

PROFESSIONAL DEVELOPMENT PROGRAMME

Tutor Professional Development Handbook: B.Ed. in Initial Teacher Education - Mathematics Year 2 Semester 2

HANDBOOK FOR COORDINATORS





The Government of Ghana



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Foreword

It is a great pleasure and privilege to be asked to write the Foreword to this latest set of Professional Development Handbooks for the Bachelor of Education (B.Ed.) in Initial Teacher Education Year 2 Semester 2 courses.

These Professional Development Handbooks are at the heart of Ghana's ambitious teacher education reforms and have played a key role in the successes achieved to date. The Handbooks aim to ensure that tutors in Colleges of Education are reflecting critically on their methods of teaching and learning and supporting each other to implement the B.Ed. in line with the National Teacher Education Curriculum Framework and National Teacher Education Assessment Policy.

Tutors act as role models for student teachers. If tutors use the 'lecture-method' then this is what student teachers will imitate when they enter basic school classrooms. If tutors use a wide variety of interactive approaches, aligned with the National Teachers' Standards, then these approaches will become standard behaviour for beginning teachers when they graduate.

Over the last six years there is compelling empirical evidence that there has been a substantial shift in tutors' behaviour and approaches. This has had a tremendous impact on student teachers. An annual external evaluation of beginning teachers' classroom practices is carried out nationwide. In the 2015 evaluation only 2% beginning teachers demonstrated competencies and behaviours in the National Teachers' Standards. By 2019 this had increased to 42%. When one considers that these figures are derived from a national sample of all beginning teachers in the country it demonstrates that there has been a genuine transformation in Ghana's teacher education system.

This latest set of Professional Development Handbooks, developed by four mentoring universities (Kwame Nkrumah University of Science and Technology, University of Education, Winneba, University for Development Studies and University of Ghana) and tutors from their affiliated Colleges of Education, represents the first set of Handbooks developed since the onset of the COVID-19 pandemic. COVID-19 has had a significant impact on all of our lives and Colleges of Education should be commended for the way in which they rapidly responded to institutional closures and made the transition to emergency remote teaching and learning. These Handbooks have been designed to reflect the current realities of the blended learning approach which is being used in Colleges of Education and it is hoped that they will play a role in increasing the effectiveness of these new approaches.

These are also the first Professional Development Handbooks to be developed since Transforming Teaching, Education & Learning (T-TEL) was established as a Ghanaian not-for-profit organisation. I would like to take this opportunity to thank both the Ghana Tertiary Education Commission and Mastercard Foundation for their collaboration and support with the 'new T-TEL' which has made the development of these Handbooks possible.

Robin Todd
Executive Director, T-TEL
May 2021

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The New approach to the Weekly Professional Development (PD) Sessions for Tutors

Guidance Notes for the CoE Professional Development Coordinators

Overview

1. Background to the new approach to PD Sessions
2. Features of the B.Ed. PD Sessions
3. The Role of the PDC
4. The Role of the PDC in coordinating the introductory Session for tutors

1. Background to the new approach to PD

- For four years the CoE have been supported in leading weekly Tutor PD Sessions. The PD Sessions have focused on key themes, such as: the NTS, Action research and classroom enquiry among others. The ten theme-based PD modules have been vital in paving the way for the Reform of Teacher Education in Ghana. They have equipped tutors with important skills and knowledge to support the smooth transition to the New B.Ed.
- The New Four-Year B.Ed. will be implemented in CoEs, now affiliated to the Public Universities, and a new approach to the tutors' weekly PD is required. This new approach involves the Universities supporting their affiliated CoE in implementing the subject specific PD Sessions.
- The weekly PD Sessions are designed to prepare subject tutors to use the B.Ed. Course Manuals to teach the 12 lessons in the Course Manuals to student teachers. This means the PD Sessions will now be subject specific. This means there will be subject specific PD groups running each week in the CoEs and universities.
- The PD Sessions are designed to help operationalize the reform of teacher education at tutor and student teacher level and to support:
 - professionalising teaching by supporting teachers in developing communities of practice and raising the status of the teaching profession
 - improving the quality of new teachers by ensuring that they undergo a rigorous and practically focused, high-quality degree level programme
 - improving the learning outcomes and life chances for all children.

2. Features of the B.Ed. PD Sessions

- The universities will prepare the Subject Leads or HoDs from their affiliated CoE to lead the weekly subject tutor Sessions,
- The subject-tutor-groups can work at separate tables in one room. However, in exceptional cases a subject may need to work in another space in order to use specific materials or resources, e.g. video or science equipment,
- The main resources for the weekly tutor Sessions are the Subject Specific Course Manuals and the PD Guidance Notes on each Course Manual,
- Each PD Guidance Note is subject specific and contains two sections. The first section provides guidance for the Introductory Session for tutors. The second section is written to provide information to guide the eight (8) weekly PD Sessions that are linked directly to the twelve lessons in the Course Manual,
- The three-hour Introductory Session is to;
 - introduce the new approach to PD and organisation of the weekly Sessions
 - introduce the course manuals.

- Age Phase:** a. Early Grade
 b. Upper Grade
 c. JHS
 d. JHS

- Name of Courses:** a. Teaching and Assessing Numeracy
 b. Teaching and Assessing mathematics for Upper Primary
 c. Teaching and Assessing JHS Mathematics
 d. Euclidean Geometry

Year 2 Semester 2

TUTOR PD SESSION FOR LESSON 1 IN THE COURSE MANUAL

LESSON TOPIC:

- a. **Early Grade** – The Mathematics Curriculum
 b. **Upper Grade** – The Mathematics Curriculum
 c. **JHS** – School Mathematics Curriculum
 d. **JHS** – Geometrical Proofs

<i>Focus: the bullets provide the frame for what is to be done. The guidance notes in italics identify the prompt the SL/HoD needs and each one must be addressed</i>	<i>Guidance notes on Leading the session. What the SL/HoDs will have to say during each stage of the session</i>	<i>Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the session)</i>	<i>Time in session</i>
Introduction / lesson overview <ul style="list-style-type: none"> • Reflection on previous PD Session (Introduction to the course manual) • Introduction and overview of the main purpose of the lesson in the course manual. 	Introduction <ol style="list-style-type: none"> 1. Ice breaker activity: Begin with an investigational activity on materials used in teaching and learning (e.g. Mention curriculum materials you used in a particular mathematics course.) 2. Let tutors tell how useful the previous PD session was and how it influenced their teaching over the week. 	Introduction <ol style="list-style-type: none"> 1. Engage in an investigational activity (e.g. Mentioning curriculum materials used in a particular mathematics course.) 2. Explain how useful the previous PD session was and how it influenced your teaching and learning 	15 mins

<ul style="list-style-type: none"> • Highlight cross cutting themes i.e., gender equality and social inclusion (GESI), ICT • Identification of important or distinctive aspects of the lesson • Reading and discussion of the introductory sections up to learning outcomes 	<ol style="list-style-type: none"> 3. Ask tutors to state the purpose of the lesson and state their expectations of the PD Session. 4. Through questioning, lead tutors to outline the important features of the course manual. 5. Ask tutors to read the introductory sections (up to Learning Outcomes (LOs)). Let tutors in pairs discuss the important or distinctive aspects of the lesson including vocabulary and fundamental concepts in the lesson. <p>Distinctive aspects include the interactive nature of the activities, emphasis on connecting concepts (The Standard-Based Curriculum, congruent and similar triangles)</p> <ol style="list-style-type: none"> a. Early Grade – Lesson 1 b. Upper Grade – Lesson 1 c. JHS; Assessment – Lesson 1 d. JHS; Euclidean – Lesson 1 	<p>of mathematics over the week.</p> <ol style="list-style-type: none"> 3. State the purpose of the lesson in the course manual and state your expectations of the PD session 4. Outline the important features of the course manual 5. Read the introductory sections (up to learning outcomes) and in pairs/groups discuss the important or distinctive aspects of the lesson (The Standard-Based Curriculum, congruent and similar triangles) and fundamental concepts in the lesson. <p>Refer to Lesson 1</p>	
<p>2. Concept Development (New learning likely to arise in this lesson):</p> <ul style="list-style-type: none"> • Identification and 	<p>Activity 2: Concept Development</p> <ol style="list-style-type: none"> 1. Lead tutors to identify familiar and unfamiliar concepts in the lesson and discuss relevant connections among concepts in the lesson with other lessons and 	<p>Activity 2: Concept Development</p> <ol style="list-style-type: none"> 1. Identify familiar and unfamiliar concepts in the lesson and discuss relevant connections among concepts in the lesson with other lessons and the use of relevant 	<p>25 mins</p>

<p>discussion of concepts</p> <ul style="list-style-type: none"> • Identification of possible challenging areas in teaching of the concept. This may include GESI and ICT related concepts • Identification of needed GESI responsive and ICT resources for the teaching and learning of the concept. 	<p>the use of relevant resources including the basic school curriculum.</p> <ol style="list-style-type: none"> 2. Engage tutors to identify and discuss various strategies for the development of conceptual understanding of the lesson. Let tutors refer to lesson 7 of the course manual for additional strategies. (PD Theme 1 & 3, CCP-PP ix-xxii). 3. Lead tutors to discuss misconceptions and barriers in teaching and learning of the lesson. 4. Let tutors discuss the differences and similarities of the objective and the standard-based curricula. 5. Engage tutors in discussing the nature and structure of the current standard-based and objective-based curricula 6. Ask tutors to outline possible challenging areas in teaching of the mathematics curriculum and geometrical proofs taking into consideration GESI (e. g. identifying areas in the curriculum where 	<p>resources including the basic school curriculum</p> <ol style="list-style-type: none"> 2. In pairs (NTS 3h) identify and discuss familiar and unfamiliar concepts in the lesson. Identify some misconceptions and barriers in teaching and learning of the lesson. (Provide an example here – e.g. curriculum is not the same as syllabus) 3. Discuss some potential misconceptions and barriers with respect to the teaching and learning of the lesson. 4. In pairs discuss the differences and similarities of the objective-based and the standard-based curricula. 5. Discuss in detail the nature and structure of the current standard-based and objective based curricula 6. Outline possible challenging areas in the teaching of the mathematics curriculum and/or geometrical proofs taking into consideration GESI. (e.g ensure language is gender neutral where possible 	
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	stereotypes are reinforced).	and examples reinforcing stereotypes are avoided)									
<p>3. Teaching and learning activities</p> <ul style="list-style-type: none"> • Reading of teaching and learning activities and identification of areas that require clarification especially GESI related activities. • Reading of teaching and learning activities and identification of GESI and ICT issues that require clarification. 	<p>Teaching and learning activities</p> <ol style="list-style-type: none"> 1. Ask tutors to suggest teaching and learning activities for the lesson taking into account GESI issues and refer them to the activities outlined in the course manual eg. i. Provision made for physically challenged ii. Both genders take leading roles in group task iii. work and even distribution of questions Ref: Writing the weekly PD session-pp 3., NTS 1a, b, c, d, 2b, e, f, 3b, c 2. Lead tutors to brainstorm and come up with some pedagogical approaches and their related core competencies likely to be inculcated CoE students and extended to basic school learners through STS activities. eg. <table border="1"> <tr> <td>Strategy</td> <td>Core Competency</td> </tr> <tr> <td>Group Work</td> <td>Collaborative learning</td> </tr> <tr> <td>Investigation</td> <td>Critical Thinking</td> </tr> <tr> <td>Role Play</td> <td>Communication</td> </tr> </table> <p>(Students can ascertain the extent to which methods are used during STS activities in schools).</p>	Strategy	Core Competency	Group Work	Collaborative learning	Investigation	Critical Thinking	Role Play	Communication	<p>Teaching and learning activities</p> <ol style="list-style-type: none"> 1. Suggest teaching and learning activities for the lesson taking into account Gender Equality and Social Inclusion (GESI) issues. Ref: Writing the weekly PD session-pp 3., NTS 1a, b, c, d, 2b, e, f, 3b, c 2. Brainstorm and come up with some pedagogical approaches and their likely related core competencies to be inculcated in CoE students and extended to basic school learners through STS activities. (Students can ascertain the extent to which methods are used during STS activities in schools). 	40 mins
Strategy	Core Competency										
Group Work	Collaborative learning										
Investigation	Critical Thinking										
Role Play	Communication										

	<p>3. Engage tutors in pairs to discuss strategies to strengthen core competences (e.g. mind- reading word puzzle, investigation, etc.).</p> <p>4. Let a tutor model a presentation of an activity using ICT tools and taking into consideration GESI (e.g. making adjustments for physically challenged learners, and getting both male and female participants to play leading roles in group work) in the B.ED and the Basic School Curricula (BSC). NTS 1a, b, c, d, 2b, e, 3b, c, J; BSC pp. iii)</p>	<p>3. Discuss strategies to strengthen core competences (e.g. mind-reading word puzzle, investigation, etc.)</p> <p>4. Model a presentation of an activity using ICT tools and taking into consideration GESI (e.g. making adjustments for physically challenged learners, and getting both male and female participants to play leading roles in group work) in the B.ED and the Basic School Curricula (BSC). NTS 1a, b, c, d, 2b, e, 3b, c, J; BSC pp. iii)</p>	
<p>4. Review of Assessment component Reading of assessment opportunities and ensuring they are aligned to the NTEAP and required course assessment: subject project (30%), subject portfolio (30%) and end of semester examination (40%) Working through one or two activities,</p>	<p>Review of Assessment Components</p> <p>1. Ask tutors to review the assessment components of the lesson in the course manual focusing on assessment of, as and for in line with the NTEAP</p> <p>a. Early Grade – The Mathematics Curriculum can be reviewed taking into consideration subject project (30%), subject portfolio (30%)</p> <p>b. Upper Grade – The Mathematics Curriculum can be reviewed taking into consideration subject project (30%), subject portfolio (30%)</p>	<p>Review of Assessment Components</p> <p>1. Review the assessment components of the lesson in the course manual focusing on assessment of, as and for in line with the NTEAP. Note the various sections of the lesson that could be reviewed in line with subject project (30%) and subject portfolio (30%)</p>	15mins

	<p>c. JHS – School Mathematics Curriculum can be reviewed taking into consideration subject project (30%), subject portfolio (30%)</p> <p>d. JHS – Geometrical Proofs can be reviewed taking into consideration subject project (30%), subject portfolio (30%)</p> <ol style="list-style-type: none"> 2. Ask tutors to identify teaching and learning resources and the concepts they can help learners use in proofs in JHS). 3. Ask tutors to discuss the assessment strategies to be used during teaching of the lesson at the various levels (KG, UP, JHS)– ‘Assessment as’ (NTS 3k). 4. Lead tutors to discuss the various ways they can support student teachers to build their portfolios before/during/ after lessons 	<ol style="list-style-type: none"> 2. Identify teaching and learning resources and the concepts they can help learners use in proofs in JHS). 3. Discuss the assessment strategies to be used during teaching of the lesson – ‘Assessment as’ (NTS 3k). 4. Discuss the various ways you can support student teachers to build their portfolios before/during/after lessons. 	
<p>Resources</p> <p>Guidance notes for SL/HoD should</p> <ul style="list-style-type: none"> • Identify any aspect of the lesson that might be challenging for tutors in terms of new learning, and 	<p>Resources</p> <ol style="list-style-type: none"> 1. Support tutors to identify inclusive resources such as posters with large prints for partially sighted learners, engaging experts in sign language, making use of projectors, flip charts, sticky notes, tactile, audio-visuals, visuals, audio, teachers and 	<p>Resources</p> <ol style="list-style-type: none"> 1. Identify as many GESI responsive resources as possible that can be used in the teaching and learning of the concepts to be introduced in the lesson. 	<p>10 mins</p>

<p>which needs to be considered prior to taking tutors through the lesson activities “walk through”. Equity and inclusion issues as well as ICT resources need consideration</p> <ul style="list-style-type: none"> • The resources needed must be identified: literature – page referenced etc, on web, YouTube, physical resources, power point; how they should be used. Consideration needs to be given to local availability • This section can build on the PD needs identified from the course manuals 	<p>learners resource packs, textbooks, course manual, pairs of compasses and ruler and addition mat, that can be used in the teaching and learning of the concepts introduced in the lesson NTS 3j</p> <ol style="list-style-type: none"> 2. Discuss with tutors how and where human and material resources including low or no cost materials for the lesson could be obtained in advance. Such material could include 3. Ask tutors, in pairs (NTS 3h), select a concept through balloting and design resources that can be used in the teaching and learning of the concepts selected (NTS 3j). 	<ol style="list-style-type: none"> 2. Participate in discussing how and where human and material resources including low or no cost materials for the lesson could be obtained in advance. 3. In pairs (NTS 3h), select a concept through balloting and design resources that can be used in the teaching and learning of the concept selected (NTS 3j). 	
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<p>Evaluation and review of session Guidance notes for SL/HoD should</p> <ul style="list-style-type: none"> Select activities, linked to CLO and indicators, from the lesson that are likely to be most different from tutors' previous experience. These could involve applying new content, e.g. from section 2, or approaches to teaching, learning and assessment, incl. gender responsive, differentiation and inclusive approaches and use of appropriate ICT tools. Identify how any assessments during the lesson relate to course assessment components The selected activities 	<p>Reflective Activity</p> <ol style="list-style-type: none"> Engage tutors in the evaluation of the session and encourage them to provide feedback on the PD session (NTS 1a, 3i). Take note of all unresolved issues and use any of following strategies <ul style="list-style-type: none"> discuss with SL/SWL put on SL/SWL WhatsApp platform for discussion tutors to research and report findings on shared platforms. <p>Advance Preparation Ask tutors to read Lesson 2 of the Course Manual on: Early Grade - Counting and Number Relationships Upper Primary - Counting and Number Relationships JHS; Assessment - Geometric Proofs: <i>Learning, teaching and applying 2</i> JHS Euclidean Geometry - Standards-based versus objective-based curriculum JHS</p> <p>N/B</p> <p>i) <i>Remind tutors to identify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a).</i></p>	<p>Reflective Activity</p> <ol style="list-style-type: none"> Show by 5 or 3 or 1 finger(s) if you "really got it", "got some of it" or "didn't get it" respectively. If you showed 5 fingers, share your experience with your colleagues Deal with unresolved issues through sharing the issues on the various electronic platforms and/or seeking solutions through research. <p>Advance Preparation Read Lesson 2 of the Course Manual on: Early Grade - Counting and Number Relationships Upper Primary - Counting and Number Relationships JHS; Assessment - Geometric Proofs: <i>Learning, teaching and applying 2</i> JHS Euclidean Geometry - Standards-based versus objective-based curriculum JHS</p> <p>N/B</p> <p>i) <i>Get a critical friend from the same or related discipline to observe your lesson during teaching and provide feedback (NTS 1a).</i></p>	<p>5 mins</p>
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<p>should be done with tutors in real or close to real time</p> <ul style="list-style-type: none"> • Anticipate any issues for clarification or questions which might arise as the tutors work through the activities and provide guidance on these. • Identify where, and which, core and transferable skills, including digital skills, are being developed or applied • Makes links to the existing PD Themes with page reference where they can support teaching, for example: action research, questioning and to other external reference material • Identify where power point 	<p>ii) <i>Read the course manual, the PD session guide ahead of time to identify any outstanding issues relating to this lesson for clarification.</i></p> <p>iii) <i>Collect all resources (such as projector, flip chart and sticky notes) you need ahead of time, prepare samples of TLMs you may need and rehearse how these may be used to support the achievement of your goals</i></p>	<p>ii) <i>Read the course manual, the PD session guide ahead of time to identify any outstanding issues relating to this lesson for clarification.</i></p> <p>iii) <i>Collect all resources (such as projector, flip chart and sticky notes) you need ahead of time, prepare samples of TLMs you may need and rehearse how these may be used to support the achievement of your goals</i></p>	
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<p>presentations or other resources need to be developed to support learning and provide guidance Identify resources required for any TLMs and provide guidance on their development</p>			
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- Age Phase:** a. Early Grade
 b. Upper Grade
 c. JHS
 d. JHS

- Name of Courses:** a. Teaching and Assessing Numeracy
 b. Teaching and Assessing mathematics for Upper Primary
 c. Teaching and Assessing JHS Mathematics
 d. Euclidean Geometry

