	outcomes
	3m) Identifies and remediates learners' difficulties or misconceptions, referring learners
	whose needs lie outside the competency of the teacher.
	Note: The assessment procedures should make room for differentiation - gender, equity,
	SEN, and inclusivity.
Instructional Resources	Posters; video clips; downloads; models, etc.
Required Text (core)	Arthur, J., Grainger, T. & Wray, D. (2006). Learning to Teach in the Primary School. Canada: Taylor
	& Francis e-Library. https://www.pdfdrive.com/learning-to-teach-in-the-primary-school-
	<u>d20209294.html</u>
	Confer, C. (2005). Teaching Number Sense. Sausalito: Math Solutions Publications.
	https://www.pdfdrive.com/teaching-number-sense-grade-1-d184198309.html
	Manitoba Education, Citizenship and Youth (2006). Rethinking classroom assessment with purpose in mind: assessment for learning, assessment as learning, assessment of learning.
	https://www.pdfdrive.com/assessment-for-learning-assessment-as-learning-assessment-of-
	learning-d6259529.html.
	Roy, G. J. (2014). Developing Prospective Teachers' Understanding of Addition and Subtraction
	with Whole Numbers. Issues in the Undergraduate Mathematics Preparation of School
	Teachers, 2.
Additional Reading List	Lakoff, G. & Núñez, R. E. (2000). Where Mathematics comes from. New York: Basic Books.
	Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Tutor notes. Accra: Unimax
	Publishers.
	Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Students activities. Accra: Unimax Publishers.
CPD Needs	How to design and teach mathematics using the new B. ED. Curriculum, NTS, NTECF, etc
5. 2 .10000	How to design and teach mathematics using the new B. EB. curricularly, Mrs, NYECY, etc. How to design and/or use some innovative materials and ideas for teaching selected.
	concepts based on Classroom assessment in mathematics in PRIMARY SCHOOL1-3.
	How to manage transition of home to school.
	Understand the various characteristics and uniqueness of Primary School learners.
	How to design tasks for assessment procedures for assessment of, as and for learning.
	Instructional strategies needed to consciously engage student teachers on how to design

Year of B.Ed.	3 Semester	3 Semester 1 Place of lesson in semes	1 2 3 4 5 6 7 8 9 10 11 12
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Title of Lesson	Rational a	nd Irrational	Num	ber			Le	sson Duration	3 Hours
Lesson description	Mathemat mathemat education mathemat covers Rat influencing	This lesson focuses on developing an understanding of Teaching and Assessing Primary School Mathematics and about how people think about mathematics and how an understanding of mathematics develops. It provides an overview of philosophies of mathematics and mathematics education and explores student teachers' beliefs about mathematics and philosophies of mathematics implicit in the official mathematics curriculum and current classroom practice. It also covers Rational and Irrational numbers and associated theories, and other psychological factors influencing learning. Another area that is considered is developing awareness of equity and diversity issues.							
Previous student teacher			ave	been	thought theor	ies in	the	teaching and	learning of
knowledge, prior learning (assumed)	maturation dada; the	mathematics, and are familiar with concepts based on child growth, development, and maturation; they are exposed to number and numeration systems as well as handling dada; they have experienced some mathematics during their basic and secondary education period.							
Possible barriers to	Different	entry l	beha	viours,	Socio-cultura	l issue	s,	different lear	ning needs,
learning in the lesson		•						ning mathemati after the lesson.	
Lesson Delivery – chosen	Face-to-	Practical	Wo		Seminars	Indeper		e-learning	Practicum
to support students in	face	Activity	Bas			ent Stu		opportunities	
achieving the outcomes			Lea	ning					
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes. • Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.	The fictory class The eprope Indepjourn The purpo Introd they a develor well a Introd teachi Prepa	 class exploration, group presentations, think-pair-share moments, lecture, etc., The e-learning opportunities will include exploring number games and activities to develop properties of numbers and relationships between and among sets of numbers Independent study would include writing self-assessment and presenting reflective papers or journals. The purpose of the lesson is to; Introduce student teachers to the course manual to enable them develop awareness of what they are expected of in this lesson. develop student teachers' understanding of the nature and importance of mathematics, as well as, how to teach mathematics to Primary School learners. 							
Learning Outcome for	Learning C	Outcomes		Learnin	g Indicators			ntify Which cross-	_
the lesson, picked and developed from the course specification							dive	e and transfousivity, equity a ersity. How w ressed or develop	nd addressing ill these be
Learning indicators for each learning outcome	and under key featur school cur and specif on rationa numbers (Demonstra of socio-cu teaching a	ate knowled, istanding of the bastriculum (BSC ically focusinal and irration NTS, 2a). ate awarene altural issues and learning oncepts (NTS)	the sic c); ng nal	exective active	cicipate in planning cuting instruction vities that can may adolescents be hematically profests, understand hematical ideas, age in logical reated on relationship ong the various and real numbers	anal ake come icient; and soning ps spects	•	Personal develop planning, teachin assessing both in in small groups, a their experiences Problem solving creative thinki objective analysi concept that creative thinking	ment: Through g, and dividually and nd sharing with peers , critical and ng: through s of facts and

	Demonstrate knowledge and conceptual understanding of number with focus on rational and irrational numbers Demonstrate competencies in using manipulatives and TLMs including ICT in a variety of ways in teaching fractions and decimal concepts (NTS 3j) Value as well as respect	for teamather numb SCHOO	T as a tool in	 Personal development: Through presentation and developing of arguments Use of ICT: Integrate ICT in developing number and in the mathematics classroom Use of ICT: Integrate ICT in developing number and in the mathematics classroom Respect and diversity: designing lesson for diverse learners with
	equity and inclusivity in the mathematics classroom (NTS 2f; NTEC 39)	SCHOO numb	ciate the	different learning stylesSocial and communication skills:
		suppo mathe • Coope in carr mathe variet • Engag thinki mathe	butions of, and rt, colleagues in the ematics classroom erate with colleagues rying out ematical tasks in a y of ways e in reflective ng about how ematics was taught in pasic school days.	consciously develop observation and presentation skills during classroom instructions to support student teachers to transfer this to STS
Topic	Sub-topic(s)	Stage/ Time	learning outcomes	rning to activities to achieve depending on delivery mode ead collaborative group work or
			Teacher Activity	Student Activity
	Review	10mins	Review the previou lesson on rational numbers as related real number system (PD Theme 1)	discussion on various to aspects of the real number system.
	The Real number system relationships among the various	50 mins	Introduce the lesson on Real number system; (PD Themes 1 &3)	and discussions on integers and technology use in Real number system across the PRIMARY SCHOOL
WEEK 9 Rational and Irrational numbers 1	aspects of real number system Operations and properties of	60 mins	Lead discussions on how to connect the various real numbe systems (PD Themes 1 & 3)	Use manipulatives to establish the relationship between and among the various real number
	application of real number system to real life	60 mins	Lead discussions on properties and operations of the renumbers (PD Themes 1 & 3)	

Assign student properties and operating teachers in groups to of the real numbers outline real number system. Explore possible further	ions
outline real number	
system. Explore possible further	
application of rational	
numbers in real life.	
Lesson assessments – Subject Portfolio	
evaluation of learning: Assign student teachers to complete teacher-made worksheets on operations ar	ıd
of, for and as learning properties of rational and irrational numbers as found in the PRIMARY SCHOOL	
within the lesson mathematics curriculum (provide immediate feedback)	
Related CLOs: 1, 2, 3	
NTS:	
2 b) Has comprehensive knowledge of the official school curriculum,	
including learning outcomes.	
2b) Has comprehensive knowledge of the official school curriculum, inclu	ıding
learning outcomes	
3m) Identifies and remediates learners' difficulties or misconceptions, referr	
learners whose needs lie outside the competency of the teach	
Note: The assessment procedures should make room for differentiation - gender, e	equity,
SEN, and inclusivity.	
Instructional Resources Posters; video clips; downloads; models, etc.	
Required Text (core) Arthur, J., Grainger, T. & Wray, D. (2006). Learning to Teach in the Primary So	chool.
Canada: Taylor & Francis e-Library. https://www.pdfdrive.com/learning-to-teach-ir	<u>า-the-</u>
primary-school-d20209294.html	
Confer, C. (2005). Teaching Number Sense. Sausalito: Math Solutions Publica	tions.
https://www.pdfdrive.com/teaching-number-sense-grade-1-d184198309.html.	
Manitoba Education, Citizenship and Youth (2006). Rethinking classroom assess	ment
with purpose in mind: assessment for learning, assessment as learning, assessment	ent of
learning.	