Year 2 Semester 2

TUTOR PD SESSION FOR LESSON 2 IN THE COURSE MANUAL

Lesson Topic: Curriculum, Counting, Number Relationships and Geometric Proofs 2

<p><i>Focus: the bullets provide the frame for what is to be done. The guidance notes in italics identify the prompt the SL/HoD needs and each one must be addressed</i></p>	<p><i>Guidance notes on Leading the session. What the SL/HoDs will have to say during each stage of the session</i></p>	<p><i>Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the session)</i></p>	<p><i>Time in session</i></p>
<p>1. Introduction / lesson overview</p> <ul style="list-style-type: none"> • Reflection on previous PD Session (Introduction to the course manual) • Introduction and overview of the main purpose of the lesson in the course manual. • Highlight cross cutting themes i.e., gender equality and social inclusion (GESI), ICT • Identification of important or distinctive 	<p>Introduction</p> <ol style="list-style-type: none"> 1. Ice breaker activity: Begin with an investigational activity (e.g. In what ways do you learn mathematics?) 2. Ask a critical friend to give feedback on observation during the enactment of Lesson 1. 3. Ask tutors to tell how useful the previous PD session was (NTS 1b) and how it influenced their teaching over the week. 	<p>Introduction</p> <ol style="list-style-type: none"> 1. Engage in an investigational activity (e.g. In what ways do you learn mathematics?) 2. Share with members feedback on observation during the teaching of Lesson 1. 3. Tell colleagues about how useful the previous PD session was and how it influenced your teaching over the week. 	<p>15 mins</p>

<p>aspects of the lesson</p> <ul style="list-style-type: none"> • Reading and discussion of the introductory sections up to learning outcomes 	<ol style="list-style-type: none"> 4. Lead tutors through questioning to state and explain the purpose of the lesson (NTS 2b) and state their expectations of the PD Session. 5. Lead tutors to outline the important features of the lesson in the course manual taking note of cross cutting themes i.e., gender equality and social inclusion (GESI), ICT 6. Ask tutors to read the introductory sections (up to learning outcomes) silently and discuss the importance or distinctive aspects of the lesson (i.e. the interactive nature of the activities, emphasis on integrated curriculum, counting, number relationships and geometric proofs 2) and suggest the relevant students' previous knowledge that can support the teaching and learning of the lesson. Refer to course manual, Lesson 2 	<ol style="list-style-type: none"> 4. State and explain the purpose of the lesson (NTS 2b) in the course manual and state your expectations of the PD session. 5. Identify the important features of the lesson in the course manual taking note of cross cutting themes i.e., gender equality and social inclusion (GESI), ICT. 6. Read the introductory sections (up to learning outcomes) silently and in pairs/groups discuss the importance or distinctive aspects of the lesson (i.e. the interactive nature of the activities, emphasis on integrated curriculum, counting, number relationships and geometric proofs 2) and suggest the relevant students' previous knowledge that can support the teaching and learning of the lesson. Refer to course manual, Lesson 2 	
<p>2. Concept Development (New learning likely to arise in this lesson):</p> <ul style="list-style-type: none"> • Identification and discussion of concepts 	<p>Concept Development</p> <ol style="list-style-type: none"> 1. Lead tutors to identify familiar and unfamiliar concepts in the lesson and discuss relevant connections among concepts in the lesson with other lessons and 	<p>Concept Development</p> <ol style="list-style-type: none"> 1. Identify familiar and unfamiliar concepts in the lesson and discuss relevant connections among concepts in the lesson with other lessons 	<p>25 mins</p>

<ul style="list-style-type: none"> • Identification of possible challenging areas in teaching of the concept. This may include GESI and ICT related concepts • Identification of needed GESI responsive and ICT resources for the teaching and learning of the concept. 	<p>the use of relevant resources including the basic school curriculum.</p> <p>Example;</p> <ol style="list-style-type: none"> i. Standards-based and objective-based curricula (BSC content standard B4.1.1.1; B5.1.1.1; B6.1.1.1) ii. Skip counting forwards and backwards(SBC content standard B4.1.1.1; B5.1.1.1; B6.1.1.1) iii. Congruence iv. Pythagoras theorem <ol style="list-style-type: none"> 2. Engage tutors to identify and discuss various strategies for the development of conceptual understanding of the lesson. Example: Interactive, Internet search, Model lessons, Exploratory (Let tutors refer to Lesson 2 of the course manual for additional strategies.) 3. Ask tutors in pairs to investigate some ways of applying skip counting forwards and backwards, congruence of similar triangles, Pythagoras theorem and Standards-based and objective-based curricula. 4. Lead tutors to explore potential misconceptions of teaching and learning “skip counting forwards 	<p>and the use of relevant resources including the basic school curriculum.</p> <ol style="list-style-type: none"> 2. Participate in the identification and discussion of various strategies for the development of conceptual understanding of the lesson 3. In pairs discuss some practical ways of applying skip counting forwards and backwards, congruence of similar triangle, Pythagoras theorem and Standards-based and objective-based curricula. 4. Explore potential misconceptions of teaching and learning “skip counting forwards and 	
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	<p>and backwards”, “congruence of similar triangle”, “Pythagoras theorem” and “Standards-based and objective-based curricula”. (eg. “all similar triangles are congruent”)</p> <p>Barriers: <i>Inappropriate inclusive resources</i> <i>Limited use of technology</i> <i>Inadequate pre-requisite knowledge</i></p> <p>N/B: <i>Refer tutors to the lesson 2 of the course manual for other potential misconceptions and barriers.</i></p> <p>5. Ask tutors to outline possible challenging areas in teaching of the concepts such as skip counting forwards and backwards, congruence of similar triangle and Pythagoras theorem and Standards-based and objective-based curricula Eg misapplying the rule of patterns.</p> <p>6. Have tutors suggest creative approaches of addressing the identified challenges. Eg. Selection model for counting problems, using the principle of multiple embodiment.</p>	<p>backwards”, “congruence of similar triangle”, “Pythagoras theorem” and “Standards-based and objective-based curricula”.</p> <p>5. Outline possible challenging areas in teaching concepts such as skip counting forwards and backwards, congruence of similar triangle and Pythagoras theorem.</p> <p>6. Suggest creative approaches of addressing the identified challenges.</p>	
<p>3. Teaching, learning and assessment activities for the lesson</p>	<p>Teaching and learning activities for the lesson</p> <p>1. Ask tutors to suggest teaching and learning activities for the lesson</p>	<p>Teaching and learning activities for the lesson</p> <p>1. Suggest teaching and learning activities that can be used in</p>	<p>40 mins</p>

<ul style="list-style-type: none"> • Reading of teaching and learning activities and identification of areas that require clarification especially GESI related activities. • Reading of teaching and learning activities and identification of GESI and ICT issues that require clarification. 	<p>taking into account Gender Equality and Social Inclusion (GESI) (eg. both male and female participants playing the leading roles in group work, even distribution of questions) issues and refer them to the activities outlined in the course manual (writing the weekly PD session- pp 3., NTS 1a, b, c, d, 2b, e, f, 3b, c;</p> <p>2. Lead tutors to brainstorm to come up with some pedagogical approaches and their related core competencies likely to be inculcated in CoE students and extended to basic school learners through STS activities.</p> <p>Example: Group Work - Collaborative learning Investigation - Critical Thinking Role Play - Communication Students can ascertain the extent to which methods are used during STS activities in schools.</p> <p>3. Engage tutors in pairs to discuss strategies to strengthen core competencies (e.g. mind- reading word puzzle, investigation, creating variant tasks and solutions, identifying applications</p>	<p>teaching the lesson taking into account GESI issues (eg. both male and female participants playing the leading roles in group work, even distribution of questions). Read the activities in the course manual lesson 2 and identify those that require clarification (NTS 1a, b, c, d, 2b, e, f, 3b, c; BSC p. iii).</p> <p>2. Brainstorm to come up with some pedagogical approaches and their likely related core competencies to be inculcated in CoE students and extended to basic school learners through STS activities.</p> <p>(Students can ascertain the extent to which methods are used during STS activities in schools).</p> <p>3. Discuss the strategies to strengthen core competencies</p>	
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	<p>of theorems and postulates making connections between topics and concepts, etc.)</p> <p>4. Let a tutor model a presentation of an activity using ICT tools and taking into consideration GESI (eg. both male and female participants playing leading roles in their groups and in the demonstration of the use of ICT tools) in the B.ED and the Basic School Curricula (BSC). NTS 1a, b, c, d, 2b, e, 3b, c, J; BSC pp. iii)</p> <p>NOTE:</p> <ul style="list-style-type: none"> ✓ <i>Tutors are likely to ask about the relevance of this activity in teaching mathematics lessons. When this comes up, refer them to the PD Theme 1, that is, Creative Approaches</i> ✓ <i>The core and transferable skills being developed or used include social skills, communication skills, critical and creative thinking skills</i> ✓ <i>Creative Activities, Questioning, Talk and Learn and Group Work can be used to support the delivery of this session</i> 	<p>4. Discuss one or two of the activities to ensure understanding and model alternative strategies for the activities using ICT tools and taking into consideration GESI (e.g. both male and female participants playing in the B.ED and the Basic School Curricula (BSC). NTS 1a, b, c, d, 2b, e, 3b, c, J; BSC pp. iii)</p>	
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<p>4. Review of Assessment component Reading of assessment opportunities and ensuring they are aligned to the NTEAP and required course assessment: subject project (30%), subject portfolio (30%) and end of semester examination (40%) Working through one or two activities.</p>	<p>Review of Assessment Components</p> <ol style="list-style-type: none"> 1. Ask tutors to review the assessment components of the lesson in the course manual focusing on assessment of, as and for in line with the NTEAP <ol style="list-style-type: none"> i. Early Grade – Standards-based and objective-based curricula could be reviewed in line with subject project (30%) and subject portfolio (30%) ii. Upper Grade – Skip counting forwards and backwards could be reviewed in line with subject project (30%) and subject portfolio (30%) iii. JHS – Congruence could be reviewed in line with subject project (30%) and subject portfolio (30%) iv. JHS – Pythagoras theorem could be reviewed in line with subject project (30%) and subject portfolio (30%) 2. Lead tutors to discuss the various ways they can support student teachers to build their portfolios before/during/ after lessons. 	<p>Review of Assessment Components</p> <ol style="list-style-type: none"> 1. Review the assessment components of the lesson in the course manual focusing on assessment of, as and for in line with the NTEAP Look at the various sections of the lesson that could be reviewed in line with subject project (30%) and subject portfolio (30%) 2. Discuss the various ways you can support student teachers to build their portfolios before/during/ after lessons 	<p>15 mins</p>
<p>Resources Guidance notes for SL/HoD should</p> <ul style="list-style-type: none"> • Identify any aspect of the lesson that might be challenging for 	<p>Resources</p> <ol style="list-style-type: none"> 1. Support tutors to identify inclusive resources such as posters with large prints for partially sighted learners, engaging experts in sign 	<p>Resources</p> <ol style="list-style-type: none"> 1. Identify as many GESI responsive resources as possible that can be used in the teaching and learning of the concepts mentioned above – The BSC 	<p>10 mins</p>

<p>tutors in terms of new learning, and which needs to be considered prior to taking tutors through the lesson activities “walk through”. Equity and inclusion issues as well as ICT resources need consideration</p> <ul style="list-style-type: none"> • The resources needed must be identified: literature – page referenced etc, on web, YouTube, physical resources, power point; how they should be used. Consideration needs to be given to local availability • This section can build on the PD needs identified from the course manuals 	<p>language, making use of projectors, flip charts, sticky notes, tactile materials, audio-visuals, visuals, audio, teachers and learners resource packs, textbooks, course manual, graph sheets and number charts that can be used in the teaching and learning of the concepts mentioned above – curriculum, counting, number relationships and geometric proofs. NTS 3j</p> <ol style="list-style-type: none"> 2. Ask tutors, in pairs (NTS 3h), select a concept through balloting and design resources that can be used in the teaching and learning of the concept s selected (NTS 3j). 3. Encourage tutors to prepare samples of TLMs for teaching of patterns in shapes using no-low-cost materials (e.g. triangles) 	<p>curriculum, counting, number relationships and geometric proof. NTS 3j</p> <ol style="list-style-type: none"> 2. In pairs (NTS 3h), select a concept through balloting and design resources that can be used in the teaching and learning of the concept selected (NTS 3j). 3. Discuss the need for using local, low or no cost materials to design and use resources for teaching shapes 	
<p>Evaluation and review of session</p> <p>Guidance notes for SL/HoD should</p> <ul style="list-style-type: none"> • Select activities, linked to CLO and indicators, from the lesson that are likely to be most different from 	<p>Reflective Activity</p> <ol style="list-style-type: none"> 1. Engage tutors in the evaluation of the session and encourage them to provide feedback on the PD session (NTS 1a, 3i). 	<p>Reflective Activity</p> <ol style="list-style-type: none"> 1. Show by 5 or 3 or 1 finger(s) if you “really got it”, “got some of it” or “didn’t get it” respectively. If you showed 5 fingers, share your experience with your colleagues 	<p>5 mins</p>

<p>tutors' previous experience. These could involve applying new content, e.g. from section 2, or approaches to teaching, learning and assessment, incl. gender responsive, differentiation and inclusive approaches and use of appropriate ICT tools.</p> <ul style="list-style-type: none"> • Identify how any assessments during the lesson relate to course assessment components • The selected activities should be done with tutors in real or close to real time • Anticipate any issues for clarification or questions which might arise as the tutors work through the activities and provide guidance on these. • Identify where, and which, core and transferable skills, including 	<ol style="list-style-type: none"> 2. Engage tutors to identify unresolved issues relating to this lesson for clarification 3. Lead tutors to take note of all unresolved issues and use any of following strategies <ol style="list-style-type: none"> i. discuss with SL/SWL ii. put on SL/SWL WhatsApp platform for discussion iii. tutors to research for the next PD session for discussion <p>Advance Preparation</p> <ol style="list-style-type: none"> 1. Ask tutors to read Lesson 3 of the Course Manual <ol style="list-style-type: none"> a. Early Grade – Counting and Number Relationships 2 b. Upper Grade – Place value 10 to 1,000 c. JHS; Assessment – Number and Numeration systems d. JHS; Euclidean – Lines and Circles: Teaching, Learning and Applying <p>N.B</p> <p>Remind tutors to:</p> <ol style="list-style-type: none"> i. identify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a). 	<ol style="list-style-type: none"> 2. Reflect on the activities in the session and identify unresolved issues relating to the lesson 3. Deal with unresolved issues through WhatsApp platform for discussion and/or research <p>Advance Preparation</p> <ol style="list-style-type: none"> 1. Read Lesson 3 of the Course Manual to identify issues of concern. <ol style="list-style-type: none"> a. Early Grade – Counting and Number Relationships 2 b. Upper Grade – Place value 10 to 1,000 c. JHS; Assessment – Number and Numeration systems d. JHS; Euclidean – Lines and Circles: Teaching, Learning and Applying <p>N.B</p> <ol style="list-style-type: none"> i. Get a critical friend from the same or related discipline to observe your lesson during teaching and provide feedback (NTS 1a). ii. Read the course manual for the next PD lesson, 	
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<p>digital skills, are being developed or applied</p> <ul style="list-style-type: none"> • Makes links to the existing PD Themes with page reference where they can support teaching, for example: action research, questioning and to other external reference material • Identify where power point presentations or other resources need to be developed to support learning and provide guidance • Identify resources required for any TLMs and provide guidance on their development 	<p><i>ii.</i> read the course manual for the next PD lesson, ahead of time to identify any outstanding issues relating to this lesson for clarification.</p> <p><i>iii.</i> collect all resources (such as projector, flip chart and sticky notes) they need ahead of time, prepare samples of TLMs you may need and rehearse how these may be used to support the achievement of their goals.</p>	<p>ahead of time to identify any outstanding issues relating to this lesson for clarification.</p> <p><i>iii.</i> Collect all resources you need ahead of time, prepare samples of TLMs you may need and rehearse how these may be used to support the achievement of your goals.</p>	
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- Age Phase:** a. Early Grade
 b. Upper Grade
 c. JHS
 d. JHS

- Name of Courses:** a. Teaching and Assessing Numeracy
 b. Teaching and Assessing mathematics for Upper Primary
 c. Teaching and Assessing JHS Mathematics
 d. Euclidean Geometry

Year 2 Semester 2

TUTOR PD SESSION FOR LESSON 3 IN THE COURSE MANUAL

LESSON TOPIC:

- a. **Early Grade** - Counting and Number Relationships,
 b. **Upper Grade** - Place value
 c. **JHS** - Number and Numeration systems
 d. **JHS** - Lines and Circles

<i>Focus: the bullets provide the frame for what is to be done. The guidance notes in italics identify the prompt the SL/HoD needs and each one must be addressed</i>	<i>Guidance notes on Leading the session. What the SL/HoDs will have to say during each stage of the session</i>	<i>Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the session)</i>	<i>Time in session</i>
Introduction / lesson overview <ul style="list-style-type: none"> • Reflection on previous PD Session (Introduction to the course manual) • Introduction and overview of the main purpose of the lesson in the course manual. • Highlight cross cutting themes i.e., gender equality and social inclusion (GESI), ICT 	Introduction <ol style="list-style-type: none"> 1. Ice breaker activity: Begin with an investigational activity (e.g. Puzzle and questioning etc.). 2. Let tutors tell how useful the PD session 2 was and how it influenced their teaching in semester two. (NTS 1b) 3. Ask a critical friend to give feedback on his/her observation of the last enacted lesson. 	Introduction <ol style="list-style-type: none"> 1. Engage in an investigational activity (e.g. Puzzle and Questioning) 2. Tell how useful the PD session 2 was and how it influenced your teaching in semester two. (NTS 1b) 3. As the critical friend, share with members feedback on your observation of the last enacted lesson. 	15 mins

<ul style="list-style-type: none"> • Identification of important or distinctive aspects of the lesson • Reading and discussion of the introductory sections up to learning outcomes • Introduction and overview of the main purpose of the lesson in the course manual • Identification of important or distinctive aspects of the lesson • Reading and discussion of the introductory sections up to learning outcomes 	<p>4. Lead tutors through questioning to state and explain the purpose of the lesson (NTS 2b) and state their expectations of the PD Session.</p> <p>5. Ask tutors to read the introductory sections (up to learning outcomes) silently. Let tutors in pairs discuss the important or distinctive aspects of the lesson (e.g., the interactive nature of the activities) and suggest the relevant students' previous knowledge that can support the teaching and learning of the lesson. Counting and Number Relationships - EGE , Place value- Upper Primary Lesson 3, lines and cycles - JHS Lesson 3, Number system - JHS Lesson 3</p>	<p>4. State and explain the purpose of the lesson (NTS 2b) and state their expectations of the PD Session.</p> <p>5. Read the introductory sections (up to learning outcomes) silently. Let tutors in pairs discuss the important or distinctive aspects of the lesson (e.g., the interactive nature of the activities) and suggest the relevant students' previous knowledge that can support the teaching and learning of the lesson. Refer to Course Manual Lesson 3:</p>	
<p>2. Concept Development (New learning likely to arise in this lesson):</p> <ul style="list-style-type: none"> • Identification and discussion of concepts • Identification of possible challenging areas in teaching of the concept. This may include GESI and ICT related concepts • Identification of needed GESI responsive and 	<p>Concept Development</p> <p>1. Lead tutors to identify familiar and unfamiliar concepts in the lesson and discuss relevant connections among concepts in the lesson with other lessons and the use of relevant resources including the basic school curriculum.</p> <p>2. Engage tutors to identify and discuss various strategies for the development of conceptual</p>	<p>Concept Development</p> <p>1. Identify familiar and unfamiliar concepts in the lesson and discuss relevant connections among concepts in the lesson with other lessons and the use of relevant resources including the basic school curriculum.</p> <p>2. Participate in the identification and discussion and discuss various strategies for the</p>	<p>25 mins</p>