Year of B.Ed.	3	Semester	1	Place of lesson in semester	123456789 10 1112
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Lesson description									
Lesson description		This lesson focuses on developing an understanding of Teaching and Assessing Primary School							
	Mathemat	focuses on	developing ar	understanding	ofTeaching a	ind Assessing Prin	nary School		
		ics and abou	t how people	think about mat	hematics an	d how an underst	anding of		
	mathemat	ics develops	. It provides a	n overview of ph	ilosophies o	f mathematics an	d mathematics		
	education	and explore:	s student tead	hers' beliefs abo	ut mathema	ntics and philosop	hies of		
	mathemat	ics implicit ir	the official n	nathematics curr	iculum and o	current classroom	practice. It also		
	covers chil	dren's devel	opmental stag	ges, how childre	n learn math	ematics and asso	ciated theories,		
	and other	psychologica	ıl factors influ	encing learning o	of fractions.	Another area that	is considered is		
	developing	gawareness	of equity and	diversity issues.					
Previous student teacher	Student-teachers have been thought theories in the teaching and learning of								
knowledge, prior learning	mathema	tics, and a	e familiar w	ith concepts b	ased on ch	ild growth, dev	elopment, and		
(assumed)	maturatio	on; they are	e exposed to	number and	numeratio	n systems as w	ell as handling		
		•	-			g their basic a	_		
	education	=	•				,		
Possible barriers to	Different	entry k	ehaviours,	Socio-cultura	issues,	different lea	rning needs,		
learning in the lesson	misconceptions about mathematics and methods of teaching mathematics. Conscious								
	efforts should be made to address them before, during and after the lesson.								
Lesson Delivery – chosen	Face-to-	Practical	Work-	Seminars	Independ	e-learning	Practicum		
to support students in	face	Activity	Based		ent Study	opportunities			
achieving the outcomes	\boxtimes		Leaning						
Lesson Delivery – main									
mode of delivery chosen			rning opportu						
to support student						lass discussions, s			
teachers in achieving the						nents, lecture, etc			
learning outcomes.						games and activiti			
						g sets of numbers			
			y would inclu	de writing self-as	sessment ar	nd presenting refle	ective papers or		
	journ								
Purpose for the		se of the less							
lesson, what you					al to enable	them develop aw	areness of what		
want the students to		•	of in this less						
achieve, serves as				_		d importance of	mathematics, as		
basis for the learning				cics to Primary Sc					
outcomes. An						eractive, and inn	ovative ways of		
expanded version of		_		y, fractions to Pr					
the description.	• Prepa	re the stude	nt teacher for	a future mather	matics classr	oom			
Learning Outcome for	Learning C	Jutcomes	Learnin	g Indicators	1.	dentify Which	cross-cutting		
the lesson, picked	Learning C	, accomics	Learinii	6 maicators		ssues- core an	U		
and developed from						kills, inclusivity			
the course						iddressing diver			
specification						_	ddressed or		
specification					_	leveloped?	uuresseu oi		

 Learning indicators 	Landard Communication and the communication of the		1 1 1 1	
for each learning outcome	nstrate a comprehensive knowledge of the official PRIMARY SCHOOL mathematics curriculum and learning outcomes covering number and numeration, their relationships, place value, fractions as well as the principles behind these concepts (NTS 2b) Demonstrate knowledge and understanding of the key features of the basic school mathematics curriculumwith emphasis on Interpreting fractions and Operation of fractions (addition and subtraction) Demonstrate competencies in using manipulatives and TLMs including ICT in a variety of ways in teaching operations on common and decimal fractions	 show a good understanding of number relationships and place value, as well as using techniques for practical activities involving the development of fraction concepts to promote mathematical thinking plan lesson based on addition and subtraction that seeks provide equitable learning opportunities for all learner outline activities that make children mathematically proficient by considering the developmental level of the learners Use manipulatives, ICT tools, and other TLMs to establish mathematical principles based on addition and subtraction of fractions 		 Respect and diversity: designing lesson for diverse learners with different learning styles Personal development: through planning, teaching, and assessing both individually and in small groups, and sharing their experiences with peers Equity and inclusivity: Providing equitable learning opportunities for all learners Problem solving, critical and creative thinking: through objective analysis of facts and concept that will lead to creative thinking Personal development: through conscious modelling of planning, presentation and assessment Use of ICT: Integrate ICT in developing fraction concepts in the mathematics classroom
	concepts (NTS 3j)	0. (I =	
Topic	Sub-topic(s)	Stage/ Time	outcomes depending Teacher-lead collabora	g to activities to achieve learning g on delivery mode selected. ative group work or independent. Student Activity
			Teacher Activity	Student Activity
			Pavious the provious	
	Introduction	10mins	Review the previous lesson by reviewing student teachers knowledgeon rational and irrational numbers	Participate in the discussion by answering questions and giving comments to enhance participation.
WEEK 11 Fractions 1 (Teaching and Assessing)	Developing fraction concept, fractional parts, and naming fractions	50 mins	lesson by reviewing student teachers knowledgeon rational and irrational numbers (PD Theme 1) Introduce the concept of fractions by assessing the student teachers background on	answering questions and giving comments to enhance
Fractions 1	Developing fraction concept, fractional parts,		lesson by reviewing student teachers knowledgeon rational and irrational numbers (PD Theme 1) Introduce the concept of fractions by assessing the student teachers	answering questions and giving comments to enhance participation. Engage in the discussions of concept of fractions by defining and giving examples of fractions

Interpreting fractions (e.g. part-whole, ratio), models of fractions, equivalent fractions.