<p>ICT resources for the teaching and learning of the concept.</p>	<p>understanding of the lesson. Vocabulary and fundamental concepts related to Counting and Number Relationships in EGE, Place value in UPP Pry, lines and cycles in JHS course, Number system in JHS course. Example: Interactive, Internet search, Model lessons, Exploratory (Let tutors refer to lesson 2 of the course manual for additional strategies.) Refer to Course Manual, lesson 3</p> <p>3. Lead tutors to discuss misconceptions and barriers in teaching and learning of the concepts to be introduced in the lesson.</p> <p>4. Engage Tutor on how the concepts in the lesson (eg. Lines) are used both in school mathematics and life outside the mathematics classroom</p> <p>5. Ask tutors to outline possible challenging areas in the teaching and learning of counting and number relationships, lines and circles, place value and number and numeration systems.</p>	<p>development of conceptual understanding of the lesson Refer to Lesson 3.</p> <p>3. Discuss some potential misconceptions and barriers with respect to the teaching and learning of the concepts to be introduced in the lesson.</p> <p>4. Discuss how the concepts in the lesson (e.g. lines) are used both in school mathematics and life outside the mathematics classroom</p> <p>5. outline possible challenging areas in the teaching and learning of counting and number relationships, place value, number and numeration systems and lines and circles</p>	
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<p>3. Teaching, learning and assessment activities for the lesson</p> <ul style="list-style-type: none"> • Reading of teaching and learning activities and identification of areas that require clarification especially GESI related activities. • Reading of teaching and learning activities and identification of GESI and ICT issues that require clarification. 	<p>Teaching and learning activities for the lesson</p> <ol style="list-style-type: none"> 1. Ask tutors to suggest teaching and learning activities for the lesson taking into account GESI (e.g. both male and female participants playing the leading roles in group work, even distribution of questions) and refer them to the activities outlined in the course manual (writing the weekly PD session-pp 3; NTS 1a, b, c, d, 2b, e, f, 3b, c; BSC pp. iii) 2. Lead tutors to brainstorm come up with some pedagogical approaches and their related core competencies likely to be inculcated in CoE students and extended to basic school learners through STS activities. eg. <table border="1" data-bbox="528 1473 906 1731"> <thead> <tr> <th>Strategy</th> <th>Core Competency</th> </tr> </thead> <tbody> <tr> <td>Group Work</td> <td>Collaborative learning</td> </tr> <tr> <td>Investigation</td> <td>Critical Thinking</td> </tr> <tr> <td>Role Play</td> <td>Communication</td> </tr> </tbody> </table> <p>Students can ascertain the extent to which methods are used during STS activities in schools.</p> 3. Engage tutors in a discussion of inclusive strategies to clarify the 	Strategy	Core Competency	Group Work	Collaborative learning	Investigation	Critical Thinking	Role Play	Communication	<p>Teaching and learning activities for the lesson</p> <ol style="list-style-type: none"> 1. Suggest teaching and learning activities that can be used in teaching the lesson taking into account GESI (e.g. both male and female participants playing the leading roles in group work, even distribution of questions). Read the activities in the course manual (pp. 12 &16), and identify those that require clarification (NTS 1a, b, c, d, 2b, e, f, 3b, c; BSC p. iii). 2. Brainstorm to come up with some pedagogical approaches and their likely related core competencies to be inculcated in CoE students and extended to basic school learners through STS activities. (Students can ascertain the extent to which methods are used during STS activities in schools). 3. Discuss the strategies to clear 	<p>40 mins</p>
Strategy	Core Competency										
Group Work	Collaborative learning										
Investigation	Critical Thinking										
Role Play	Communication										

	<p>otherwise dark spots (e.g. using Selection model for counting problems and principle of multiple embodiment etc.)</p> <p>4. Engage tutors in pairs to discuss strategies to strengthen core competencies (e.g. mind-reading word puzzle, investigation, creating variant tasks and solutions, identifying applications of concepts and making connections between topics and concepts).</p> <p>5. Let a tutor model the presentation of an activity using ICT tools, taking into consideration GESI issues in the B.ED and the Basic School Mathematics Curricula (BSMC), NTS 1a, b, c, d, 2b, e, 3b, c; BSC pp. iii)</p> <p>N.B <i>Tutors are likely to ask about the relevance of this activity in teaching mathematics lessons. When this comes up, refer them to PD Manuals</i></p> <p><i>i. that is, Creative Approaches</i></p> <p><i>ii. The core and transferable skills being developed or used include social skills, communication</i></p>	<p>potential uncertainties</p> <p>4. Discuss the strategies to strengthen core competencies. Discuss one or two of the activities to ensure understanding.</p> <p>5. Model alternative strategies for the activities using ICT tools and taking into consideration GESI issues in the B.ED and the Basic School Curricula (BSC). NTS 1a, b, c, d, 2b, e, 3b, c, J; BSC pp. iii)</p>	
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	<p><i>skills, critical and creative thinking skills</i></p> <p><i>iii. Creative Activities, Questioning, Talk and Learn and Group Work can be used to support the delivery of this session</i></p>		
<p>4. Review of Assessment component Reading of assessment opportunities and ensuring they are aligned to the NTEAP and required course assessment: subject project (30%), subject portfolio (30%) and end of semester examination (40%) Working through one or two activities.</p>	<p>Review of Assessment Components</p> <p>1. Ask tutors to review the assessment components of the lesson in the course manual focusing on assessment of, as and for in line with the NTEAP Ref. Course Manual, Lesson 3</p> <p>a. Early Grade – The Mathematics Curriculum can be reviewed taking into consideration subject project (30%), subject portfolio (30%)</p> <p>b. Upper Grade – The Mathematics Curriculum can be reviewed taking into consideration subject project (30%), subject portfolio (30%)</p> <p>c. JHS – School Mathematics Curriculum can be reviewed taking into consideration subject project (30%), subject portfolio (30%)</p> <p>d. JHS – Geometrical Proofs can be reviewed taking into consideration subject project (30%), subject portfolio (30%)</p> <p>2. Lead tutors to discuss the various ways they can support student teachers to build their</p>	<p>Review of Assessment Components</p> <p>1. Review the assessment components of the lesson in the course manual focusing on assessment of, as and for in line with the NTEAP. The various sections of the lesson should be reviewed in line with subject project (30%) and subject portfolio (30%)</p> <p>2. Discuss the various ways you can support student teachers to build their portfolios</p>	<p>15 mins</p>

	portfolios before/during/ after lessons.	before/during/ after lessons	
<p>Resources</p> <p>Guidance notes for SL/HoD should</p> <ul style="list-style-type: none"> Identify any aspect of the lesson that might be challenging for tutors in terms of new learning, and which needs to be considered prior to taking tutors through the lesson activities “walk through”. Equity and inclusion issues as well as ICT resources need consideration The resources needed must be identified: literature – page referenced etc, on web, YouTube, physical resources, power point; how they should be used. Consideration needs to be given to local availability <p>This section can build on the PD needs identified from the course manuals</p>	<p>Activity 3: Resources</p> <ol style="list-style-type: none"> Support tutors to identify and design resources that can be used in the teaching and learning of the concepts such as Counting and Number Relationships, Lines and Circles, Place value Number and Numeration systems (NTS 3j) <p>Examples of Resources: Teachers Resource pack, Student’s resource pack, Adaptive resources, visual materials, audio visual materials, Posters number charts; ten frames, video clips downloaded from the internet; tape measure.</p> <ol style="list-style-type: none"> Discuss with tutors how and where human and material resources for the lesson could be obtain. Such material could include projectors, flip charts and sign language personnel. Ask tutors in pairs (NTS 3h) to select a concept through balloting and design resources that can be used in the teaching and learning of the concept (NTS 3j). 	<p>Activity 3: Resources</p> <ol style="list-style-type: none"> Identify and design resources that can be used in teaching and learning of the concepts such as tessellations, symmetry, congruence and similarity of shapes; triangles and properties of triangles. NTS 3j) Participate in discussing how and where human and material resources for the lesson could be obtained in advance. In pairs (NTS 3h), select a concept through balloting and design resources that can be used in the teaching and learning of the concept selected (NTS 3j). <p><i>Discuss the need for using local, low or no</i></p>	10 mins

		<i>cost materials to design and use resources for teaching shapes</i>	
<p>Guidance notes for SL/HoD should</p> <ul style="list-style-type: none"> Select activities, linked to CLO and indicators, from the lesson that are likely to be most different from tutors' previous experience. These could involve applying new content, e.g. from section 2, or approaches to teaching, learning and assessment, incl. gender responsive, differentiation and inclusive approaches and use of appropriate ICT tools. Identify how any assessments during the lesson relate to course assessment components The selected activities should be done with tutors in real or close to real time Anticipate any issues for clarification or questions which might arise as the tutors work through the 	<p>Activity 5: Reflective Activity</p> <ol style="list-style-type: none"> Engage tutors in the evaluation of the session and encourage them to provide feedback on the PD session (NTS 1a, 3i). Engage tutors to identify unresolved issues relating to this lesson for clarification Lead tutors to take note of all unresolved issues and use any of following strategies <ol style="list-style-type: none"> discuss with SL/SWL put on SL/SWL WhatsApp platform for discussion tutors to research for the next PD session for discussion <p>Advance Preparation</p> <ol style="list-style-type: none"> Ask tutors to read: EGE: Teaching and Assessment - lesson 4 UPP: Addition of numbers within 99 and then numbers within 999, UPP lesson 4 JHS: Circle Theorems: Learning, teaching and applying, JHS lesson 4 	<p>Activity 5: Reflective Activity</p> <ol style="list-style-type: none"> Show by 5 or 3 or 1 finger(s) if you "really got it", "got some of it" or "didn't get it" respectively. If you showed 5 fingers, share your experience with your colleagues Reflect on the activities in the session and identify unresolved issues relating to the lesson Deal with unresolved issues through WhatsApp platform for discussion and/or research <p>Advance Preparation</p> <ol style="list-style-type: none"> Read: EGE: Teaching and Assessment EGE lesson 4 UPP: Addition of numbers within 99 and then numbers within 999, lesson 4 JHS: Circle Theorems: Learning, teaching and applying, JHS PP34 	5 mins

<p>activities and provide guidance on these.</p> <ul style="list-style-type: none"> • Identify where, and which, core and transferable skills, including digital skills, are being developed or applied • Makes links to the existing PD Themes with page reference where they can support teaching, for example: action research, questioning and to other external reference material • Identify where power point presentations or other resources need to be developed to support learning and provide guidance • Identify resources required for any TLMs and provide guidance on their development 	<p>JHS: Classroom Assessment JHS lesson 4</p> <p>N.B</p> <ol style="list-style-type: none"> i. <i>Remind tutors to identify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a).</i> ii. <i>Read the course manual for the next PD lesson, ahead of time to identify any outstanding issues relating to this lesson for clarification.</i> iii. <i>Collect all resources (such as projector, flip chart and sticky notes) you need ahead of time, prepare samples of TLMs you may need and rehearse how these may be used to support the achievement of your goals</i> 	<p>JHS: Classroom Assessment JHS lesson 4</p> <p>N.B</p> <ol style="list-style-type: none"> i. <i>Get a critical friend from the same or related discipline to observe your lesson during teaching and provide feedback (NTS 1a).</i> ii. <i>Read the course manual for the next PD lesson, ahead of time to identify any outstanding issues relating to this lesson for clarification.</i> iii. <i>Collect all resources you need ahead of time, prepare samples of TLMs you may need and rehearse how these may be used to support the achievement of your goals</i>
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- Age Phase:** a. Early Grade
 b. Upper Grade
 c. JHS
 d. JHS

- Name of Courses:** a. Teaching and Assessing Numeracy
 b. Teaching and Assessing mathematics for Upper Primary
 c. Teaching and Assessing JHS Mathematics
 d. Euclidean Geometry

Year 2 Semester 2

TUTOR PD SESSION FOR LESSON 4 IN THE COURSE MANUAL

Lesson Topic:

- a. **Early Grade** – Place Value 10 - 1000
 b. **Upper Grade** – Addition of numbers within 99 and the then numbers within 999
 c. **JHS** – Classroom Assessment
 d. **JHS** – Circle Theorems: Learning Teaching and Applying

<i>Focus: the bullets provide the frame for what is to be done. The guidance notes in italics identify the prompt the SL/HoD needs and each one must be addressed</i>	<i>Guidance notes on Leading the session. What the SL/HoDs will have to say during each stage of the session</i>	<i>Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the session)</i>	<i>Time in session</i>
Introduction / lesson overview <ul style="list-style-type: none"> • Reflection on previous PD Session (Introduction to the course manual) • Introduction and overview of the main purpose of the lesson in the course manual. • Highlight cross cutting themes i.e., gender equality and 	Introduction / lesson overview <ol style="list-style-type: none"> 1. Ice breaker activity: Begin with an investigational activity (e.g. Identify the prime numbers between 4 and 15) 2. Ask tutors to tell how useful the previous PD session was and how it influenced their teaching over the week. 	Introduction / lesson overview <ol style="list-style-type: none"> 1. Engage in an investigational activity (eg. identify the prime numbers between 4 and 15) 2. Explain how useful the previous PD session was and how it influenced their teaching over the week. 	15 mins

<p>social inclusion (GESI), ICT</p> <ul style="list-style-type: none"> • Identification of important or distinctive aspects of the lesson • Reading and discussion of the introductory sections up to learning outcomes 	<ol style="list-style-type: none"> 3. Ask the critical friend to give feedback on his/her observation of the last enacted lesson. 4. Ask tutors to state the purpose of the lesson and state their expectations of the PD Session (NTS 2b) 5. Lead tutors to outline the important features of the lesson in the course manual. 6. Ask tutors to read the introductory sections (up to learning outcomes) and discuss the important or distinctive aspects of the lesson (e.g. the interactive nature of the activities with emphasis on connecting concepts such as ,Place Value, Addition of numbers Classroom Assessment and Circle Theorems with other lessons and the use of relevant resources including the basic school curriculum) and suggest the relevant students' previous knowledge that can support the teaching and learning of the lesson. <p>Course Manual for:</p> <ol style="list-style-type: none"> a. Early Grade – lesson 4 b. Upper Grade – lesson 4 c. JHS; Assessment – lesson 4 d. JHS; Euclidean – lesson 4 	<ol style="list-style-type: none"> 3. As the critical friend, share with members feedback on your observation of the last enacted lesson. 4. State the purpose of the lesson and state your expectations of the lesson. 5. Outline the important features of the lesson in the course manual. 6. Read the introductory sections (up to learning outcomes) and in pairs/groups discuss the important or distinctive aspects of the lesson (e.g. connecting Place Value, Addition of numbers Classroom Assessment and Circle Theorems with other lessons and the use of relevant resources including the basic school curriculum) and suggest the relevant students' previous knowledge that can support the teaching and learning of the lesson.. <p>Course Manual for:</p> <ol style="list-style-type: none"> a. Early Grade – lesson 4 b. Upper Grade – lesson 4 c. JHS; Assessment – lesson 4 d. JHS; Euclidean – lesson 4 	
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	BSC Content Standards B4.1.1.1 B5.1.1.1 B6.1.1.1 B4.1.3.1 CCP-B8.3.2.1 (PD Theme 1, 3 & 4)	BSC Content Standards B4.1.1.1 B5.1.1.1 B6.1.1.1 B4.1.3.1 CCP-B8.3.2.1 (PD Theme 1, 3 & 4) (PD Theme 1, 3 & 4)	
<p>2. Concept Development (New learning likely to arise in this lesson):</p> <ul style="list-style-type: none"> • Identification and discussion of concepts • Identification of possible challenging areas in teaching of the concept. This may include GESI and ICT related concepts • Identification of needed GESI responsive and ICT resources for the teaching and learning of the concept. 	<p>Concept Development</p> <ol style="list-style-type: none"> 1. Lead tutors to identify familiar and unfamiliar concepts in the lesson and discuss relevant connecting concepts in the lesson – e.g. micro lesson, the use of technology across the Early Grade mathematics, subtraction of whole numbers and trigonometric equations with other concepts and the use of relevant resources). 2. Engage tutors to identify and discuss various strategies for the development of conceptual understanding of <ol style="list-style-type: none"> a. Early Grade – Place Value b. Upper Grade – Addition of numbers c. JHS; Assessment – Classroom Assessment d. JHS; Eclidean – Circle Theorem 3. Lead tutors to discuss misconceptions and barriers in teaching and learning of <ol style="list-style-type: none"> a. Early Grade – Place Value b. Upper Grade – Addition of numbers 	<p>Concept Development</p> <ol style="list-style-type: none"> 1. Identify familiar and unfamiliar concepts in the lesson and discuss relevant connecting concepts in the lesson - micro lesson, the use of technology across the Early Grade mathematics, subtraction of whole numbers and trigonometric equations with other concepts and the use of relevant resources). 2. Identify and discuss various strategies for the development of conceptual understanding of <ol style="list-style-type: none"> a. Early Grade – Place Value b. Upper Grade – Addition c. JHS; Assessment – Classroom Assessment d. JHS; Euclidean – Circle Theorem 3. Discuss some potential misconceptions and barriers with respect to the teaching and learning of <ol style="list-style-type: none"> a. Early Grade – Place Value b. Upper Grade – Addition of numbers 	25 mins

	c. JHS; Assessment – Classroom Assessment d. JHS; Euclidean – Circle Theorem (e.g. that a circular object is a circle, any angle subtended on the circumference has the same value)	c. JHS; Assessment – Classroom Assessment d. JHS; Euclidean – Circle Theorem	
3. Teaching, learning and assessment activities for the lesson <ul style="list-style-type: none"> • Reading of teaching and learning activities and identification of areas that require clarification especially GESI related activities. • Reading of teaching and learning activities and identification of GESI and ICT issues that require clarification. 	Teaching and learning activities <ol style="list-style-type: none"> 1. Ask tutors to suggest teaching and learning activities for the lesson taking into account GESI (e.g. making adjustments for physically challenged learners, and getting both male and female participants to play leading roles in group work) NTS 1a, b, c, d, 2b, e, f, 3b, c; 2. Lead tutors to brainstorm come up with some pedagogical approaches and their related core competencies likely to be inculcated in CoE students and extended to basic school learners through STS activities. Example: Group Work - Collaborative learning Investigation - Critical Thinking Role Play - Communication 	Teaching and learning activities <ol style="list-style-type: none"> 1. Suggest teaching and learning activities for the lesson taking into account GESI (e.g. making adjustments for physically challenged learners, and getting both male and female participants to play leading roles in group work) NTS 1a, b, c, d, 2b, e, f, 3b, c; (Writing the Weekly PD Session-p 3., NTS 1a, b, c, d, 2b, e, f, 3b, c;(NTS 1a, b, c, d, 2b, e, f, 3b, c; BSC p. iii) 2. Brainstorm to come up with some pedagogical approaches and their likely related core competencies to be inculcated in CoE students and extended to basic school learners through STS activities. (Students can ascertain the extent to which methods are used during STS activities in schools). 	40 mins

	<p>Students can ascertain the extent to which methods are used during STS activities in schools.</p> <ol style="list-style-type: none"> 3. Engage tutors in a discussion of strategies to strengthen core competencies. (e.g. difficulty identifying the places of digits and their values beyond hundreds). 4. Engage tutors to work through one or two of the activities to ensure understanding. 5. Ask a tutor to model alternative strategies for the activities using ICT tools, taking into consideration GESI issues (eg. both male and female participants playing the leading roles in group work, even distribution of questions and in the demonstration of the use of ICT tools by both male and female participants) in the B.ED and the Basic School Curricula (BSC). NTS 1a, b, c, d, 2b, e, 3b, c, J; BSC pp. iii). 	<ol style="list-style-type: none"> 3. Discuss the strategies to strengthen core competencies. 4. Work through one or two of the suggested activities to ensure understanding. 5. Model alternative strategies for the activities using ICT tools, taking into consideration GESI issues (e.g. both male and female participants playing the leading roles in group work, even distribution of questions and in the demonstration of the use of ICT tools by both male and female participants) in B.ED and Basic School Curricula. 	
<p>4. Review of Assessment component Reading of assessment opportunities and ensuring they are aligned to the</p>	<p>Review of Assessment Components</p> <ol style="list-style-type: none"> 1. Ask tutors to review the assessment components of the lesson in the course manual focusing on assessment of, as and 	<p>Review of Assessment Components</p> <ol style="list-style-type: none"> 1. Ask tutors to review the assessment components of the lesson in the course manual focusing on 	<p>40 mins</p>

<p>NTEAP and required course assessment: subject project (30%), subject portfolio (30%) and end of semester examination (40%) Working through one or two activities.</p>	<p>for in line with the NTEAP</p> <p>a. Early Grade – Place Value can be reviewed taking into consideration subject project (30%), subject portfolio (30%)</p> <p>b. Upper Grade – Addition of numbers can be reviewed taking into consideration subject project (30%), subject portfolio (30%)</p> <p>c. JHS; Assessment – Classroom Assessment can be reviewed taking into consideration subject project (30%), subject portfolio (30%)</p> <p>d. JHS; Euclidean – Circle Theorem can be reviewed taking into consideration subject project (30%), subject portfolio (30%)</p> <p>2. Lead tutors to discuss the various ways they can support student teachers to build their portfolios before/during/ after lessons</p>	<p>assessment of, as and for in line with the NTEAP.</p> <p>Look at the various sections of the lesson that could be reviewed in line with subject project (30%) and subject portfolio (30%)</p> <p>2. Discuss the various ways you can support student teachers to build their portfolios before/during/ after lessons</p>	
<p>Resources</p> <p>Guidance notes for SL/HoD should</p> <ul style="list-style-type: none"> Identify any aspect of the lesson that might be challenging for tutors in terms of new learning, and which needs to be considered 	<p>Resources</p> <p>1. Support tutors to identify inclusive resources such as posters with large prints for partially sighted learners, engaging experts in sign language, making use of projectors, flip charts, sticky notes, tactile, audio-visuals, visuals, audio, teachers and</p>	<p>Resources</p> <p>1. Identify as many GESI responsive resources as possible that can be used in the teaching and learning of the concepts introduced in the lesson.</p> <p>a. Early Grade – lesson 4 b. Upper Grade – lesson 4 c. JHS; Assessment – lesson 4</p>	<p>10 mins</p>