Operation of fractions: (Addition and subtractions) Whole number with a fraction, fraction with whole number and fraction with another fraction.

(PD Themes 1 & 3)

Assign student to part-whole, ratio,

Use the multipurpose multiplication chart to explore equivalent fraction concepts (PD Themes 1 & 3)

three respectively.

explore how fractions are represented and interpreted through ICT tools and other manipulatives. Include; Fractions as linear, etc)

manipulatives. Fractions as part-whole, ratio, linear, etc. Part of unit/whole, part of a group, ratio

through ICT tools and other

Participate in the exploratory activity using the multi-purpose chart and other manipulatives to explore the concepts of equivalent fractions

1	2	3	4	5
2	4	6	8	10
3	6	9	12	15
4	8	12	16	20
5	10	15	20	25

Using the first two rows for an illustration, we can generate the equivalence fractions of $\frac{1}{2}$ as follows: $\frac{1}{2} = \frac{2}{4} = \frac{3}{6} = \frac{4}{8}$, ...

Use the knowledge of equivalent fractions to explore operations on fractions (eg. Addition and subtraction of fractions). Example, Solve $\frac{1}{2} + \frac{1}{3}$ Using the multi-purpose chart

above, we can write $\frac{1}{2} + \frac{1}{3} \operatorname{as} \frac{3}{6} + \frac{2}{6} = \frac{2+3}{6} = \frac{5}{6}$

1	2	3
2	4	6
3	6	9
4	8	12
5	10	15
6	12	18



1	2
2	4
3	6
4	8
5	10
	12

1	2
2	4
3	6
4	8
5	10
6	12

Connect how knowledge of equivalent fractions can be used to introduce operations on fractions (eg. Addition and subtraction of fractions).

Assign student teachers in groups to outline properties of Integers initiate collaborative group activity identify areas where integers are applied in real life

Assign student teachers to work more examples on common fractions

Have student teachers solve problems on fractions and also plan lessons on

	fractions in groups for peer review Work more examples on common fractions groups.							
	Solve problems on fractions and also plan lessons on fractions in groups for peer review							
Lesson assessments – evaluation of learning: of, for and as learning within the lesson	Subject Portfolio Collection and discussion of Cumulative Learning Portfolio for grading later.							
Instructional Resources	Posters; video clips; downloads; models, etc.							
Required Text (core) Additional Reading List	Arthur, J., Grainger, T. & Wray, D. (2006). Learning to Teach in the Primary School. Canada: Taylor & Francis e-Library. https://www.pdfdrive.com/learning-to-teach-in-the-primary-school-d20209294.html Confer, C. (2005). Teaching Number Sense. Sausalito: Math Solutions Publications. https://www.pdfdrive.com/teaching-number-sense-grade-1-d184198309.html . Manitoba Education, Citizenship and Youth (2006). Rethinking classroom assessment with purpose in mind: assessment for learning, assessment as learning, assessment of learning. https://www.pdfdrive.com/assessment-for-learning-assessment-as-learning-assessment-of-learning-d6259529.html . Roy, G. J. (2014). Developing Prospective Teachers' Understanding of Addition and Subtraction with Whole Numbers. https://www.pdfdrive.com/assessment-for-learning-assessment-as-learning-assessment-of-learning-d6259529.html . Roy, G. J. (2014). Developing Prospective Teachers' Understanding of Addition and Subtraction with Whole Numbers. https://www.pdfdrive.com/assessment-for-learning-assessment-for-learning-assessment-of-learning-assessment-of-learning-assessment-of-learning-assessment-of-learning-assessment-of-learning-assessment-of-learning-assessment-of-learning-assessment-of-learning-assessment-of-learning-assessment-of-learning-assessment-of-learning-assessment-of-learning-assessment-of-learning-assessment-of-learning-assessment-of-learning-assessment-of-learning-assessment-of-learning-assessment-of-learning-assessment-of-learning-as							
	Martin, J. et. al. (1994). <i>Mathematics for teacher training in Ghana: Students activities</i> . Accra: Unimax Publishers.							
CPD Needs	 How to design and teach mathematics using the new B. ED. Curriculum, NTS, NTECF, etc How to design and/or use some innovative materials and ideas for teaching selected concepts based on Classroom instruction and assessment of mathematics in PRIMARY SCHOOL1-3. 							
	 How to manage transition of home to school. Understand the various characteristics and uniqueness of Primary School learners. How to design tasks for assessment procedures for assessment of, as and for learning. Instructional strategies needed to consciously engage student teachers on how to design and produce portfolios, journals and STS reports. 							