<p>prior to taking tutors through the lesson activities “walk through”. Equity and inclusion issues as well as ICT resources need consideration</p> <ul style="list-style-type: none"> The resources needed must be identified: literature – page referenced etc, on web, YouTube, physical resources, power point; how they should be used. Consideration needs to be given to local availability This section can build on the PD needs identified from the course manuals 	<p>leaners resource packs, textbooks, course manual, pairs of compasses and ruler and addition mat, that can be used in the teaching and learning of the concepts introduced in the lesson.</p> <p>a. Early Grade – lesson 4 b. Upper Grade – lesson 4 c. JHS; Assessment – lesson 4 d. JHS; Euclidean – lesson 4 (PD themes 1 & 3)</p> <p>2. Discuss with tutors how and where human and material resources for the lesson could be obtain in advance. Such resources can include projectors, flip charts and sign language personnel.</p> <p>3. Let tutors, in pairs (NTS 3h), select a concept and develop the rubrics for designing resources that can be used in the teaching and learning of the concepts selected.</p>	<p>d. JHS; Euclidean – lesson 4 (PD themes 1)</p> <p>2. Participate in discussing how and where human and material resources for the lesson could be obtain in advance.</p> <p>3. In pairs (NTS 3h), select a concept and develop the rubrics for designing resources that can be used in the teaching and learning of the concepts selected. NTS 3j</p>	
<p>Evaluation and review of session</p> <p>Guidance notes for SL/HoD should</p> <ul style="list-style-type: none"> Select activities, linked to CLO and indicators, from the lesson that are likely to be most different from tutors’ previous 	<p>Reflective Activity</p> <p>4. Engage tutors in the evaluation of the session and encourage them to provide feedback on the PD session (NTS 1a, 3i).</p> <p>5. Take note of all unresolved issues and use any of following strategies</p>	<p>Reflective Activity</p> <p>4. Show by 5 or 3 or 1 finger(s) if you “really got it”, “got some of it” or “didn’t get it” respectively. If you showed 5 fingers, share your experience with your colleagues</p> <p>5. Deal with unresolved issues through sharing the issues on the</p>	<p>5 mins</p>

<p>experience. These could involve applying new content, e.g. from section 2, or approaches to teaching, learning and assessment, incl. gender responsive, differentiation and inclusive approaches and use of appropriate ICT tools.</p> <ul style="list-style-type: none"> • Identify how any assessments during the lesson relate to course assessment components • The selected activities should be done with tutors in real or close to real time • Anticipate any issues for clarification or questions which might arise as the tutors work through the activities and provide guidance on these. • Identify where, and which, core and transferable skills, including digital skills, are being developed or applied 	<ul style="list-style-type: none"> – discuss with SL/SWL – put on SL/SWL WhatsApp platform for discussion – tutors to research and report findings on shared platforms. <p>Advance Preparation</p> <p>Ask tutors to read Lesson 5 of the Course Manual</p> <p>a. Early Grade – Addition within 19 and 99 :</p> <p>b. Upper Grade – Classroom assessment:</p> <p>c. JHS; Assessment – Micro Lessons:</p> <p>d. JHS; Eclidean – Geometric construction:</p> <p>N.B</p> <p>i. <i>Remind tutors to identify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a).</i></p> <p>ii. <i>Read the course manual for the next PD lesson, ahead of time to identify any outstanding issues relating to this lesson for clarification.</i></p> <p>iii. <i>Collect all resources you need ahead of time, prepare samples of TLMs you may need and rehearse how these may be used to support the achievement of your goals</i></p>	<p>various electronic platforms and/or seeking solutions through research.</p> <p>Advance Preparation</p> <p>Read Lesson 6 of the Course Manual</p> <p>a. Early Grade – Addition within 19 and 99 :</p> <p>b. Upper Grade – Classroom assessment:</p> <p>c. JHS; Assessment – Micro Lessons:</p> <p>d. JHS; Eclidean – Geometric construction:</p> <p>N.B</p> <p>i. <i>Get a critical friend from the same or related discipline to observe your lesson during teaching and provide feedback (NTS 1a).</i></p> <p>ii. <i>Read the course manual for the next PD lesson, ahead of time to identify any outstanding issues relating to this lesson for clarification.</i></p> <p>iii. <i>Collect all resources you need ahead of time, prepare samples of TLMs you may need and rehearse how these may be used to support the achievement of your goals.</i></p>	
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<ul style="list-style-type: none"> • Makes links to the existing PD Themes with page reference where they can support teaching, for example: action research, questioning and to other external reference material • Identify where power point presentations or other resources need to be developed to support learning and provide guidance • Identify resources required for any TLMs and provide guidance on their development 			
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- Age Phase:** a. Early Grade
 b. Upper Grade
 c. JHS
 d. JHS

- Name of Courses:** a. Teaching and Assessing Numeracy
 b. Teaching and Assessing mathematics for Upper Primary
 c. Teaching and Assessing JHS Mathematics
 d. Euclidean Geometry

Year 2 Semester 2

TUTOR PD SESSION FOR LESSON 5 IN THE COURSE MANUAL

LESSON TOPIC:

- a. **Early Grade** - Addition (within 19 and then 99)
 b. **Upper Grade** - Classroom assessment in mathematics in the Upper Primary 1
 c. **JHS** - Micro Lessons and use of technology across junior high school numeracy
 d. **JHS** - Geometrical constructions

<i>Focus: the bullets provide the frame for what is to be done. The guidance notes in italics identify the prompt the SL/HoD needs and each one must be addressed</i>	<i>Guidance notes on Leading the session. What the SL/HoDs will have to say during each stage of the session</i>	<i>Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the session)</i>	<i>Time in session</i>
Introduction / lesson overview <ul style="list-style-type: none"> • Reflection on previous PD Session (Introduction to the course manual) • Introduction and overview of the main purpose of the lesson in the course manual. 	Introduction / lesson overview <ol style="list-style-type: none"> 1. Ice breaker activity: Begin with an investigational activity (e.g. Tell how to determine the shortest distances between any given two points) 2. Ask tutors to tell how useful the previous PD session was and how it influenced their teaching over the week. 	Introduction / lesson overview <ol style="list-style-type: none"> 1. Engage in an investigational activity by for example telling how to determine the shortest distances between any given two points) 2. Tell how useful the previous PD session was and how it influenced your teaching over the week. 	15 mins

<ul style="list-style-type: none"> • Highlight cross cutting themes i.e., gender equality and social inclusion (GESI), ICT • Identification of important or distinctive aspects of the lesson • Reading and discussion of the introductory sections up to learning outcomes 	<ol style="list-style-type: none"> 3. Ask the critical friend to give feedback on his/her observation of the last enacted lesson. 4. Ask tutors state the purpose of the lesson and state their expectations of the PD Session (NTS 2b) 5. Lead tutors to outline the important features of the course manual 6. Ask tutors to read the introductory sections (up to learning outcomes) and discuss the important or distinctive aspects of the lesson (i.e. the interactive nature of the activities with emphasis on connecting concepts (creating addition facts, Effective assessment skills, key features of the basic school curriculum, applying geometry to real life) with other lessons and the use of relevant resources including the basic school curriculum) and suggest the relevant students' previous knowledge that can support the teaching and learning of the lesson. <p>Course Manual for:</p> <ol style="list-style-type: none"> a. Early Grade – Lesson 5 b. Upper Grade – Lesson 5 c. JHS; Assessment – Lesson 5 	<ol style="list-style-type: none"> 3. As the critical friend, share with members feedback on your observation of the last enacted lesson. 4. State the purpose of the lesson and state your expectations of the lesson 5. Identify the important features of the course manual 6. Read the introductory sections (up to learning outcomes) and in pairs/groups discuss the important or distinctive aspects of the lesson (i.e. Initiate discussions on strategies to create addition facts, effectively employ assessment skills, explain key features of the basic school curriculum and apply geometry to real life) and suggest the relevant students' previous knowledge that can support the teaching and learning of the lesson. <p>Course Manual for lesson 5 BSC Content Standards B1.1.2.3, B1.1.2.4, B2.1.2.3, B2.1.2.4, B3.1.2.3, B3.1.2.4, CCP pp. 49-53 (PD Theme 1, 3 & 4)</p>	
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	d. JHS; Euclidean – Lesson 5 BSC Content Standards B1.1.2.3, B1.1.2.4, B2.1.2.3, B2.1.2.4, B3.1.2.3, B3.1.2.4, CCP pp. 49-53 (PD Theme 1, 3 & 4)		
<p>2. Concept Development (New learning likely to arise in this lesson):</p> <ul style="list-style-type: none"> • Identification and discussion of concepts • Identification of possible challenging areas in teaching of the concept. This may include GESI and ICT related concepts • Identification of needed GESI responsive and ICT resources for the teaching and learning of the concept. 	<p>Concept Development</p> <ol style="list-style-type: none"> 1. Lead tutors to identify familiar and unfamiliar concepts in the lesson and discuss relevant connections among concepts in the lesson with other lessons and the use of relevant resources including the basic school curriculum) and suggest the relevant students’ previous knowledge that can support the teaching and learning of the lesson. <ol style="list-style-type: none"> a. Early Grade – Addition within 19 and 99 b. Upper Grade – Classroom assessment c. JHS; Assessment – Micro Lessons d. JHS; Eclidean – Geometric construction 2. Engage tutors to identify and discuss various strategies for the development of conceptual understanding of the lesson. Example: Interactivity, Internet search, Model lessons, Exploratory (Let tutors refer to lesson 2 of the course manual for additional strategies.) 	<p>Concept Development</p> <ol style="list-style-type: none"> 1. Identify familiar and unfamiliar concepts in the lesson and discuss relevant connections among concepts in the lesson with other lessons and the use of relevant resources including the basic school curriculum) and suggest the relevant students’ previous knowledge that can support the teaching and learning of the lesson. 2. Identify and discuss various strategies for the development of conceptual understanding of 	25 mins

	<p>3. Lead tutors to discuss misconceptions and barriers with respect to the teaching and learning of</p> <ol style="list-style-type: none"> Early Grade – Addition within 19 and 99 Upper Grade – Classroom assessment JHS; Assessment – Micro Lessons JHS; Eclidean – Geometric construction (e.g. one must add ones before the tens) <p>4. Ask tutors to outline possible challenging areas in teaching of the concepts such as skip counting forwards and backwards, congruence of similar triangle and Pythagoras theorem and Standards-based and objective-based curricula (e.g. misapplying the rules of patterns).</p>	<p>3. Discuss some potential misconceptions and barriers with respect to the teaching and learning of</p> <ol style="list-style-type: none"> Early Grade – Addition within 19 and 99 Upper Grade – Classroom assessment JHS; Assessment – Micro Lessons JHS; Eclidean – Geometric construction <p>4. Outline possible challenging areas in teaching concepts such as skip counting forwards and backwards, congruence of similar triangle and Pythagoras theorem.</p>	
<p>3. Teaching, learning and assessment activities for the lesson</p> <ul style="list-style-type: none"> Reading of teaching and learning activities and identification of areas that require clarification especially GESI related activities. Reading of teaching and 	<p>Teaching and learning activities</p> <ol style="list-style-type: none"> Ask tutors to suggest teaching and learning activities for the lesson taking into account GESI (e.g. making adjustments for physically challenged learners, and getting both male and female participants to play leading roles in group work) NTS 1a, b, c, d, 2b, e, f, 3b, c; (Writing the Weekly PD Session-p 3., NTS 1a, b, c, d, 2b, e, f, 3b, c; 	<p>Teaching and learning activities</p> <ol style="list-style-type: none"> Suggest teaching and learning activities that can be used in teaching the lesson taking into account GESI issues (e.g. making adjustments for physically challenged learners, and getting both male and female participants to play leading roles in group work). (Writing the Weekly PD Session-p 3., NTS 1a, b, c, d, 2b, e, f, 3b, c;(NTS 	<p>40 mins</p>

<p>learning activities and identification of GESI and ICT issues that require clarification.</p>	<p>2. Lead tutors to suggest creative approaches of addressing the identified challenges. Eg. Selection model for addition problems, using the principle of multiple embodiment. Students can ascertain the extent to which methods are used during STS activities in schools.</p> <p>3. Engage tutors in a discussion of strategies to strengthen core competencies. (e.g. using concrete materials to proof that the sum of two 2-digit numbers does not depend on which place values are summed first)</p> <p>4. Engage tutors to work through one or two of the activities to ensure understanding.</p> <p>5. Ask a tutor to model alternative strategies for the activities using ICT tools, taking into consideration GESI issues (e.g. both male and female participants playing the leading roles in their groups and in the demonstration of the use of ICT tools) in the B.ED and the Basic School Curricula (BSC). NTS 1a, b, c, d, 2b, e, 3b, c, J; BSC pp. iii).</p>	<p>1a, b, c, d, 2b, e, f, 3b, c; BSC p. iii)</p> <p>2. Suggest creative approaches of addressing the identified challenges. Students can ascertain the extent to which methods are used during STS activities in schools.</p> <p>3. Discuss of the strategies to strengthen core competencies.</p> <p>4. Work through one or two of the suggested activities to ensure understanding.</p> <p>5. Model alternative strategies for the activities using ICT tools, taking into consideration GESI issues in B.ED and Basic School Curricula.</p>	
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<p>4. Review of Assessment component Reading of assessment opportunities and ensuring they are aligned to the NTEAP and required course assessment: subject project (30%), subject portfolio (30%) and end of semester examination (40%) Working through one or two activities.</p>	<p>Review of Assessment Components</p> <ol style="list-style-type: none"> 1. Ask tutors to review the assessment components of the lesson in the course manual focusing on assessment of, as and for in line with the NTEAP <ol style="list-style-type: none"> a. Early Grade – lesson 5 b. Upper Grade – lesson 5 c. JHS Euclidean – lesson 5 d. JHS Assessment – lesson 5 2. Let tutors discuss the assessment strategies to be used during enactment of the lesson referring to the NTEAP at the various levels (KG, UP, JHS)– ‘Assessment as’ (NTS 3k). 3. Lead tutors to discuss the various ways they can support student teachers to build their portfolios before/during/ after lessons 	<p>Review of Assessment Components</p> <ol style="list-style-type: none"> 1. Identify the assessment components of the lesson in the new course manual focusing on assessment of, as and for in line with the NTEAP Look at the various sections of the lesson that could be reviewed in line with subject project (30%) and subject portfolio (30%) 2. Discuss the assessment strategies to be used during enactment of the lesson making reference to the NTEAP 3. Discuss the various ways you can support student teachers to build their portfolios before/during/ after lessons 	<p>15 mins</p>
<p>Resources</p> <p>Guidance notes for SL/HoD should</p> <ul style="list-style-type: none"> • Identify any aspect of the lesson that might be challenging for tutors in terms of new learning, and which needs to be considered prior to taking 	<p>Resources</p> <ol style="list-style-type: none"> 1. Support tutors to identify inclusive resources such as tactile materials, audio-visuals, visuals, audio, teachers and learners resource packs, textbooks, course manual, pairs of compasses and ruler and addition mat, that can be used in the 	<p>Resources</p> <ol style="list-style-type: none"> 1. Identify inclusive resources such as tactile, audio-visuals, visuals, audio, teachers and learners resource packs, textbooks, course manual, pairs of compasses and ruler and addition mat, that can be used in the teaching and learning of the concepts introduced in the lesson. 	<p>10 mins</p>

<p>tutors through the lesson activities “walk through”.</p> <p>Equity and inclusion issues as well as ICT resources need consideration</p> <ul style="list-style-type: none"> • The resources needed must be identified: literature – page referenced etc, on web, YouTube, physical resources, power point; how they should be used. Consideration needs to be given to local availability • This section can build on the PD needs identified from the course manuals 	<p>teaching and learning of the concepts (PD themes 1 & 5)</p> <ol style="list-style-type: none"> 2. Discuss with tutors how and where human and material resources for the lesson could be obtain in advance. Such resources can include projectors, flip charts and sign language personnel. 3. Let tutors, in pairs (NTS 3h), select a concept and develop the rubrics for designing resources that can be used in the teaching and learning of the concepts selected. 	<ol style="list-style-type: none"> 2. Participate in discussing how and where human and material resources for the lesson could be obtain in advance. 3. In pairs (NTS 3h), select a concept and develop the rubrics for designing resources that can be used in the teaching and learning of the concepts selected. NTS 3j 	
<p>Evaluation and review of session</p> <p>Guidance notes for SL/HoD should</p> <ul style="list-style-type: none"> • Select activities, linked to CLO and indicators, from the lesson that are likely to be most different from tutors’ previous experience. These could 	<p>Reflective Activity</p> <ol style="list-style-type: none"> 1. Engage tutors in the evaluation of the session and encourage them to provide feedback on the PD session (NTS 1a, 3i). 2. Take note of all unresolved issues and use any of following strategies <ul style="list-style-type: none"> – discuss with SL/SWL 	<p>Reflective Activity</p> <ol style="list-style-type: none"> 1. Show by 5 or 3 or 1 finger(s) if you “really got it”, “got some of it” or “didn’t get it” respectively. If you showed 5 fingers, share your experience with your colleagues. 2. Deal with unresolved issues through sharing the issues on the various electronic platforms and/or 	<p>5 mins</p>

<p>involve applying new content, e.g. from section 2, or approaches to teaching, learning and assessment, incl. gender responsive, differentiation and inclusive approaches and use of appropriate ICT tools.</p> <ul style="list-style-type: none"> • Identify how any assessments during the lesson relate to course assessment components • The selected activities should be done with tutors in real or close to real time • Anticipate any issues for clarification or questions which might arise as the tutors work through the activities and provide guidance on these. • Identify where, and which, core and transferable skills, including 	<ul style="list-style-type: none"> – put on SL/SWL WhatsApp platform for discussion – tutors to research and report findings on shared platforms. <p>Advance Preparation</p> <ol style="list-style-type: none"> 1. Ask tutors to read Lesson 6 of the Course Manual (e.g. Trigonometric ratios (sine, cosine and tangent) ahead of time to identify issues of concern for clarification) p. 32 <p>N.B</p> <ol style="list-style-type: none"> i. <i>Remind tutors to identify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a).</i> ii. <i>Read the course manual for the next PD lesson, ahead of time to identify any outstanding issues relating to this lesson for clarification.</i> iii. <i>Collect all resources (such as projector, flip chart and sticky notes) you need ahead of time, prepare samples of TLMs you may need and rehearse how these may be used to support the achievement of your goals</i> 	<p>seeking solutions through research.</p> <p>Advance Preparation</p> <ol style="list-style-type: none"> 1. Read Lesson 6 of the Course Manual (e.g. Trigonometric ratios (sine, cosine and tangent) ahead of time to identify issues of concern for clarification) p. 32 <p>N.B</p> <ol style="list-style-type: none"> i. <i>Get a critical friend from the same or related discipline to observe your lesson during teaching and provide feedback (NTS 1a).</i> ii. <i>Read the course manual for the next PD lesson, ahead of time to identify any outstanding issues relating to this lesson for clarification.</i> iii. <i>Collect all resources you need ahead of time, prepare samples of TLMs you may need and rehearse how these may be used to support the achievement of your goals.</i> 	
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<p>digital skills, are being developed or applied</p> <ul style="list-style-type: none"> • Makes links to the existing PD Themes with page reference where they can support teaching, for example: action research, questioning and to other external reference material • Identify where power point presentations or other resources need to be developed to support learning and provide guidance • Identify resources required for any TLMs and provide guidance on their development 			
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- Age Phase:** a. Early Grade
 b. Upper Grade
 c. JHS
 d. JHS

- Name of Courses:** a. Teaching and Assessing Numeracy
 b. Teaching and Assessing mathematics for Upper Primary
 c. Teaching and Assessing JHS Mathematics
 d. Euclidean Geometry

Year 2 Semester 2

TUTOR PD SESSION FOR LESSON 6 IN THE COURSE MANUAL

LESSON TOPIC:

- a. **Early Grade** – Classroom Assessment
 b. **Upper Grade** – Classroom Assessment
 c. **JHS** – Micro Lesson and Use of Technology Across Junior High School Numeracy
 d. **JHS** – Trigonometry: Learning and Applying

<i>Focus: the bullets provide the frame for what is to be done. The guidance notes in italics identify the prompt the SL/HoD needs and each one must be addressed</i>	<i>Guidance notes on Leading the session. What the SL/HoDs will have to say during each stage of the session</i>	<i>Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the session)</i>	<i>Time in session</i>
Introduction / lesson overview <ul style="list-style-type: none"> Reflection on previous PD Session (Introduction to the course manual) Introduction and overview of the main purpose of the lesson in the course manual. 	Introduction / lesson overview <ol style="list-style-type: none"> Ice breaker activity: Begin with an investigational activity a (e.g. mention in turns the set of triangular numbers from 1 and not more than 50) Ask tutors to tell how useful the previous PD session was and how it influenced their teaching over the week. 	Introduction / lesson overview <ol style="list-style-type: none"> Engage in an investigational activity (eg. mention in turns the set of triangular numbers from 1 and not more than 50) Explain how useful the previous PD session was and how it influenced your teaching over the week. 	15 mins

<ul style="list-style-type: none"> • Highlight cross cutting themes i.e., gender equality and social inclusion (GESI), ICT • Identification of important or distinctive aspects of the lesson • Reading and discussion of the introductory sections up to learning outcomes 	<ol style="list-style-type: none"> 3. Ask the critical friend to give feedback on his/her observation of the last enacted lesson. 4. Ask tutors to state the purpose of the lesson and state their expectations of the PD Session (NTS 2b) 5. Lead tutors to outline the important features of the lesson in the course manual. 6. Ask tutors to read the introductory sections (up to learning outcomes) and discuss the important or distinctive aspects of the lesson (i.e. the interactive nature of the activities with emphasis on connecting concepts - Classroom Assessment, Micro Lesson, the Use of Technology Across Junior High School Numeracy and Trigonometry with other lessons and the use of relevant resources including the basic school curriculum) and suggest the relevant students' previous knowledge that can support the teaching and learning of the lesson. <p>Course Manual for:</p> <ol style="list-style-type: none"> a. Early Grade – Lesson 6. b. Upper Grade – Lesson 6 c. JHS; Assessment – Lesson 6 	<ol style="list-style-type: none"> 3. As the critical friend, share with members feedback on your observation of the last enacted lesson. 4. State the purpose of the lesson and state your expectations of the lesson. 5. Outline the important features of the lesson in the course manual. 6. Read the introductory sections (up to learning outcomes) and in pairs/groups discuss the important or distinctive aspects of the lesson (i.e. the interactive nature of the activities with emphasis on connecting concepts (Classroom Assessment, Micro Lesson, the Use of Technology Across Junior High School Numeracy and Trigonometry with other lessons and the use of relevant resources including the basic school curriculum) and suggest the relevant students' previous knowledge that can support the teaching and learning of the lesson. <p>Course Manual for:</p> <ol style="list-style-type: none"> a. Early Grade – Lesson 6. b. Upper Grade – Lesson 6 	
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	d. JHS; Euclidean – Lesson 6 BSC Content Standards B4.1.1.1 B5.1.1.1 B6.1.1.1 B4.1.3.1 CCP-B8.3.2.1 (PD Theme 1, 3 & 4)	c. JHS; Assessment – Lesson 6 d. JHS; Euclidean – Lesson 6 BSC Content Standards B4.1.1.1 B5.1.1.1 B6.1.1.1 B4.1.3.1 CCP-B8.3.2.1 (PD Theme 1, 3 & 4) (PD Theme 1, 3 & 4)																
<p>2. Concept Development (New learning likely to arise in this lesson):</p> <ul style="list-style-type: none"> • Identification and discussion of concepts • Identification of possible challenging areas in teaching of the concept. This may include GESI and ICT related concepts • Identification of needed GESI responsive and ICT resources for the teaching and learning of the concept. 	<p>Concept Development</p> <ol style="list-style-type: none"> 1. Lead tutors to identify familiar and unfamiliar concepts in the lesson and discuss relevant connections among concepts in the lesson with other lessons and the use of relevant resources. 2. Engage tutors to identify and discuss various strategies for the development of conceptual understanding of the lesson. <table border="1"> <thead> <tr> <th>Level</th> <th>Concept</th> <th>Strategy</th> </tr> </thead> <tbody> <tr> <td>Early Child</td> <td>Assessment</td> <td>Interactive</td> </tr> <tr> <td>Upp Grade</td> <td>Assessment</td> <td>Internet search</td> </tr> <tr> <td>JHS (Assesst)</td> <td>Micro lesson</td> <td>Model lessons</td> </tr> <tr> <td>JHS (Euclidean)</td> <td>Trigonometry</td> <td>Exploratory</td> </tr> </tbody> </table> <ol style="list-style-type: none"> 3. Let tutors refer to Lesson 6 of the course manual for additional strategies. 4. Lead tutors to discuss misconceptions and barriers in teaching and learning of the various concepts to be introduced in the lesson. 	Level	Concept	Strategy	Early Child	Assessment	Interactive	Upp Grade	Assessment	Internet search	JHS (Assesst)	Micro lesson	Model lessons	JHS (Euclidean)	Trigonometry	Exploratory	<p>Concept Development</p> <ol style="list-style-type: none"> 1. Identify familiar and unfamiliar concepts in the lesson and discuss relevant connections among concepts in the lesson with other lessons and the use of relevant resources. 2. Identify and discuss various strategies for the development of conceptual understanding of <ol style="list-style-type: none"> a. Early Grade – Classroom Assessment b. Upper Grade – Classroom Assessment c. JHS; Assessment – Micro Lesson and Use of Technology d. JHS; Euclidean – Trigonometry 3. Refer to Lesson 6 of the course manual for additional strategies 4. Discuss some potential misconceptions and barriers with respect to the teaching and learning of the various concepts to be 	25 mins
Level	Concept	Strategy																
Early Child	Assessment	Interactive																
Upp Grade	Assessment	Internet search																
JHS (Assesst)	Micro lesson	Model lessons																
JHS (Euclidean)	Trigonometry	Exploratory																

	<p>Eg.</p> <p>a. Early Grade – Classroom Assessment: <i>That assessment is done only after teaching</i></p> <p>b. Upper Grade – Classroom Assessment: <i>That assessment is done only after teaching</i></p> <p>c. JHS; Assessment – Micro Lesson and Use of Technology: <i>That JHS students should not use calculators</i></p> <p>d. JHS; Euclidean – Trigonometry: <i>That trigonometry cannot be apply in everyday life activity.</i></p> <p>Barriers: <i>Inappropriate inclusive resources Limited use of technology Inadequate pre-requisite knowledge N/B: Refer tutors to the Lesson 6 of the course manual for other potential misconceptions and barriers.</i></p>	introduced in the lesson.	
<p>3. Teaching, learning and assessment activities for the lesson</p> <ul style="list-style-type: none"> • Reading of teaching and learning activities and identification of areas that require clarification especially GESI related activities. • Reading of teaching and learning 	<p>Teaching and learning activities</p> <p>1. Ask tutors to suggest teaching and learning activities for the lesson taking into account GESI (e.g. making adjustments for physically challenged learners, and getting both male and female participants to play leading roles in group work)</p> <p>NTS 1a, b, c, d, 2b, e, f, 3b, c; Ref: writing the weekly PD session-p 3., NTS 1a, b, c, d, 2b, e, f, 3b, c; BSC p. iii)</p>	<p>Teaching and learning activities</p> <p>1. Suggest teaching and learning activities that can be used in teaching the lesson taking into account GESI (e.g. making adjustments for physically challenged learners, and getting both male and female participants to play leading roles in group work) (writing the weekly PD session-p 3., NTS 1a, b, c, d, 2b, e, f, 3b, c (NTS 1a, b, c, d, 2b, e, f, 3b, c; BSC p. iii)</p>	40 mins

<p>activities and identification of GESI and ICT issues that require clarification.</p>	<p>2. Guide tutors to come up with some creative approaches and their related core competencies likely to be inculcated in CoE students and extended to basic school learners through STS activities..</p> <p>eg.</p> <table border="1" data-bbox="472 577 866 792"> <thead> <tr> <th>Strategy</th> <th>Core Competency</th> </tr> </thead> <tbody> <tr> <td>Group Work</td> <td>Collaborative learning</td> </tr> <tr> <td>Investigation</td> <td>Critical Thinking</td> </tr> <tr> <td>Role Play</td> <td>Communication</td> </tr> </tbody> </table> <p>(Students can ascertain the extent to which methods are used during STS activities in schools)</p> <p>3. Engage tutors in a discussion of strategies to strengthen core competencies. (e.g. Using activity-based/demonstration to solve problem with differentiated assessment of, as and for)</p> <p>4. Ask a tutor to model alternative strategies for the activities using ICT tools, taking into consideration GESI issues (e.g. both male and female participants playing the leading roles in their groups and in the demonstration of the use of ICT tools) in the B.ED and the Basic School Curricula (BSC). NTS 1a, b, c, d, 2b, e, 3b, c, J; BSC pp. iii).</p>	Strategy	Core Competency	Group Work	Collaborative learning	Investigation	Critical Thinking	Role Play	Communication	<p>2. Come up with some pedagogical approaches and their likely related core competencies to be inculcated in CoE students and extended to basic school learners through STS activities. (Students can ascertain the extent to which methods are used during STS activities in schools).</p> <p>3. Discuss the strategies to strengthen core competencies.</p> <p>4. Model alternative strategies for the activities using ICT tools, taking into consideration GESI issues (e.g. both male and female participants playing the leading roles in their groups and in the demonstration of the use of ICT tools) in B.ED and Basic School Curricula.</p>	
Strategy	Core Competency										
Group Work	Collaborative learning										
Investigation	Critical Thinking										
Role Play	Communication										

<p>4. Review of Assessment component</p> <p>Reading of assessment opportunities and ensuring they are aligned to the NTEAP and required course assessment: subject project (30%), subject portfolio (30%) and end of semester examination (40%) Working through one or two activities.</p>	<p>Review of Assessment Components</p> <ol style="list-style-type: none"> 1. Ask tutors to review the assessment components of the lesson in the course manual focusing on assessment of, as and for in line with the NTEAP <ol style="list-style-type: none"> a. Early Grade – Lesson 6. b. Upper Grade – Lesson 6 c. JHS; Assessment – Lesson 6 d. JHS; Euclidean – Lesson 6 2. Let tutors discuss the assessment strategies to be used during enactment of the lesson referring to the NTEAP at the various levels (KG, UP, JHS)– ‘Assessment as’ (NTS 3k). 3. Lead tutors to discuss the various ways they can support student teachers to build their portfolios before/during/ after lessons 	<p>Review of Assessment Components</p> <ol style="list-style-type: none"> 1. Ask Ask tutors to review the assessment components of the lesson in the course manual focusing on assessment of, as and for in line with the NTEA <ol style="list-style-type: none"> a. Early Grade – Lesson 6. b. Upper Grade – Lesson 6 c. JHS; Assessment – Lesson 6 d. JHS; Euclidean – Lesson 6 2. Discuss the assessment strategies to be used during enactment of the lesson making reference to the NTEAP at the various levels (KG, UP, JHS) – ‘Assessment as’ (NTS 3k). 3. Discuss the various ways you can support student teachers to build their portfolios before/during/ after lessons 	<p>15 mins</p>
<p>Resources</p> <p>Guidance notes for SL/HoD should</p> <ul style="list-style-type: none"> • Identify any aspect of the lesson that might be challenging for tutors in terms of new learning, and which needs to be 	<p>Resources</p> <ol style="list-style-type: none"> 1. Support tutors to identify GESI responsive resources such as tactile materials, audio-visuals, visuals, audio, teachers and learners resource packs, textbooks, course manual, pairs of compasses and ruler and addition mat, that can be used in the teaching and learning of the concepts mentioned above. 	<p>Resources</p> <ol style="list-style-type: none"> 1. Identify as many GESI responsive resources as possible that can be used in the teaching and learning of the concepts mentioned above. <ol style="list-style-type: none"> a. Early Grade – Lesson 6. b. Upper Grade – Lesson 6 c. JHS; Assessment – Lesson 6 d. JHS; Euclidean – Lesson 6 <p>(PD themes 1)</p>	<p>10 mins</p>

<p>considered prior to taking tutors through the lesson activities “walk through”. Equity and inclusion issues as well as ICT resources need consideration</p> <ul style="list-style-type: none"> • The resources needed must be identified: literature – page referenced etc, on web, YouTube, physical resources, power point; how they should be used. Consideration needs to be given to local availability • This section can build on the PD needs identified from the course manuals 	<p>a. Early Grade – Lesson 6. b. Upper Grade – Lesson 6 c. JHS; Assessment – Lesson 6 d. JHS; Euclidean – Lesson 6 (PD themes 1 & 3)</p> <p>2. Let tutors, in pairs (NTS 3h), select a concept and develop the rubrics for designing resources that can be used in the teaching and learning of the concepts selected.</p>	<p>2. In pairs (NTS 3h), select a concept and develop the rubrics for designing resources that can be used in the teaching and learning of the concepts selected. NTS 3j</p>	
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<p>Evaluation and review of session Guidance notes for SL/HoD should</p> <ul style="list-style-type: none"> Select activities, linked to CLO and indicators, from the lesson that are likely to be most different from tutors' previous experience. These could involve applying new content, e.g. From section 2, or approaches to teaching, learning and assessment, incl. gender responsive, differentiation and inclusive approaches and use of appropriate ICT tools. Identify how any assessments during the lesson relate to course assessment components The selected activities 	<p>Reflective Activity</p> <ol style="list-style-type: none"> Engage tutors in the evaluation of the session and encourage them to provide feedback on the PD session (NTS 1a, 3i). Take note of all unresolved issues and use any of following strategies <ul style="list-style-type: none"> – discuss with SL/SWL – put on SL/SWL WhatsApp platform for discussion – tutors to research and report findings on shared platforms. <p>Advance Preparation Ask tutors to read Lesson 7 of the Course Manual</p> <ol style="list-style-type: none"> Early Grade – Classroom assessment Upper Grade – Micro Lesson and Use of Technology Across Upper Primary Numeracy 1 JHS; Assessment – Teaching Integers in the Basic Schools JHS; Euclidean – Trigonometry 2 <p>N.B</p> <ol style="list-style-type: none"> <i>Remind tutors to identify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a).</i> <i>Read the course manual for the next PD lesson, ahead of time to identify any outstanding issues</i> 	<p>Reflective Activity</p> <ol style="list-style-type: none"> Rate the PD session with the given checklist. Reflect on the activities in the session and outline outstanding issues relating to the lesson Deal with unresolved issues through WhatsApp platform for discussion and/or research <p>Advance Preparation Read Lesson 7 of the Course Manual</p> <ol style="list-style-type: none"> Early Grade – Classroom assessment Upper Grade – Micro Lesson and Use of Technology Across Junior High School Numeracy 1 JHS; Assessment – Teaching Integers in the Basic Schools JHS; Euclidean – Trigonometry 2 <p>N.B</p> <ol style="list-style-type: none"> <i>Get a critical friend from the same or related discipline to observe your lesson during teaching and provide feedback (NTS 1a).</i> <i>Read the course manual for the next PD lesson, ahead of time to identify any outstanding issues relating to this lesson for clarification.</i> 	<p>5 mins</p>
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<p>should be done with tutors in real or close to real time</p> <ul style="list-style-type: none"> • Anticipate any issues for clarification or questions which might arise as the tutors work through the activities and provide guidance on these. • Identify where, and which, core and transferable skills, including digital skills, are being developed or applied • Makes links to the existing PD Themes with page reference where they can support teaching, for example: action research, questioning and to other external reference material • Identify where power point 	<p><i>relating to this lesson for clarification.</i></p> <p><i>iii. Collect all resources (such as projector, flip chart and sticky notes) you need ahead of time, prepare samples of TLMs you may need and rehearse how these may be used to support the achievement of your goals</i></p>	<p><i>iii. Collect all resources you need ahead of time, prepare samples of TLMs you may need and rehearse how these may be used to support the achievement of your goals</i></p>	
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<p>presentations or other resources need to be developed to support learning and provide guidance</p> <ul style="list-style-type: none">• Identify resources required for any TLMs and provide guidance on their development			
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- Age Phase:** a. Early Grade
 b. Upper Grade
 c. JHS
 d. JHS

- Course Title:** a. Teaching and Assessing Numeracy
 b. Teaching and Assessing mathematics for Upper Primary
 c. Teaching and Assessing JHS Mathematics
 d. Euclidean Geometry

Year 2 Semester 2

TUTOR PD SESSION FOR LESSON 7 IN THE COURSE MANUAL

LESSON TOPIC:

Early Grade; Classroom Assessment of Mathematics in the Early Grade (2)
 Upper Primary; Micro Lessons and use of technology across upper primary numeracy 1
 JHS; Teaching Integers in the Basic School
 JHS; Trigonometry 2: Learning and Applying

<p><i>Focus: the bullet points provide the frame for what is to be done. The guidance notes in italics identify the prompt the SL/HoD needs and each one must be addressed</i></p>	<p><i>Guidance notes on Leading the session. What the SL/HoDs will have to say during each stage of the session</i></p>	<p><i>Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the session) Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the session)</i></p>	<p><i>Time in session</i></p>
<p>1. Introduction / lesson overview</p> <ul style="list-style-type: none"> • Reflection on previous PD Session (Introduction to the course manual) • Introduction and overview of the main purpose of the lesson in the course manual. • Highlight cross cutting themes 	<p>Introduction</p> <ol style="list-style-type: none"> 1. Ice breaker activity: Begin with an investigational activity (e.g. How can you know the amount of mathematical knowledge gained by a learner?) 2. Ask a critical friend to give feedback on observation during the enactment of lesson 1 	<p>Introduction</p> <ol style="list-style-type: none"> 1. Engage in an investigational activity (e.g. How can you know the amount of mathematical knowledge gained by a learner?) 2. As a critical friend, share with members feedback on observation during the teaching of Lesson 6. 	<p>15 mins</p>

<p>i.e., gender equality and social inclusion (GESI), ICT</p> <ul style="list-style-type: none"> • Identification of important or distinctive aspects of the lesson • Reading and discussion of the introductory sections up to learning outcomes 	<ol style="list-style-type: none"> 3. Ask tutors to tell how useful the previous PD session (NTS 1b) influenced their teaching over the week. 4. Lead tutors through questioning to state the purpose of the lesson (NTS 2b) and state their expectations of the PD Session. 5. Lead tutors to outline the important features of the lesson in the course manual taking note of cross cutting themes i.e., gender equality and social inclusion (GESI), ICT, etc. 6. Have tutors read the introductory sections of the lesson and work in pairs/groups and reflect on previous PD Session outlining the key features of Early Grade; Classroom Assessment of Mathematics in the Early Grade (2); Upper Primary; Micro Lessons and use of technology across upper primary numeracy 1; JHS; Teaching Integers in the Basic School JHS; Trigonometry 2: Learning and Applying) and suggest the relevant students' previous knowledge that can support the 	<ol style="list-style-type: none"> 3. Explain how the previous PD session influenced your teaching over the week. 4. State and explain the purpose of the lesson (NTS 2b) in the course manual and state your expectations of the PD session. 5. Identify the important features of the lesson in the course manual taking note of cross cutting themes i.e., gender equality and social inclusion (GESI), ICT, etc. 6. Read the introductory sections (up to learning outcomes) silently and in pairs/groups discuss the important or distinctive aspects of the lesson (i.e. Week 7 Lesson 7: Classroom Assessment of Mathematics in the Early Grade (2); Upper Primary ; Micro Lessons and use of technology across upper primary numeracy 1; JHS; Teaching Integers in the Basic School JHS; Trigonometry 2: Learning and Applying) and suggest the relevant students' 	
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	teaching and learning of the lesson.	previous knowledge that can support the teaching and learning of the lesson.	
<p>2. Concept Development (New learning likely to arise in this lesson):</p> <ul style="list-style-type: none"> • Identification and discussion of concepts • Identification of possible challenging areas in teaching of the concept. This may include GESI and ICT related concepts • Identification of needed GESI responsive and ICT resources for the teaching and learning of the concept. 	<p>Concept Development</p> <ol style="list-style-type: none"> 1. Engage tutors in the identification and discussion of familiar and unfamiliar concepts in the lesson including operation of integers, especially, addition of integers, subtraction of Integers, micro lesson (PD Themes 1 & 3) (i.e. WEEK 7 Lesson 7 concepts: Classroom Assessment of Mathematics in the Early Grade 2; Upper Primary; Micro Lessons and use of technology across upper primary numeracy 1; JHS; Teaching Integers in the Basic School; JHS; Trigonometry 2: Learning and Applying) 2. Lead tutors to search on the internet for detailed information on the strategies for developing assessment tools for children in the early grade 3. Engage tutors in a collaborative practical activities involving planning, designing, and preparation of manipulatives and 	<p>Concept Development</p> <ol style="list-style-type: none"> 1. In pairs/groups identify and discuss familiar and unfamiliar concepts in the lesson 2. Search on the internet for detailed information on the strategies for developing assessment tools for children in the early grade; 3. Participate in a collaborative practical activities involving planning, designing, and preparation of manipulatives and 	25 mins