Year of B.Ed.	3	Semester	1	Place of lesson in semester	12345678910 11 12
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Title of Lesson	Fractions 2						Lesson Duration	3 Hours
Lesson description	Mathemati mathematic education a mathematic covers child and other p	This lesson focuses on developing an understanding ofTeaching and Assessing Primary School Mathematics and about how people think about mathematics and how an understanding of mathematics develops. It provides an overview of philosophies of mathematics and mathematics education and explores student teachers' beliefs about mathematics and philosophies of mathematics implicit in the official mathematics curriculum and current classroom practice. It also covers children's developmental stages, how children learn mathematics and associated theories, and other psychological factors influencing learning of fractions. Another area that is considered is developing awareness of equity and diversity issues.						
Previous student teacher knowledge, prior learning (assumed) Possible barriers to	are familiar to number mathemati Different e	Student-teachers have been thought theories in the teaching and learning of mathematics, and are familiar with concepts based on child growth, development, and maturation; they are exposed to number and numeration systems as well as handling dada; they have experienced some mathematics during their basic and secondary education period. Different entry behaviours, Socio-cultural issues, different learning needs, misconceptions about						
learning in the lesson		cs and meth e, during ar			-	tics. Consciou	s efforts should be	made to address
Lesson Delivery – chosen to support students in achieving the outcomes		ace Activity Based Study opportunities						Practicum
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes. • Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description.	The faclass e The e- proper Independent Introduction Adverse Introduction Introduc	exploration, elearning op rties of numendent studels. See of the less uce student re expected op student to, how to teauce the student mathematical mathematical student of the student mathematical s	group group portun hbers and y would soon is to teacher ach madent to teatics, es	vill inclupresentities wind relading or, ers to the constant of the constant o	ude lecturer/ tations, think Il include exp tionships bet de writing se he course mailon. erstanding of tics to Primar s to prepare ly, fractions t	e-pair-share moloring numbe ween and am If-assessment anual to enab f the nature a y School learr	nteractive, and inrool learners.	c., ies to develop is ective papers or vareness of what mathematics, as
 Learning Outcome for the lesson, picked and developed from the course specification Learning indicators 	Learning O				ing Indicator		developed?	nd transferable y, equity and rsity. How will addressed or
for each learning outcome	and unders key feature school mati curriculum on Interpre and Operat (multiplicat division) th	with empha eting fraction tion of fracti	the sic asis ns ions	te p u ic so	rticipate in a an make studeachers math roficient; that nderstand makes, comput olve problem ngage in logieasoning	dent- nematically at is, athematical se fluently, as, and	creative th objective a	lving, critical and ninking: through nalysis of facts t that will lead to nking

	Demonstrate knowledg instructional practices f teaching the PRIMARY SCHOOL mathematics curriculum(NTS 3e)		•	pro stra app	mathematically ficient multiple itegies that are propriate for a eloping multiplication	•	Social and communication skills: consciously develop observation and presentation skills during classroom instructions to
	Demonstrate understanding of syllab guidelines for classroon assessment and skills of effective assessment fo teaching mathematics i the PRIMARY SCHOOLspecialism including designing an assessment tools with t rubrics and design assessment tool with th rubrics	n f or n	•	carry material round such and material strain descriptions asset descriptions with asset learn SCH	eloping multiplication division of fractions of out basic thematics instructional tines for PRIMARY HOOL pupils, including afforcement activities lengaging learners in thematical discourse thematical discourse ain the steps and attegies involved in igning a good essment tool ign an assessment tool in the rubrics for essing mathematics raing in PRIMARY HOOL1-3 lain syllabus	•	Communication skills: by critiquing assignments and presentations using rubrics co-designed by tutors and student teachers Assessment literacy: through modelling of comprehensive strategies embedded with instruction
				guid asse (AfL lear asse	delines for classroom essment for learning L), assessment of rning (AoL) and essment as learning L)[NTS 2b, 3l, 3m]		
Topic	Sub-topic(s)	Stag		(7.10.	Teaching and learning		activities to achieve learning
		Tim	е				delivery mode selected. group work or independent.
					Teacher Activity		Student Activity
	Review	10m	nins		Review the previous lesson on addition and subtraction of fractions (PD Theme 1)	1	Participate in the discussion by answering questions and giving comments to enhance participation.
	Operations on fractions (Multiplication and Division of fractions): Whole number with a fraction, fraction with whole number and fraction with another fraction.	50	0 mi	ns	Engage student teachers in discussingthe use of manipulative materials and other resources (including ICT tools) in modeling multiplication of fractions (PD Themes 1 & 3)	1	Participate in the discussions based on the use of manipulative materials and other resources (including ICT tools) in modeling multiplication of fractions
WEEK 12 Fractions 2	indetion.		0 mi 0 mi		Assign student teachers to in collaborative groups to outline strategies for planning and teaching multiplication of fractions		Outline strategies for planning and teaching multiplication of fractions in groups
	Connecting common and decimal fractions and percent				Engage student teachers in an interactive group discussion to develop the concepts involving	ie i	Discuss the use of models and manipulatives to develop the concepts involving division of fractions

division of fractions using Work more examples on variety of models and division of fractions manipulatives (e.g fractional charts/boards, Pay attention to the exposition on the need for strips of paper, grids, Cuisenaire rods, connecting common and decimal fractions and percent etc.,) Give exposition on the need for connecting Participate in the group common and decimal activity to connect common fractions and percent and decimal fractions and percent using a variety of Engage student teachers models, manipulatives and in an interactive group other resources, including activity to connect draught board, grids, the common and decimal multi-purpose charts fractions and percent (PD Themes 1 & 3) Engage in a collaborative group work to connect common fractions, decimal fractions, and percent using Engage student teachers knowledge of equivalent to connect common fractions fractions, decimal 3 5 fractions, and percent 6 2 4 8 10 using knowledge of 3 6 9 12 15 equivalent fractions 8 12 16 20 5 10 15 20 25 Lead a discussion to establish the fact that to For example, when converting Applications and decimal fractions are the common fraction $\frac{1}{2}$ to a review common fractions whose decimal fraction, we can use equivalences have the chart above (in an denominators (or extended form) to generate fractional parts) which the equivalent fractions of the are 10 or powers of 10 given fraction, that is, $\frac{1}{2} = \frac{2}{4} = \frac{3}{8} = \frac{5}{10}$. This shows that $\frac{1}{2} = \frac{5}{10} = 0.5$, because the denominator of $\frac{5}{10}$ is 10. Similarly, since $\frac{1}{2} = \frac{5}{10}$, we can represent $\frac{1}{4}$ as follows $\frac{1}{4} = \frac{1}{2} \cdot \frac{1}{2} = \frac{5}{10} \cdot \frac{5}{10} = \frac{25}{100}$. This shows that $\frac{25}{100} = \frac{25}{100} = 0.25$. Participate in the interactive given fraction, that is, Use interactive group activity to identify and outline potential applications of the Participate in the interactive concepts discussed in group activity to identify and this course to PRIMARY outline potential applications SCHOOL curriculum. of the concepts discussed in this course to PRIMARY Engage student teachers SCHOOL curriculum. in a review of the various lessons within the course to ensure mathematical Review of the various lessons connection within the course to ensure mathematical connection

Lesson assessments –	Revision and feedback on Subject Portfolio
evaluation of learning: of,	Revision and reedback on Subject Fortions
for and as learning within	
the lesson	Revision and feedback on Subject Projects
Instructional Resources	Posters; video clips; downloads; models, etc.
instructional Resources	Posters; video clips; downloads; inodels, etc.
Required Text (core)	Arthur, J., Grainger, T. & Wray, D. (2006). Learning to Teach in the Primary School. Canada: Taylor
	& Francis e-Library. https://www.pdfdrive.com/learning-to-teach-in-the-primary-school-
	d20209294.html
	Confer, C. (2005). Teaching Number Sense. Sausalito: Math Solutions Publications.
	https://www.pdfdrive.com/teaching-number-sense-grade-1-d184198309.html.
	Manitoba Education, Citizenship and Youth (2006). Rethinking classroom assessment with purpose
	in mind: assessment for learning, assessment as learning, assessment of learning.
	https://www.pdfdrive.com/assessment-for-learning-assessment-as-learning-assessment-of-
	learning-d6259529.html.
	Roy, G. J. (2014). Developing Prospective Teachers' Understanding of Addition and Subtraction
	with Whole Numbers. Issues in the Undergraduate Mathematics Preparation of School
	Teachers, 2.
Additional Reading List	Lakoff, G. & Núñez, R. E. (2000). Where Mathematics comes from. New York: Basic Books.
	Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Tutor notes. Accra: Unimax
	Publishers.
	Martin, J. et. al. (1994). Mathematics for teacher training in Ghana: Students activities. Accra:
	Unimax Publishers.
CPD Needs	How to design and teach mathematics using the new B. ED. Curriculum, NTS, NTECF, etc
	How to design and/or use some innovative materials and ideas for teaching selected
	concepts based on Classroom assessment in mathematics in PRIMARY SCHOOL1-3.
	How to manage transition of home to school.
	Understand the various characteristics and uniqueness of Primary School learners.
	How to design tasks for assessment procedures for assessment of, as and for learning.
	Instructional strategies needed to consciously engage student teachers on how to design
	and produce portfolios, journals and STS reports.
	and produce portrollos, journals and 313 reports.