	<p>other models for teaching selected concepts in upper primary mathematics</p> <ol style="list-style-type: none"> <i>i.</i> Tutors in groups to outline properties of integers <i>ii.</i> Engage tutors to explore on the internet for definition and applications of radian measure and circular functions conceptual understanding of the ideas to be developed in the lesson <p>4. Have tutors discuss possible misconceptions and barriers in teaching and learning of Early Grade: Classroom Assessment of Mathematics in the Early Grade (2); Upper Primary; Micro Lessons and use of technology across upper primary numeracy 1; JHS; Teaching Integers in the Basic School; JHS; Trigonometry 2: Learning and Applying)</p> <p>5. Have tutors outline possible challenging areas in teaching number and numerals including mental mathematics.</p>	<p>other models for teaching selected concepts in upper primary mathematics</p> <p>4. Discuss potential misconceptions and barriers in teaching and learning of the concepts in Lesson 7</p> <p>5. Outline possible challenging areas in the teaching of the identified concepts.</p>	
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	<p>6. Ask tutors to identify resources that can be used in the teaching and learning of the concepts mentioned above (e.g. mental maths games, Number chart puzzles, etc.</p> <p>7. Let tutors in pairs select a concept through balloting and design resources that can be used in the teaching and learning of the concept.</p> <p>NOTE: <i>Knowledge and understanding of number concepts including counting and identification of number bases in Ghanaian number words may be challenging and needs to be addressed'</i></p> <ul style="list-style-type: none"> • <i>Analyse number words in different Ghanaian languages to establish knowledge of number bases and operations that are embedded in these languages</i> • <i>In pairs or groups tutors discuss the need for using local low or no cost materials to design and</i> 	<p>6. Identify resources that can be used in teaching and learning of the concepts mentioned above (e.g. mental maths games, number games, Number chart puzzles, etc.</p> <p>7. In pairs select a concept through balloting and design resources that can be used in the teaching and learning of the concept selected.</p>	
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	<i>use resources for teaching number concepts.</i>		
<p>3. Teaching, learning and assessment activities for the lesson</p> <ul style="list-style-type: none"> • Reading of teaching and learning activities and identification of areas that require clarification especially GESI related activities. • Reading of teaching and learning activities and identification of GESI and ICT issues that require clarification. • Reading of assessment opportunities and ensuring they are aligned to the NTEAP and required course assessment: subject project (30%), subject portfolio (30%) and end of semester examination (40%) Working through one or two activities, 	<p>Teaching and learning activities for the lesson</p> <ol style="list-style-type: none"> 1. Ask tutors to suggest teaching and learning activities for the lesson taking into account Gender Equality and Social Inclusion (GESI) (e.g. both male and female participants playing the leading roles in group work, even distribution of questions) and refer them to the activities outlined in the course manual (writing the weekly PD session-pp 3., NTS 1a, b,c, d, 2b, e, f, 3b, c; UPP-pp. 20; JHS; Euclidean- pp. 26; JHS; Assessment-25, EGE- p. 16 2. Lead tutors to brainstorm and come up with some pedagogical approaches and their related core competencies likely to be inculcated in CoE students and extended to basic school learners through STS activities. Example: Group Work - Collaborative learning Investigation - Critical Thinking Role Play - Communication (Students can ascertain the extent to which 	<p>Teaching and learning activities for the lesson</p> <ol style="list-style-type: none"> 1. Suggest teaching and learning activities that can be used in teaching the lesson taking into account GESI (e.g. both male and female participants playing the leading roles in group work, even distribution of questions). Read the activities in the course manual (pp. 12 &16), and identify those that require clarification (NTS 1a, b, c, d, 2b, e, f, 3b, c; BSC p. iii). 2. Brainstorm and come up with some pedagogical approaches and their likely related core competencies to be inculcated in CoE students and extended to basic school learners through STS activities. <ol style="list-style-type: none"> a. (Students can ascertain the extent to which methods are used during STS activities in schools). 	40 mins

	<p>methods are used during STS activities in schools).</p> <p>3. Engage tutors in pairs to discuss strategies to strengthen core competencies (e.g. mind- reading word puzzle, investigation, etc.).</p> <p>4. Let a tutor model a presentation of an activity using ICT tools and taking into consideration GESI (e.g. both male and female participants playing leading roles in their groups and in the demonstration of the use of ICT tools) in the B.ED and the Basic School Curricula (BSC). NTS 1a, b, c, d, 2b, e, 3b, c, J; BSC pp. iii)</p> <p>NOTE:</p> <p><i>i. Tutors are likely to ask about the relevance of this activity in teaching mathematics lessons. When this comes up, refer them to the PD Theme 1, that is, Creative Approaches</i></p> <p><i>ii. The core and transferable skills being developed or used include social skills, communication skills, critical and creative thinking skills</i></p> <p><i>iii. Creative Activities, Questioning, Talk and Learn and Group Work</i></p>	<p>3. Discuss the strategies to strengthen core competencies.</p> <p>4. Discuss one or two of the activities to ensure understanding and model alternative strategies for the activities using ICT tools and taking into consideration GESI (e.g. both male and female participants playing leading roles in their groups and in the demonstration of the use of ICT tools) in the B.ED and the Basic School Curricula (BSC). NTS 1a, b, c, d, 2b, e, 3b, c, J; BSC pp. iii)</p>	
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	<i>can be used to support the delivery of this session</i>		
<p>4. Evaluation and review of session:</p> <ul style="list-style-type: none"> ● Review learning and identification of any outstanding issues relating to this lesson for clarification ● Course assignment <ul style="list-style-type: none"> ○ Advance preparation <p>In the case of unresolved issues</p>	<p>Activity 4: Review of Assessment Components</p> <ol style="list-style-type: none"> 1. Ask tutors to review the assessment components of the lesson in the course manual focusing on assessment of, as and for in line with the NTEAP. <ol style="list-style-type: none"> a. Early Grade – Lesson 7 b. Upper Grade – Lesson 7 c. JHS Euclidean – Lesson 7 d. JHS Assessment – Lesson 7 2. Let tutors discuss the assessment strategies to be used during enactment of the lesson referring to the NTEAP at the various levels (KG, UP, JHS) (NTS 3k). 3. Lead tutors to discuss the various ways they can support student teachers to build their portfolios before/during/ after lessons. 	<p>Review of Assessment Components</p> <ol style="list-style-type: none"> 1. Review the assessment components of the lesson in the course manual focusing on assessment of, as and for in line with the NTEAP. <ol style="list-style-type: none"> a. Early Grade – Lesson 7 b. Upper Grade – Lesson 7 c. JHS Euclidean – Lesson 7 d. JHS Assessment – Lesson 7 2. Discuss the assessment strategies to be used during enactment of the lesson making reference to the NTEAP at the various levels (KG, UP, JHS) (NTS 3k). 3. Discuss the various ways you can support student teachers to build their portfolios before/during/ after lessons. 	15 mins
<p>Resources</p> <p>Guidance notes for SL/HoD should</p> <ul style="list-style-type: none"> ● Identify any aspect of the lesson that might be challenging for tutors in terms 	<p>Resources</p> <ol style="list-style-type: none"> 1. Support tutors to identify inclusive resources such as tactile materials, audio-visuals, visuals, audio, teachers and learners resource packs, textbooks, 	<p>Resources</p> <ol style="list-style-type: none"> 1. Identify and design inclusive resources such as tactile, audio-visuals, visuals, audio, teachers and learners resource packs, textbooks, course manual, graph sheets 	10 mins

<p>of new learning, and which needs to be considered prior to taking tutors through the lesson activities “walk through”. Equity and inclusion issues as well as ICT resources need consideration</p> <ul style="list-style-type: none"> • The resources needed must be identified: literature – page referenced etc, on web, YouTube, physical resources, power point; how they should be used. Consideration needs to be given to local availability • This section can build on the PD needs identified from the course manuals 	<p>course manual, graph sheets and number charts that can be used in the teaching and learning of the concepts to be introduced in the lesson.</p> <ol style="list-style-type: none"> 2. Ask tutors, in pairs (NTS 3h), select a concept through balloting and design resources that can be used in the teaching and learning of the concept (NTS 3j). 3. Encourage tutors to prepare samples of TLMs for teaching of <ol style="list-style-type: none"> a. Teaching and Assessing Numeracy b. Teaching and Assessing mathematics for Upper Primary c. Teaching and Assessing JHS Mathematics d. Euclidean Geometry 	<p>and number charts that can be used in the teaching and learning of the concepts to be introduced in the lesson, – the BSC curriculum, counting, number relationships and geometric proof. NTS 3j</p> <ol style="list-style-type: none"> 2. In pairs (NTS 3h), select a concept through balloting and design resources that can be used in the teaching and learning of the concept selected (NTS 3j). 3. Discuss the need for using local, low or no cost materials to design and use resources for teaching of the lesson. 	
<p>Course assessment in accordance with the NTEAP: SWL need to review assessment in the course manual to ensure it complies with NTEAP implementation</p>	<p>Reflective Activity</p> <ol style="list-style-type: none"> 1. Engage tutors in the evaluation of the session and encourage them to provide feedback on the PD session (NTS 1a, 3i). 2. Engage tutors to identify unresolved issues 	<p>Reflective Activity</p> <ol style="list-style-type: none"> 1. Show by 5 or 3 or 1 finger(s) if you “really got it”, “got some of it” or “didn’t get it” respectively. If you showed 5 fingers, share your experience with your colleagues. 2. Reflect on the activities in the session 	<p>5 mins</p>

<p>and the 60% continuous assessment and 40 % End of semester examination. This means ensuring subject project, subject portfolio preparation and development are explicitly addressed in the PD sessions.</p>	<p>relating to this lesson for clarification.</p> <p>3. Lead tutors to take note of all unresolved issues and use any of following strategies</p> <ul style="list-style-type: none"> i. discuss with SL/SWL ii. put on SL/SWL WhatsApp platform for discussion. iii. tutors to research for the next PD session for discussion <p>Advance Preparation Ask tutors to read Lesson 8 of the Course Manual (Micro Lessons and use of technology across upper primary numeracy 2) to identify issues of concern for clarification.</p> <p>N.B <i>Remind tutors to identify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a).</i></p> <p><i>Collect all resources you need ahead of time, prepare samples of TLMs you may need and rehearse how these may be used to support the achievement of your goals</i></p>	<p>and identify unresolved issues relating to the lesson.</p> <p>3. Deal with unresolved issues through WhatsApp platform for discussion and/or research</p> <p>Advance Preparation Read Lesson 8 of the Course Manual (Micro Lessons and use of technology across upper primary numeracy 2) to identify issues of concern.</p> <p>N.B <i>Get a critical friend from the same or related discipline to observe your lesson during teaching and provide feedback (NTS 1a).</i></p>	
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- Age Phase:** a. Early Grade
 b. Upper Grade
 c. JHS
 d. JHS

- Name of Courses:** a. Teaching and Assessing Numeracy
 b. Teaching and Assessing mathematics for Upper Primary
 c. Teaching and Assessing JHS Mathematics
 d. Euclidean Geometry

Year 2 Semester 2

TUTOR PD SESSION FOR LESSON 8 IN THE COURSE MANUAL

LESSON TOPIC:

- a. Early Grade** – Classroom Assessment of Mathematics in the Early Grade (3)
b. Upper Grade – Micro Lessons and use of technology across upper primary numeracy 2
c. JHS – Teaching Integers in the Basic School 2
d. JHS – Trigonometry 3: Learning and Applying

<i>Focus: the bullets provide the frame for what is to be done. The guidance notes in italics identify the prompt the SL/HoD needs and each one must be addressed</i>	<i>Guidance notes on Leading the session. What the SL/HoDs will have to say during each stage of the session</i>	<i>Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the session)</i>	<i>Time in session</i>
1. Introduction / lesson overview <ul style="list-style-type: none"> • Reflection on previous PD Session (Introduction to the course manual) • Introduction and overview of the main purpose of the lesson in the course manual. • Highlight cross cutting themes i.e., gender equality and social inclusion (GESI), ICT • Identification of important or 	Introduction / lesson overview <ol style="list-style-type: none"> 1. Ice breaker activity: Begin with an investigational activities (e.g. mention in turns the set of triangular numbers from 1 and not more than 50) 2. Ask tutors to tell how useful the previous PD session was and how it influenced their teaching over the week. 	Introduction / lesson overview <ol style="list-style-type: none"> 1. Engage in an investigational activity (eg. mention in turns the set of triangular numbers from 1 and not more than 50) 2. Explain how useful the previous PD session was and how it influenced their teaching over the week. 	15 mins

<p>distinctive aspects of the lesson Reading and discussion of the introductory sections up to learning outcomes</p>	<ol style="list-style-type: none"> 3. Ask the critical friend to give feedback on his/her observation of the last enacted lesson. 4. Ask tutors to state the purpose of the lesson and state their expectations of the PD Session (NTS 2b) 5. Lead tutors to outline the important features of the lesson in the course manual 6. Ask tutors to read the introductory sections (up to learning outcomes) and discuss the important or distinctive aspects of the lesson (i.e. the interactive nature of the activities with emphasis on connecting concepts – (Classroom Assessment of mathematics in early Grade 3 ;Micro Lessons and use of technology across upper primary numeracy 2 ; ,Teaching Integers in the Basic School 2; Trigonometry 3: Learning and Applying with other lessons and the use of relevant resources) and suggest the relevant students’ previous knowledge that can support the teaching 	<ol style="list-style-type: none"> 3. As the critical friend, share with members feedback on your observation of the last enacted lesson. 4. State the purpose of the lesson and state your expectations of the lesson 5. Identify the important features of the lesson in the course manual. 6. Read the introductory sections (up to learning outcomes) and in pairs/groups discuss the important or distinctive aspects of the lesson (i.e. the interactive nature of the activities with emphasis on connecting concepts (Classroom Assessment of mathematics in early Grade 3, Micro Lesson and the Use of Technology across upper primary Numeracy 2 and Trigonometry 3, Learning and Applying with other lessons and the use of relevant resources) and suggest the relevant students’ previous knowledge that can support the teaching 	
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	<p>and learning of the lesson.</p> <p>See Course Manual for:</p> <p>a. Early Grade – Lesson 8. b. Upper Grade – Lesson 8 c. JHS; Assessment – Lesson 8 d. JHS; Euclidean – Lesson 8</p> <p>BSC Content Standards B4.1.1.1 B5.1.1.1 B6.1.1.1 B4.1.3.1 CCP-B8.3.2.1 (PD Theme 1, 3 & 4)</p>	<p>and learning of the lesson.</p> <p>See Course Manual for:</p> <p>a. Early Grade – Lesson 8. b. Upper Grade – Lesson 8 c. JHS; Assessment – Lesson 8 d. JHS; Euclidean – Lesson 8</p> <p>BSC Content Standards B4.1.1.1 B5.1.1.1 B6.1.1.1 B4.1.3.1 CCP-B8.3.2.1 (PD Theme 1, 3 & 4)</p>																
<p>2. Concept Development (New learning likely to arise in this lesson):</p> <ul style="list-style-type: none"> • Identification and discussion of concepts • Identification of possible challenging areas in teaching of the concept. This may include GESI and ICT related concepts • Identification of needed GESI responsive and ICT resources for the teaching and learning of the concept. 	<p>Concept Development</p> <ol style="list-style-type: none"> 1. Lead tutors to identify familiar and unfamiliar concepts in the lesson and discuss relevant connections among concepts in the lesson with other lessons and the use of relevant resources including the basic school curriculum. 2. Engage tutors to identify and discuss various strategies for the development of conceptual understanding of the lesson. <table border="1"> <thead> <tr> <th>Level</th> <th>Concept</th> <th>Strategy</th> </tr> </thead> <tbody> <tr> <td>Early Child</td> <td>Assessment</td> <td>Interactive</td> </tr> <tr> <td>Upp Grade</td> <td>Micro Lessons</td> <td>Model lessons/ Internet search</td> </tr> <tr> <td>JHS (Assesst)</td> <td>Teaching Integers</td> <td>Model lessons</td> </tr> <tr> <td>JHS (Eucl)</td> <td>Trigonometry 3</td> <td>Exploratory</td> </tr> </tbody> </table>	Level	Concept	Strategy	Early Child	Assessment	Interactive	Upp Grade	Micro Lessons	Model lessons/ Internet search	JHS (Assesst)	Teaching Integers	Model lessons	JHS (Eucl)	Trigonometry 3	Exploratory	<p>Concept Development</p> <ol style="list-style-type: none"> 1. Identify familiar and unfamiliar concepts in the lesson and discuss relevant connections among concepts in the lesson with other lessons and the use of relevant resources including the basic school curriculum. 2. Identify and discuss various strategies for the development of conceptual understanding of <ul style="list-style-type: none"> a. Early Grade – Classroom Assessment b. Upper Grade – Classroom Assessment c. JHS; Assessment – Micro Lesson and Use of Technology d. JHS; Euclidean – Trigonometry 	25 mins
Level	Concept	Strategy																
Early Child	Assessment	Interactive																
Upp Grade	Micro Lessons	Model lessons/ Internet search																
JHS (Assesst)	Teaching Integers	Model lessons																
JHS (Eucl)	Trigonometry 3	Exploratory																

	<p>Let tutors refer to Lesson 8 of the course manual for additional strategies. Engage tutors to identify and discuss unfamiliar concepts in the lesson</p> <p>3. Lead tutors to discuss misconceptions and barriers in teaching and learning of the concepts to be developed in the lesson.</p> <p>Eg.</p> <p>a. Early Grade – Classroom Assessment of Mathematics in the Early Grade (3)</p> <p>b. Upper Grade – Micro Lessons and use of technology across upper primary numeracy 2</p> <p>c. JHS – Teaching Integers in the Basic School 2</p> <p>d. JHS – Trigonometry 3: Learning and Applying <i>That trigonometry cannot be apply in everyday life activity.</i></p> <p>Barriers: <i>Inappropriate inclusive resources Limited use of technology Inadequate pre-requisite knowledge N/B: Refer tutors to the Lesson 8 of the course manual for other potential misconceptions and barriers.</i></p>	<p>3. Discuss some potential misconceptions and barriers with respect to the teaching and learning of concepts to be developed in the lesson;</p> <p>a. Early Grade – Classroom Assessment of Mathematics in the Early Grade (3)</p> <p>b. Upper Grade – Micro Lessons and use of technology across upper primary numeracy 2</p> <p>c. JHS – Teaching Integers in the Basic School 2</p> <p>d. JHS – Trigonometry 3: Learning and Applying</p>	
<p>3. Teaching, learning and assessment activities for the lesson</p> <ul style="list-style-type: none"> • Reading of teaching and learning activities and 	<p>Teaching and learning activities</p> <p>1. Ask tutors to suggest teaching and learning activities for the lesson taking into</p>	<p>Teaching and learning activities</p> <p>1. Suggest teaching and learning activities that can be used in teaching the lesson</p>	<p>40 mins</p>

<p>identification of areas that require clarification especially GESI related activities.</p> <ul style="list-style-type: none"> • Reading of teaching and learning activities and identification of GESI and ICT issues that require clarification. 	<p>account GESI (e.g. both male and female participants playing the leading roles in group work, even distribution of questions) Writing the Weekly PD Session-p 3., NTS 1a, b, c, d, 2b, e, f, 3b, c</p> <ol style="list-style-type: none"> 2. Lead tutors to brainstorm and come up with some pedagogical approaches and their related core competencies likely to be inculcated in CoE students and extended to basic school learners through STS activities. 3. (Students can ascertain the extent to which methods are used during STS activities in schools). 4. Engage tutors in a discussion of strategies strengthen core competencies. (e.g. using activity-based/demonstration to solve problem with differentiated assessment of, as and for; engaging tutors in exploratory activities to solve the problem of inability to state the correct trig ratio). 	<p>taking into account GESI (e.g. both male and female participants playing the leading roles in group work, even distribution of questions). (Writing the Weekly PD Session-p 3., NTS 1a, b, c, d, 2b, e, f, 3b, c; BSC pp. iii).</p> <ol style="list-style-type: none"> 2. Brainstorm and come up with some pedagogical approaches and their likely related core competencies to be inculcated in CoE students and extended to basic school learners through STS activities. 3. (Students can ascertain the extent to which methods are used during STS activities in schools). 4. Discuss the strategies to strengthen core competencies. 	
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	<p>5. Ask a tutor to model alternative strategies for the activities using ICT tools, taking into consideration GESI issues (e.g. both male and female participants playing leading roles in their groups and in the demonstration of the use of ICT tools in the B.ED and the Basic School Curricula (BSC). NTS 1a, b, c, d, 2b, e, 3b, c, J; BSC pp. iii).</p>	<p>5. Model alternative strategies for the activities using ICT tools, taking into consideration GESI (e.g. both male and female participants playing leading roles in their groups and in the demonstration of the use of ICT tools in B.ED and Basic School Curricula.</p>	
<p>4. Review of Assessment component Reading of assessment opportunities and ensuring they are aligned to the NTEAP and required course assessment: subject project (30%), subject portfolio (30%) and end of semester examination (40%) Working through one or two activities.</p>	<p>Review of Assessment Components</p> <ol style="list-style-type: none"> 1. Ask tutors to review the assessment components of the lesson in the course manual focusing on assessment of, as and for in line with the NTEAP. <ol style="list-style-type: none"> a. Early Grade – Lesson 8. b. Upper Grade – Lesson 8 c. JHS; Assessment – Lesson 8 d. JHS; Euclidean – Lesson 8 2. Let tutors discuss the assessment strategies to be used during enactment of the lesson referring to the NTEAP at the various levels (KG, UP, JHS)– ‘Assessment as’ (NTS 3k). 	<p>Review of Assessment Components</p> <ol style="list-style-type: none"> 1. Ask tutors to review the assessment components of the lesson in the course manual focusing on assessment of, as and for in line with the NTEAP. <ol style="list-style-type: none"> a. Early Grade – Lesson 8. b. Upper Grade – Lesson 8 c. JHS; Assessment – Lesson 8 d. JHS; Euclidean – Lesson 8 2. Discuss the assessment strategies to be used during enactment of the lesson making reference to the NTEAP at the various levels (KG, UP, JHS)– ‘Assessment as’ (NTS 3k) 	<p>15 mins</p>

	3. Lead tutors to discuss the various ways they can support student teachers to build their portfolios before/during/ after lessons	3. Discuss the various ways you can support student teachers to build their portfolios before/during/ after lessons	
<p>Resources</p> <p>Guidance notes for SL/HoD should</p> <ul style="list-style-type: none"> Identify any aspect of the lesson that might be challenging for tutors in terms of new learning, and which needs to be considered prior to taking tutors through the lesson activities “walk through”. Equity and inclusion issues as well as ICT resources need consideration The resources needed must be identified: literature – page referenced etc, on web, YouTube, physical resources, power point; how they should be used. Consideration needs to be given to local availability This section can build on the PD needs identified from the course manuals 	<p>Resources</p> <ol style="list-style-type: none"> Support tutors to identify GESI responsive resources such as supporting staff for sign language, projectors, flip charts, sticky notes, tactile materials, audio-visuals, visuals, audio, teachers and learners resource packs, textbooks, course manual, pairs of compasses and ruler and addition mat, that can be used in the teaching and learning of the concepts in the lesson. <ol style="list-style-type: none"> Early Grade – Lesson 8. Upper Grade – Lesson 8 JHS; Assessment – Lesson 8 JHS; Euclidean – Lesson 8 <p>(PD themes 1 & 3)</p> Discuss with tutors how and where human and material resources for the lesson could be obtain in advance. Such resources can include projectors, flip charts and sign language personnel. Let tutors, in pairs (NTS 3h), select a concept 	<p>Resources</p> <ol style="list-style-type: none"> Identify as many GESI responsive resources as possible that can be used in the teaching and learning of the concepts in the lesson. <ol style="list-style-type: none"> Early Grade – Lesson 8. Upper Grade – Lesson 8 JHS; Assessment – Lesson 8 JHS; Euclidean – Lesson 8 <p>(PD themes 1)</p> Participate in discussing how and where human and material resources for the lesson could be obtain in advance. In pairs (NTS 3h), select a concept and 	10 mins

	and develop the rubrics for designing resources that can be used in the teaching and learning of the concepts selected.	develop the rubrics for designing resources that can be used in the teaching and learning of the concepts selected. NTS 3j	
<p>Evaluation and review of session</p> <p>Guidance notes for SL/HoD should</p> <ul style="list-style-type: none"> Select activities, linked to CLO and indicators, from the lesson that are likely to be most different from tutors' previous experience. These could involve applying new content, e.g. from section 2, or approaches to teaching, learning and assessment, incl. gender responsive, differentiation and inclusive approaches and use of appropriate ICT tools. Identify how any assessments during the lesson relate to course assessment components The selected activities should be done with tutors in real or close to real time Anticipate any issues for clarification or questions which 	<p>Reflective Activity</p> <ol style="list-style-type: none"> Engage tutors in the evaluation of the session and encourage them to provide feedback on the PD session (NTS 1a, 3i). Engage tutors to identify unresolved issues relating to this lesson for clarification. Lead tutors to take note of all unresolved issues and use any of following strategies <ol style="list-style-type: none"> discuss with SL/SWL put on SL/SWL WhatsApp platform for discussion. tutors to research for the next PD session for discussion <p>Advance Preparation Ask tutors to read Lesson 9 of the Course Manual</p> <ol style="list-style-type: none"> Early Grade – Classroom assessment Upper Grade – Micro Lesson and Use of Technology Across Junior High School Numeracy 1 JHS; Assessment – Teaching Integers in the Basic Schools 	<p>Reflective Activity</p> <ol style="list-style-type: none"> Show by 5 or 3 or 1 finger(s) if you “really got it”, “got some of it” or “didn’t get it” respectively. If you showed 5 fingers, share your experience with your colleagues. Identify unresolved issues relating to the lesson. Deal with unresolved issues through WhatsApp platform for discussion and/or research <p>Advance Preparation Read Lesson 9 of the Course Manual</p> <ol style="list-style-type: none"> Early Grade – Classroom assessment Upper Grade – Micro Lesson and Use of Technology Across Junior High School Numeracy 1 JHS; Assessment – Teaching Integers in the Basic Schools 	5 mins

<p>might arise as the tutors work through the activities and provide guidance on these.</p> <ul style="list-style-type: none"> • Identify where, and which, core and transferable skills, including digital skills, are being developed or applied • Makes links to the existing PD Themes with page reference where they can support teaching, for example: action research, questioning and to other external reference material • Identify where power point presentations or other resources need to be developed to support learning and provide guidance <p>Identify resources required for any TLMs and provide guidance on their development</p>	<p>d. JHS; Euclidean – Trigonometry</p> <p>N.B</p> <p><i>i. Remind tutors to identify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a).</i></p> <p><i>ii. Read the course manual for the next PD lesson, ahead of time to identify any outstanding issues relating to this lesson for clarification.</i></p> <p><i>iii. Collect all resources you need ahead of time, prepare samples of TLMs you may need and rehearse how these may be used to support the achievement of your goals</i></p>	<p>d. JHS; Euclidean – Trigonometry 2</p> <p>N.B</p> <p><i>i. Get a critical friend from the same or related discipline to observe your lesson during teaching and provide feedback (NTS 1a).</i></p> <p><i>ii. Read the course manual for the next PD lesson, ahead of time to identify any outstanding issues relating to this lesson for clarification.</i></p> <p><i>iii. Collect all resources you need ahead of time, prepare samples of TLMs you may need and rehearse how these may be used to support the achievement of your goals</i></p>	
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- Age Phase:** a. Early Grade
 b. Upper Grade
 c. JHS
 d. JHS

- Name of Courses:** a. Teaching and Assessing Numeracy
 b. Teaching and Assessing mathematics for Upper Primary
 c. Teaching and Assessing JHS Mathematics
 d. Euclidean Geometry

Year 2 Semester 2

TUTOR PD SESSION FOR LESSON 9 IN THE COURSE MANUAL

LESSON TOPIC:

- a. **Early Grade** – Micro Lesson and Use of Technology Across Early Grade Mathematics (1)
 b. **Upper Grade** – Subtraction of whole numbers within 19 and then numbers within 99
 c. **JHS** – Rational and Irrational numbers
 d. **JHS** – Trigonometric Equations: *Learning, teaching and applying*

<i>Focus: the bullets provide the frame for what is to be done. The guidance notes in italics identify the prompt the SL/HoD needs and each one must be addressed</i>	<i>Guidance notes on Leading the session. What the SL/HoDs will have to say during each stage of the session</i>	<i>Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the session)</i>	<i>Time in session</i>
1. Introduction / lesson overview <ul style="list-style-type: none"> • Reflection on previous PD Session (Introduction to the course manual) • Introduction and overview of the main purpose of the lesson in the course manual. • Highlight cross cutting themes 	Introduction / lesson overview <ol style="list-style-type: none"> 1. Ice breaker activity: Begin with an investigational activity (e.g. Create your own acronym for the basic trigonometric ratios) 2. Ask tutors to tell how useful the previous PD session was and how it influenced their teaching over the week. 3. Ask a critical friend to give feedback on 	Introduction / lesson overview <ol style="list-style-type: none"> 1. Engage in an investigational activity (e.g. create personal acronyms for the basic trigonometric ratios) 2. Explain how useful the previous PD session was and how it influenced your teaching over the week. 3. As the critical friend, share with members 	15 mins

<p>i.e., gender equality and social inclusion (GESI), ICT</p> <ul style="list-style-type: none"> • Identification of important or distinctive aspects of the lesson • Reading and discussion of the introductory sections up to learning outcomes 	<p>his/her observation of the last enacted lesson.</p> <ol style="list-style-type: none"> 4. Ask tutors to suggest the purpose of the lesson and state their expectations of the PD Session (NTS 2b) 5. Lead tutors to outline the important features of the lesson in the course manual taking note of cross cutting themes i.e., gender equality and social inclusion (GESI), ICT, etc. 6. Ask tutors to read the introductory sections (up to learning outcomes) and discuss the important or distinctive aspects of the lesson (i.e. the interactive nature of the activities) and suggest the relevant students' previous knowledge that can support the teaching and learning of the lesson. <p>See Course Manual for:</p> <ol style="list-style-type: none"> a. Early Grade – Lesson 9 b. Upper Grade – Lesson 9 c. JHS; Assessment – Lesson 9 d. JHS; Euclidean – Lesson 9 <p>BSC- B4.1.3.1 B5.1.3.1, CCP- B8.3.2.1 (PD Theme 1 &3)</p>	<p>feedback on your observation of the last enacted lesson.</p> <ol style="list-style-type: none"> 4. Suggest the purpose of the lesson and state your expectations of the lesson. 5. Identify the important features of the lesson in the course manual taking note o cross cutting themes i.e., gender equality and social inclusion (GESI), ICT, etc. 6. Read the introductory sections (up to learning outcomes) and in pairs/groups discuss the important or distinctive aspects of the lesson (i.e. the interactive nature of the activities) and suggest the relevant students' previous knowledge that can support the teaching and learning of the lesson. <p>See Course Manual for: Lesson 9 BSC- B4.1.3.1 B5.1.3.1, CCP- B8.3.2.1 (PD Theme 1 &3)</p>	
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<p>2. Concept Development (New learning likely to arise in this lesson):</p> <ul style="list-style-type: none"> • Identification and discussion of concepts • Identification of possible challenging areas in teaching of the concept. This may include GESI and ICT related concepts • Identification of needed GESI responsive and ICT resources for the teaching and learning of the concept. 	<p>Concept Development</p> <ol style="list-style-type: none"> 1. Lead tutors to identify familiar and unfamiliar concepts in the lesson and discuss relevant connections among concepts in the lesson with other lessons and the use of relevant resources including the basic school curriculum. 2. Engage tutors to identify and discuss various strategies for the development of conceptual understanding of the lesson. Example: <table border="1" data-bbox="491 931 858 1256"> <thead> <tr> <th>Level</th> <th>Concept</th> <th>Strategy</th> </tr> </thead> <tbody> <tr> <td>Early Child</td> <td>Micro lesson</td> <td>Interactive</td> </tr> <tr> <td>Upper Grade</td> <td>Subtraction of Whole Nos.</td> <td>Internet search</td> </tr> <tr> <td>JHS (Assessment)</td> <td>Rational and Irrational Nos.</td> <td>Model lessons</td> </tr> <tr> <td>JHS (Eucl)</td> <td>Trigonometric equations</td> <td>Exploratory</td> </tr> </tbody> </table> <p>Let tutors refer to Lesson 9 of the course manual for additional strategies.</p> <ol style="list-style-type: none"> 3. Lead tutors to discuss misconceptions and barriers in teaching and learning of the concepts to be developed in the lesson. <p>Eg.</p> <p>a. Early Grade – Micro Lesson and Use of Technology: <i>That the use of ICT tools does not encourage logically reason.</i></p> <p>b. Upper Grade – Subtraction of whole numbers: <i>That smaller</i></p>	Level	Concept	Strategy	Early Child	Micro lesson	Interactive	Upper Grade	Subtraction of Whole Nos.	Internet search	JHS (Assessment)	Rational and Irrational Nos.	Model lessons	JHS (Eucl)	Trigonometric equations	Exploratory	<p>Concept Development</p> <ol style="list-style-type: none"> 1. Identify familiar and unfamiliar concepts in the lesson and discuss relevant connections among concepts in the lesson with other lessons and the use of relevant resources including the basic school curriculum. 2. Identify and discuss various strategies for the development of conceptual understanding of the lesson. 3. Discuss some potential misconceptions and barriers with respect to the teaching and learning of the concepts to be developed in the lesson. 	<p>25 mins</p>
Level	Concept	Strategy																
Early Child	Micro lesson	Interactive																
Upper Grade	Subtraction of Whole Nos.	Internet search																
JHS (Assessment)	Rational and Irrational Nos.	Model lessons																
JHS (Eucl)	Trigonometric equations	Exploratory																

	<p><i>numbers are subtracted from the bigger numbers during subtraction.</i></p> <p>c. JHS; Assessment – Rational and Irrational numbers: <i>That a fraction is made up two different numbers.</i></p> <p>d. JHS; Euclidean Geometry – Trigonometry: <i>That trigonometry cannot be apply in everyday life activity.</i></p> <p>Barriers: <i>Inappropriate inclusive resources Limited use of technology Inadequate pre-requisite knowledge N/B: Refer tutors to the lesson 9 of the course manual for other potential misconceptions and barriers.</i></p>		
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<p>3. Teaching, learning and assessment activities for the lesson</p> <ul style="list-style-type: none"> • Reading of teaching and learning activities and identification of areas that require clarification especially GESI related activities. • Reading of teaching and learning activities and identification of GESI and ICT issues that require clarification. 	<p>Teaching and learning activities</p> <ol style="list-style-type: none"> 1. Ask tutors to suggest teaching and learning activities for the lesson taking into account Gender Equality and Social Inclusion (GESI) (e.g. both male and female participants playing the leading roles in group work, even distribution of questions) and refer them to the activities outlined in the course manual (Writing the Weekly PD Session-p 3., NTS 1a, b, c, d, 2b, e, f, 3b, c; UPP- p. 20; JHS; Euclidean- p. 26; JHS; Assessment-25, EGE- p. 16) 2. Lead tutors to brainstorm and come up with some pedagogical approaches and their related core competencies likely to be inculcated in CoE students and extended to basic school learners through STS activities. <p>eg.</p> <table border="1" data-bbox="496 1556 853 1776"> <tr> <td>Strategy</td> <td>Core Competency</td> </tr> <tr> <td>Group Work</td> <td>Collaborative learning</td> </tr> <tr> <td>Investigation</td> <td>Critical Thinking</td> </tr> <tr> <td>Role Play</td> <td>Communication</td> </tr> </table> <p>(Students can ascertain the extent to which methods are used during STS activities in schools.)</p>	Strategy	Core Competency	Group Work	Collaborative learning	Investigation	Critical Thinking	Role Play	Communication	<p>Teaching and learning activities</p> <ol style="list-style-type: none"> 1. Ask tutors to suggest teaching and learning activities for the lesson taking into account Gender Equality and Social Inclusion (GESI) (e.g. both male and female participants playing the leading roles in group work, even distribution of questions) and refer them to the activities outlined in the course manual (Writing the Weekly PD Session-p 3., NTS 1a, b, c, d, 2b, e, f, 3b, c; UPP- p. 20; JHS; Euclidean- p. 26; JHS; Assessment-25, EGE- p. 16) 2. Brainstorm and come up with some pedagogical approaches and their likely related core competencies to be inculcated in CoE students and extended to basic school learners through STS activities. (Students can ascertain the extent to which methods are used during STS activities in schools.) 	<p>40 mins</p>
Strategy	Core Competency										
Group Work	Collaborative learning										
Investigation	Critical Thinking										
Role Play	Communication										

	<p>3. Engage tutors in a discussion of strategies strengthen core competencies. (e.g. Using the principle of multiple embodiment to solve problems related to subtraction and engaging tutors in exploratory activities to solve the problem of inability to use of ICT tools).</p> <p>4. Ask a tutor to model alternative strategies for the activities using ICT tools, taking into consideration GESI (e.g. both male and female participants playing leading roles in their groups and in the demonstration of the use of ICT tools) in the B.ED and the Basic School Curricula (BSC). NTS 1a, b, c, d, 2b, e, 3b, c, J; BSC pp. iii).</p> <p>NOTE:</p> <ol style="list-style-type: none"> 1. <i>Tutors are likely to ask about the relevance of this activity in teaching mathematics lessons. When this comes up, refer them to the PD Theme 1, that is, Creative Approaches</i> 2. <i>The core and transferable skills being developed or used include social skills, communication skills, critical and creative thinking skills</i> 	<p>3. Discuss some strategies strengthen core competencies.</p> <p>4. Model alternative strategies for the activities using ICT tools, taking into consideration GESI (e.g. both male and female participants playing leading roles in their groups and in the demonstration of the use of ICT tools) in B.ED and Basic School Curricula. NTS 1a, b, c, d, 2b, e, 3b, c, J; BSC pp. iii).</p>	
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	<i>Creative Activities, Questioning, Talk and Learn and Group Work can be used to support the delivery of this session</i>		
<p>4. Review of Assessment component</p> <ul style="list-style-type: none"> Reading of assessment opportunities and ensuring they are aligned to the NTEAP and required course assessment: subject project (30%), subject portfolio (30%) and end of semester examination (40%) Working through one or two activities. 	<p>Review of Assessment Components</p> <ol style="list-style-type: none"> Ask tutors to review the assessment components of the lesson in the course manual focusing on assessment of, as and for in line with the NTEAP. <ol style="list-style-type: none"> Early Grade – Lesson 9 Upper Grade – Lesson 9 JHS; Assessment – Lesson 9 JHS; Euclidean – Lesson 9 Let tutors discuss the assessment strategies to be used during enactment of the lesson referring to the NTEAP at the various levels (KG, UP, JHS) – ‘Assessment as’ (NTS 3k). Lead tutors to discuss the various ways they can support student teachers to build their portfolios before/during/ after lessons. 	<p>Review of Assessment Components</p> <ol style="list-style-type: none"> Review the assessment components of the lesson in the course manual focusing on assessment of, as and for in line with the NTEAP See Course manual - Lesson 9 Discuss the assessment strategies to be used during enactment of the lesson making reference to the NTEAP at the various levels (KG, UP, JHS) (NTS 3k). Discuss the various ways you can support student teachers to build their portfolios before/during/ after lessons. 	15 mins
<p>Resources Guidance notes for SL/HoD should</p> <ul style="list-style-type: none"> Identify any aspect of the lesson that might be challenging for 	<p>Resources</p> <ol style="list-style-type: none"> Support tutors to identify GESI responsive resources such as supporting staff for sign language, projectors, flip charts, sticky notes, tactile materials, audio- 	<p>Resources</p> <ol style="list-style-type: none"> Identify as many GESI responsive resources as possible that can be used in the teaching and learning of the concepts in the lesson. (PD themes 1 & 3) 	10 mins

<p>tutors in terms of new learning, and which needs to be considered prior to taking tutors through the lesson activities “walk through”. Equity and inclusion issues as well as ICT resources need consideration</p> <ul style="list-style-type: none"> The resources needed must be identified: literature – page referenced etc, on web, YouTube, physical resources, power point; how they should be used. Consideration needs to be given to local availability This section can build on the PD needs identified from the course manuals 	<p>visuals, visuals, audio, teachers and learners resource packs, textbooks, course manual, pairs of compasses and ruler and addition mat, that can be used in the teaching and learning of the concepts in the lesson.</p> <p>Refer for more suggested resources:</p> <ol style="list-style-type: none"> Early Grade – Lesson 9 Upper Grade – Lesson 9 JHS; Assessment – Lesson 9 JHS; Euclidean – Lesson 9 <p>(PD themes 1 & 3)</p> <ol style="list-style-type: none"> Discuss with tutors how and where human and material resources for the lesson could be obtain in advance. Such resources can include projectors, flip charts and sign language personnel. Let tutors, in pairs (NTS 3h), select a concept and develop the rubrics for designing resources that can be used in the teaching and learning of the concepts selected. 	<ol style="list-style-type: none"> Participate in discussing how and where human and material resources for the lesson could be obtain in advance. In pairs (NTS 3h), select a concept and develop the rubrics for designing resources that can be used in the teaching and learning of the concepts selected. NTS 3j 	
<p>Guidance notes for SL/HoD should</p> <ul style="list-style-type: none"> Select activities, linked to CLO and indicators, from the lesson that are likely to be most 	<p>Reflective Activity</p> <ol style="list-style-type: none"> Engage tutors in the evaluation of the session and encourage them to provide feedback on the PD session (NTS 1a, 3i). 	<p>Reflective Activity</p> <ol style="list-style-type: none"> Show by 5 or 3 or 1 finger(s) if you “really got it”, “got some of it” or “didn’t get it” respectively. If you showed 5 fingers, share your experience with your colleagues. 	<p>5 mins</p>