Year of B.Ed. 3 Semester 1 Place of lesson in semester 1 2 3 4 5 6 7 8 9 10 11 12

Title of Lesson	End of Ser	nester Reviev	v (Le	ssons 1-	11)		Les	sson Duration	3 Hours	
Lesson description	and Assess conceptua examination	This lesson focuses much on the overview of the whole semester mathematics course: Teaching and Assessing Upper Primary School mathematics. It serves as buffer to contain any unresolved conceptual issues that occurred within the semester. Here issues of how end of semester examination are to be conducted and to prepare the student teachers psychologically enough for incident-free end of semester examinations.						d		
Previous student teacher knowledge, prior learning (assumed)	Student-t mathema semester	student-teachers have studied Teaching and Assessing upper primary school nathematics and can apply various mathematical concepts learnt, throughout the emester, in their assessment.								
Possible barriers to learning in the lesson	efforts sh	ptions abou	t ma	addres	tics and m	ethods of te ore, during a	each	ing mathema fter the lessor	tics. Consci	eds, ious
Lesson Delivery – chosen to support students in achieving the outcomes	Face-to- face	Activity	Wor Base Lean	ed iing	Seminars	Independen Study		e-learning opportunities	Practicum	
Lesson Delivery – main mode of delivery chosen to support student teachers in achieving the learning outcomes.	The factorsThe eproper	exploration, g -learning opp erties of numb endent study	ode v roup ortui oers a	will inclu presentities with and relation	ide lecturer/ tations, think Il include exp tionships bet	a-pair-share moloring numbe ween and am	nome er gar iong :	es discussions, sents, lecture, etc mes and activiti sets of numbers presenting refl	es to develop	р
 Purpose for the lesson, what you want the students to achieve, serves as basis for the learning outcomes. An expanded version of the description. 	Introd they a develor well a Introd teachi	well as, how to teach mathematics to Primary School learners.						s, as s of		
 Learning Outcome for the lesson, picked and developed from the course specification Learning indicators 	Learning C	Outcomes	L	earning	Indicators		issi ski add the	entify Which ues- core an	d transfera , equity	able and
for each learning outcome	key featur basic scho (BSC); and focusing o irrational r (NTS, 2a). Demonstra of socio-cu in teaching	e and ding of the es of the ol curriculum specifically n rational and	5	execu activiti adole mathe is, und ideas, reaso relatio variou numb identi teach mathe	ipate in planting instructicies that can scents become matically produced and engage ning based opiniships amous aspects of er system fy and designing important ematical idea MARY SCHOOLERS	onal make early ne officient; that chematical in logical n ng the the real n tasks for t s in number	•	Personal deveronment of the personal deveronment of the personal deveronment of the personal developing developi	ing, teaching both d in small aring their ith peers ng, critical aking: through sis of facts will leading developm asentation	and ough and to

	including ICT in a variety of ways in teaching fractions and decimal concepts (NTS 3j)	manipul teaching mathem operation of ration number • Use ICT PRIMAR learning • Apprecia of, and so the mat • Coopera carrying tasks in • Engage about he	a variety of atives and TLMs for g important natical ideas such as ons and properties al and irrational seas a tool in supporting Y SCHOOL pupils in number ate the contributions support, colleagues in hematics classroom ate with colleagues in out mathematical a variety of ways in reflective thinking ow mathematics was in their basic school	 Use of ICT: Integrate ICT in developing number and in the mathematics classroom Use of ICT: Integrate ICT in developing number and in the mathematics classroom Respect and diversity: designing lesson for diverse learners with different learning styles Social and communication skills: consciously develop observation and presentation skills during classroom instructions to support student teachers to transfer this to STS
Topic	Sub-topic(s)	Stage/	_	ning to activities to achieve
		Time		depending on delivery mode ead collaborative group work or
			independent.	
			Teacher Activity	Student Activity
	Review	10mins	Review the	Participate in the discussion on various aspects of the real
	Review	TOITIIIS	previous lesson on rational numbers	number system.
			as related to real	, , , , , , , , , , , , , , , , , , , ,
			number system.	
			(PD Theme 1)	
			Introduce the lesson on Real	Initiate verbal exposition and discussions on integers and
			number system;	technology use in Real number
	The Real number system		(PD Themes 1 &3)	system across the PRIMARY SCHOOL curriculum.
	relationships among		Lead discussions	
	the various aspects of	50 mins	on how to connect	Use manipulatives to establish
		20 IIIII13		·
	real number system	50 mins	the various real	the relationship between and
WEEK 9		30 IIIIIIS		·
Rational and Irrational		60 mins	the various real number systems (PD Themes 1 & 3)	the relationship between and among the various real number
	real number system Operations and properties of rational		the various real number systems (PD Themes 1 & 3) Lead discussions	the relationship between and among the various real number systems.
Rational and Irrational	real number system Operations and		the various real number systems (PD Themes 1 & 3)	the relationship between and among the various real number
Rational and Irrational	Operations and properties of rational numbers	60 mins	the various real number systems (PD Themes 1 & 3) Lead discussions on properties and	the relationship between and among the various real number systems. Use manipulatives such as
Rational and Irrational	Operations and properties of rational numbers application of real		the various real number systems (PD Themes 1 & 3) Lead discussions on properties and operations of the	the relationship between and among the various real number systems. Use manipulatives such as number line, Cuisenaire rods, fractional charts, paper folding to explore properties and
Rational and Irrational	Operations and properties of rational numbers	60 mins	the various real number systems (PD Themes 1 & 3) Lead discussions on properties and operations of the real numbers (PD Themes 1 & 3)	the relationship between and among the various real number systems. Use manipulatives such as number line, Cuisenaire rods, fractional charts, paper folding
Rational and Irrational	Operations and properties of rational numbers application of real number system to	60 mins	the various real number systems (PD Themes 1 & 3) Lead discussions on properties and operations of the real numbers (PD Themes 1 & 3) Assign student	the relationship between and among the various real number systems. Use manipulatives such as number line, Cuisenaire rods, fractional charts, paper folding to explore properties and operations of the real numbers
Rational and Irrational	Operations and properties of rational numbers application of real number system to	60 mins	the various real number systems (PD Themes 1 & 3) Lead discussions on properties and operations of the real numbers (PD Themes 1 & 3)	the relationship between and among the various real number systems. Use manipulatives such as number line, Cuisenaire rods, fractional charts, paper folding to explore properties and

Lesson assessments –	Subject Portfolio
evaluation of learning:	Assign student teachers to complete teacher-made worksheets on operations and
of, for and as learning	properties of rational and irrational numbers as found in the PRIMARY SCHOOL
within the lesson	mathematics curriculum (provide immediate feedback)
	Related CLOs: 1, 2, 3
	NTS:
	2 b) Has comprehensive knowledge of the official school curriculum,
	including learning outcomes.
	2b) Has comprehensive knowledge of the official school curriculum, including
	learning outcomes
	3m) Identifies and remediates learners' difficulties or misconceptions, referring
	learners whose needs lie outside the competency of the teacher.
	Note: The assessment procedures should make room for differentiation - gender, equity,
	SEN, and inclusivity.
Instructional Resources	Posters; video clips; downloads; models, etc.
Required Text (core)	Arthur, J., Grainger, T. & Wray, D. (2006). Learning to Teach in the Primary School.
	Canada: Taylor & Francis e-Library. https://www.pdfdrive.com/learning-to-teach-in-the-
	primary-school-d20209294.html
	Confer, C. (2005). Teaching Number Sense. Sausalito: Math Solutions Publications.
	https://www.pdfdrive.com/teaching-number-sense-grade-1-d184198309.html.
	Manitoba Education, Citizenship and Youth (2006). Rethinking classroom assessment with purpose in mind; assessment for learning, assessment as learning, assessment of
	with purpose in mind: assessment for learning, assessment as learning, assessment of learning.

 $^{^{\}rm 1}$ See rubrics on Subject Portfolio Assessment in Annex 6 of NTEAP $^{\rm 2}$ See rubrics on Subject Project Assessment in Annex 6 of NTEAP

- Introduction; a clear statement of aim and purpose of the project-10%
- Methodology; what the student teacher has done and how achieve the purpose of the project-20%
- Substantive or main section-40%
- Conclusion 30%

Component 3: End of Semester Examination- (40% overall)