<p>different from tutors' previous experience. These could involve applying new content, e.g. from section 2, or approaches to teaching, learning and assessment, incl. gender responsive, differentiation and inclusive approaches and use of appropriate ICT tools.</p> <ul style="list-style-type: none"> • Identify how any assessments during the lesson relate to course assessment components • The selected activities should be done with tutors in real or close to real time • Anticipate any issues for clarification or questions which might arise as the tutors work through the activities and provide guidance on these. 	<ol style="list-style-type: none"> Engage tutors to identify unresolved issues relating to this lesson for clarification. Lead tutors to take note of all unresolved issues and use any of following strategies <ol style="list-style-type: none"> discuss with SL/SWL put on SL/SWL WhatsApp platform for discussion. tutors to research for the next PD session for discussion <p>Advance Preparation Ask tutors to read Lesson 10 of the Course Manual</p> <ol style="list-style-type: none"> Early Grade – Micro Lessons and use of technology across early grade mathematics (2) Upper Grade – Shape, space and Measurement 1 JHS; Assessment – Rational and Irrational numbers 2 JHS; Euclidean – Sine and cosine rules: Learning and Applying 1 <p>N.B</p> <ul style="list-style-type: none"> ✓ <i>Remind tutors to identify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a).</i> ✓ <i>Read the course manual for the next PD lesson, ahead of time to identify any outstanding issues</i> 	<ol style="list-style-type: none"> Reflect on the activities in the session and identify unresolved issues relating to the lesson. Deal with unresolved issues through WhatsApp platform for discussion and/or research <p>Advance Preparation Read Lesson 10 of the Course Manual</p> <ol style="list-style-type: none"> Early Grade – Micro Lessons and use of technology across early grade mathematics (2) Upper Grade – Shape, space and Measurement 1 JHS; Assessment – Rational and Irrational numbers 2 JHS; Euclidean – Sine and cosine rules: Learning and Applying 1 <p>N.B</p> <ul style="list-style-type: none"> ✓ <i>Get a critical friend from the same or related discipline to observe your lesson during teaching and provide feedback (NTS 1a).</i> ✓ <i>Read the course manual for the next PD lesson, ahead of time to identify any outstanding issues relating to this lesson for clarification.</i> ✓ <i>Collect all resources you need ahead of time,</i> 	
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<ul style="list-style-type: none"> • Identify where, and which, core and transferable skills, including digital skills, are being developed or applied • Makes links to the existing PD Themes with page reference where they can support teaching, for example: action research, questioning and to other external reference material • Identify where power point presentations or other resources need to be developed to support learning and provide guidance • Identify resources required for any TLMs and provide guidance on their development 	<p><i>relating to this lesson for clarification.</i></p> <p>✓ <i>Collect all resources (such as projector, flip chart and sticky notes) you need ahead of time, prepare samples of TLMs you may need and rehearse how these may be used to support the achievement of your goals.</i></p>	<p><i>prepare samples of TLMs you may need and rehearse how these may be used to support the achievement of your goals.</i></p>	
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- Age Phase:** a. Early Grade
 b. Upper Grade
 c. JHS
 d. JHS

- Name of Courses:** a. Teaching and Assessing Numeracy
 b. Teaching and Assessing mathematics for Upper Primary
 c. Teaching and Assessing JHS Mathematics
 d. Euclidean Geometry

Year 2 Semester 2

TUTOR PD SESSION FOR LESSON 10 IN THE COURSE MANUAL

LESSON TOPIC:

- a. **Early Grade** – Micro Lessons and use of technology across early grade mathematics (2)
 b. **Upper Grade** – Shape, space and Measurement 1
 c. **JHS** – Rational and Irrational numbers 2
 d. **JHS** – Sine and cosine rules: Learning and Applying 1

<i>Focus: the bullets provide the frame for what is to be done. The guidance notes in italics identify the prompt the SL/HoD needs and each one must be addressed</i>	<i>Guidance notes on Leading the session. What the SL/HoDs will have to say during each stage of the session</i>	<i>Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the session)</i>	<i>Time in session</i>
1. Introduction / lesson overview <ul style="list-style-type: none"> • Reflection on previous PD Session (Introduction to the course manual) • Introduction and overview of the main purpose of the lesson in the course manual. • Highlight cross cutting themes i.e., gender equality and 	Introduction / lesson overview <ol style="list-style-type: none"> 1. Ice breaker activity: Begin with an investigational activity (e.g. mention types of fraction and give an example each). 2. Ask tutors to tell how useful the previous PD session was and how it influenced their teaching over the week. 3. Ask the critical friend to give feedback on his/her 	Introduction / lesson overview <ol style="list-style-type: none"> 1. Engage in an investigational activity (e.g. mention types of fraction and give an example each). 2. Explain how useful the previous PD session was and how it influenced their teaching over the week. 3. As the critical friend, share with members 	15 mins

<p>social inclusion (GESI), ICT</p> <ul style="list-style-type: none"> • Identification of important or distinctive aspects of the lesson <p>Reading and discussion of the introductory sections up to learning outcomes</p>	<p>observation of the last enacted lesson.</p> <ol style="list-style-type: none"> 4. Ask tutors to state the purpose of the lesson and state their expectations of the PD Session (NTS 2b) 5. Lead tutors to outline the important features of the lesson in the course manual. 6. Ask tutors to read the introductory sections (up to learning outcomes) and discuss the important or distinctive aspects of the lesson (i.e. the interactive nature of the activities with emphasis on connecting concepts - Micro Lessons and use of technology across early grade mathematics, Shape, space and Measurement, Rational and Irrational numbers and Sine and cosine rules with other lessons and the use of relevant resources) and suggest the relevant students' previous knowledge that can support the teaching and learning of the lesson. <p>See Course Manual for:</p> <ol style="list-style-type: none"> a. Early Grade – Lesson 10. b. Upper Grade – Lesson 10 c. JHS; Assessment – Lesson 10 d. JHS; Euclidean – Lesson 10 	<p>feedback on your observation of the last enacted lesson.</p> <ol style="list-style-type: none"> 4. State the purpose of the lesson and state your expectations of the lesson 5. Outline the important features of the lesson in the course manual. 6. Read the introductory sections (up to learning outcomes) and discuss the important or distinctive aspects of the lesson (i.e. the interactive nature of the activities with emphasis on connecting concepts - Micro Lessons and use of technology across early grade mathematics, Shape, space and Measurement, Rational and Irrational numbers and Sine and cosine rules with other lessons and the use of relevant resources) and suggest the relevant students' previous knowledge that can support the teaching and learning of the lesson. <p>See Course Manual for:</p> <ol style="list-style-type: none"> a. Early Grade – Lesson 10. b. Upper Grade – Lesson 10 	
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		c. JHS; Assessment – Lesson 10 d. JHS; Euclidean – Lesson 10	
<p>2. Concept Development (New learning likely to arise in this lesson):</p> <ul style="list-style-type: none"> • Identification and discussion of concepts • Identification of possible challenging areas in teaching of the concept. This may include GESI and ICT related concepts <p>Identification of needed GESI responsive and ICT resources for the teaching and learning of the concept.</p>	<p>Concept Development</p> <ol style="list-style-type: none"> 1. Lead tutors to identify familiar and unfamiliar concepts in the lesson and discuss relevant connections among concepts in the lesson with other lessons and the use of relevant resources including the basic school curriculum. 2. Engage tutors to identify and discuss various strategies for the development of conceptual understanding of the lesson. Early Grade: Micro Lessons and use of technology. Strategies: Internet search and Exploratory. Upper Grade: Shape, space and Measurement. Strategies: Inclusive Activity-Based and Demonstration JHS Assessment: Rational and Irrational Strategies: Number Games, internet search and Model lesson JHS Euclidean: Sine and cosine rules Strategies: Exploratory and collaborative group activity 3. Engage tutors to identify and discuss unfamiliar concepts in the lesson. 	<p>Concept Development</p> <ol style="list-style-type: none"> 1. Identify familiar and unfamiliar concepts in the lesson and discuss relevant connections among concepts in the lesson with other lessons and the use of relevant resources including the basic school curriculum. 2. Identify and discuss various strategies for the development of conceptual understanding of Early Grade: Micro Lessons and use of technology. Upper Grade: Shape, space and Measurement. JHS Assessment: Rational and Irrational numbers JHS Euclidean: Sine and cosine rules 3. Identify and discuss familiar and unfamiliar concepts in the lesson. 	25 mins

	<p>4. Lead tutors to discuss misconceptions and barriers in teaching and learning of the concepts in the lesson.</p> <p>Eg.</p> <p>Early Grade: Micro Lessons and use of technology. Misconception: <i>Girls fear maths and use of technological devices</i></p> <p>Upper Grade: Shape, space and Measurement. Misconception: <i>Maths for boys but not Girls</i></p> <p>JHS Assessment: Rational and Irrational numbers Misconception: <i>some numbers cannot be represented with objects.</i> <i>E.g. -1</i></p> <p>JHS Euclidean: Sine and cosine rules Misconception: <i>not useful to real life situation</i></p> <p>Barriers: <i>Inappropriate inclusive resources</i> <i>Limited use of technology</i> <i>Inadequate pre-requisite knowledge</i> <i>N/B: Refer tutors to the lesson 10 of the course manual for other potential misconceptions and barriers.</i></p>	<p>4. Discuss some potential misconceptions and barriers with respect to the teaching and learning of concepts in the lesson.</p>	
<p>3. Teaching, learning and assessment activities for the lesson</p> <ul style="list-style-type: none"> • Reading of teaching and learning activities and identification of areas that 	<p>Teaching and learning activities</p> <p>1. Ask tutors to suggest teaching and learning activities for the lesson taking into account Gender Equality and Social Inclusion (GESI) (e.g. both male and female participants playing the leading roles</p>	<p>Teaching and learning activities</p> <p>1. Ask tutors to suggest teaching and learning activities for the lesson taking into account Gender Equality and Social Inclusion (GESI) (e.g. both male and female participants playing the leading</p>	<p>40 mins</p>

<p>require clarification especially GESI related activities.</p> <ul style="list-style-type: none"> • Reading of teaching and learning activities and identification of GESI and ICT issues that require clarification. 	<p>in group work, even distribution of questions) and refer them to the activities outlined in the course manual</p> <p>(Writing the Weekly PD Session-p 3., NTS 1a, b, c, d, 2b, e, f, 3b, c; UPP-p. 20; JHS; Euclidean- p. 26; JHS; Assessment-25, EGE- p. 16)</p> <p>2. Lead tutors to brainstorm and come up with some creative approaches and their related core competencies likely to be inculcated in CoE students and extended to basic school learners through STS activities.</p> <p>Example: Group Work - Collaborative learning Investigation - Critical Thinking Role Play - Communication (Students can ascertain the extent to which methods are used during STS activities in schools.)</p> <p>3. Engage tutors in a discussion of strategies strengthen core competencies. (e.g. Using activity-based/demonstration to solve problem with differentiated assessment of, as and for; engaging tutors in exploratory activities to solve the problems)</p>	<p>roles in group work, even distribution of questions) and refer them to the activities outlined in the course manual</p> <p>(Writing the Weekly PD Session-p 3., NTS 1a, b, c, d, 2b, e, f, 3b, c; BSC p.iii, UPP-p. 20; JHS; Euclidean- p. 26; JHS; Assessment-25, EGE- p. 16)</p> <p>2. Brainstorm and come up with some pedagogical approaches and their likely related core competencies to be inculcated in CoE students and extended to basic school learners through STS activities.</p> <p>(Students can ascertain the extent to which methods are used during STS activities in schools.)</p> <p>3. Discuss the strategies to strengthen core competencies.</p>	
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	4. Ask a tutor to model alternative strategies for the activities using ICT tools, taking into consideration GESI issues (e.g. both male and female participants playing leading roles in their groups and in the demonstration of the use of ICT tools) in the B.ED and the Basic School Curricula (BSC). NTS 1a, b, c, d, 2b, e, 3b, c, J; BSC pp. iii).	4. Model alternative strategies for the activities using ICT tools, taking into consideration GESI (e.g. both male and female participants playing leading roles in their groups and in the demonstration of the use of ICT tools) in B.ED and Basic School Curricula.	
<p>4. Review of Assessment component Reading of assessment opportunities and ensuring they are aligned to the NTEAP and required course assessment: subject project (30%), subject portfolio (30%) and end of semester examination (40%) Working through one or two activities.</p>	<p>Review of Assessment Components</p> <ol style="list-style-type: none"> 1. Ask tutors to review the assessment components of the lesson in the course manual focusing on assessment of, as and for in line with the NTEAP <ol style="list-style-type: none"> a. Early Grade – Lesson 10. b. Upper Grade – Lesson 10 c. JHS; Assessment – Lesson 10 d. JHS; Euclidean – Lesson 10 2. Lead tutors to discuss the various ways they can support student teachers to build their portfolios before/during/ after lessons 3. Let tutors discuss the assessment strategies to be used during enactment of the lesson referring to the NTEAP at 	<p>Review of Assessment Components</p> <ol style="list-style-type: none"> 1. Ask tutors to review the assessment components of the lesson in the course manual focusing on assessment of, as and for in line with the NTEAP <ol style="list-style-type: none"> a. Early Grade – Lesson 10 b. Upper Grade – Lesson 10 c. JHS; Assessment – Lesson 10 d. JHS; Euclidean – Lesson 10 2. Discuss the various ways you can support student teachers to build their portfolios before/during/ after lessons 3. Discuss the assessment strategies to be used during enactment of the lesson making 	15 mins

	the various levels (KG, UP, JHS) (NTS 3k).	reference to the NTEAP	
<p>Resources</p> <p>Guidance notes for SL/HoD should</p> <ul style="list-style-type: none"> Identify any aspect of the lesson that might be challenging for tutors in terms of new learning, and which needs to be considered prior to taking tutors through the lesson activities “walk through”. Equity and inclusion issues as well as ICT resources need consideration The resources needed must be identified: literature – page referenced etc, on web, YouTube, physical resources, power point; how they should be used. Consideration needs to be given to local availability This section can build on the PD needs identified from the course manuals 	<p>Resources</p> <ol style="list-style-type: none"> Support tutors to identify inclusive resources such as tactile materials, audio-visuals, visuals, audio, teachers and learners resource packs, textbooks, course manual, pairs of compasses and ruler and addition mat, that can be used in the teaching and learning of the concepts in the lesson, graph sheets, GeoGebra app, set of mathematical instrument, manipulatives, permanent markers, circular models). <ol style="list-style-type: none"> Early Grade – Lesson 10. Upper Grade – Lesson 10 JHS; Assessment – Lesson 10 JHS; Euclidean – Lesson 10 (PD themes 1 & 3) Let tutors, in pairs (NTS 3h), select a concept and develop the rubrics for designing resources that can be used in the teaching and learning of the concept selected. 	<p>Resources</p> <ol style="list-style-type: none"> Identify inclusive resources such as tactile, audio-visuals, visuals, audio, teachers and learners resource packs, textbooks, course manual, pairs of compasses and ruler and addition mat, that can be used in the teaching and learning of the concepts in the lesson: <ol style="list-style-type: none"> Early Grade – Lesson 10. Upper Grade – Lesson 10 JHS; Assessment – Lesson 10 JHS; Euclidean – Lesson 10 (PD themes 1) In pairs (NTS 3h), select a concept and develop the rubrics for designing resources that can be used in the teaching and learning of the concept selected. NTS 3j 	10 mins

<p>Evaluation and review of session Guidance notes for SL/HoD should</p> <ul style="list-style-type: none"> • Select activities, linked to CLO and indicators, from the lesson that are likely to be most different from tutors' previous experience. These could involve applying new content, e.g. from section 2, or approaches to teaching, learning and assessment, incl. gender responsive, differentiation and inclusive approaches and use of appropriate ICT tools. • Identify how any assessments during the lesson relate to course assessment components • The selected activities should be done with tutors in real or close to real time • Anticipate any issues for clarification or 	<p>Reflective Activity</p> <ol style="list-style-type: none"> 1. Engage tutors in the evaluation of the session and encourage them to provide feedback on the PD session (NTS 1a, 3i). 2. Take note of all unresolved issues and use any of following strategies. <ul style="list-style-type: none"> – discuss with SL/SWL – put on SL/SWL WhatsApp platform for discussion. – tutors to research and report findings on shared platforms. <p>Advance Preparation Ask tutors to read Lesson 11 of the Course Manual</p> <ol style="list-style-type: none"> a. Early Grade – Subtraction of whole numbers up to 99 b. Upper Grade – Shape, space and Measurement 2 c. JHS; Assessment – Fractions 1 d. JHS; Euclidean – Applications of Euclidean Geometry and Trigonometry (Lesson 10) <p>N.B</p> <ul style="list-style-type: none"> ✓ <i>Remind tutors to identify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a).</i> ✓ <i>Read the course manual for the next PD lesson, ahead of time to identify</i> 	<p>Reflective Activity</p> <ol style="list-style-type: none"> 1. Show by 5 or 3 or 1 finger(s) if you “really got it”, “got some of it” or “didn’t get it” respectively. If you showed 5 fingers, share your experience with your colleagues 2. Deal with unresolved issues through sharing the issues on the various electronic platforms and/or seeking solutions through research. <p>Advance Preparation Read Lesson 11 of the Course Manual</p> <ol style="list-style-type: none"> a. Early Grade – Subtraction of whole numbers up to 99 b. Upper Grade – Shape, space and Measurement 2 c. JHS; Assessment – Fractions 1 d. JHS; Euclidean – Applications of Euclidean Geometry and Trigonometry (Lesson 10). <p>N.B</p> <ul style="list-style-type: none"> ✓ <i>Get a critical friend from the same or related discipline to observe your lesson during teaching and provide feedback (NTS 1a).</i> ✓ <i>Read the course manual for the next PD</i> 	<p>5 mins</p>
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<p>questions which might arise as the tutors work through the activities and provide guidance on these.</p> <ul style="list-style-type: none"> • Identify where, and which, core and transferable skills, including digital skills, are being developed or applied • Makes links to the existing PD Themes with page reference where they can support teaching, for example: action research, 	<p><i>any outstanding issues relating to this lesson for clarification.</i></p> <p>✓ <i>Collect all resources (such as projector, flip chart and sticky notes) you need ahead of time, prepare samples of TLMs you may need and rehearse how these may be used to support the achievement of your goals</i></p>	<p><i>lesson, ahead of time to identify any outstanding issues relating to this lesson for clarification.</i></p> <p>✓ <i>Collect all resources you need ahead of time, prepare samples of TLMs you may need and rehearse how these may be used to support the achievement of your goals</i></p>	
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- Age Phase:** a. Early Grade
 b. Upper Grade
 c. JHS
 d. JHS

- Name of Courses:** a. Teaching and Assessing Numeracy
 b. Teaching and Assessing mathematics for Upper Primary
 c. Teaching and Assessing JHS Mathematics
 d. Euclidean Geometry

Year 2 Semester 2

TUTOR PD SESSION FOR LESSON 11 IN THE COURSE MANUAL

LESSON TOPIC:

- a. **Early Grade** – Subtraction of whole numbers up to 99
 b. **Upper Grade** – Shape, space and Measurement 2
 c. **JHS** – Fractions 2
 d. **JHS** – Sine and cosine rules: Learning and Applying 2

<i>Focus: the bullets provide the frame for what is to be done. The guidance notes in italics identify the prompt the SL/HoD needs and each one must be addressed</i>	<i>Guidance notes on Leading the session. What the SL/HoDs will have to say during each stage of the session</i>	<i>Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the session)</i>	<i>Time in session</i>
1. Introduction / lesson overview <ul style="list-style-type: none"> • Reflection on previous PD Session (Introduction to the course manual) • Introduction and overview of the main purpose of the lesson in the course manual. • Highlight cross cutting themes i.e., gender equality and social 	Introduction / lesson overview <ol style="list-style-type: none"> 1. Ice breaker activity: Begin with an investigational activity (e.g. Identify the prime numbers between 4 and 15) 2. Ask tutors to tell how useful the previous PD session was and how it influenced their teaching over the week. 	Introduction / lesson overview <ol style="list-style-type: none"> 1. Engage in an investigational activity (e.g. identify the prime numbers between 4 and 15) 2. Explain how useful the previous PD session was and how it influenced their teaching over the week. 	15 mins

<p>inclusion (GESI), ICT</p> <ul style="list-style-type: none"> • Identification of important or distinctive aspects of the lesson <p>Reading and discussion of the introductory sections up to learning outcomes</p>	<ol style="list-style-type: none"> 3. Ask the critical friend to give feedback on his/her observation of the last enacted lesson. 4. Ask tutors to state the purpose of the lesson and state their expectations of the PD Session (NTS 2b) 5. Lead tutors to outline the important features of the lesson in the course manual 6. Ask tutors to read the introductory sections (up to learning outcomes) and discuss the important or distinctive aspects of the lesson (i.e. the interactive nature of the activities with emphasis on connecting concepts: <ul style="list-style-type: none"> a. Early Grade – Subtraction of whole numbers up to 99 b. Upper Grade – Shape, space and Measurement 2 c. JHS – Fractions 2 d. JHS – Sine and cosine rules: Learning and Applying 2, with other lessons and the use of relevant resources including the basic education curriculum) and suggest the relevant students' previous knowledge that can support the teaching and learning of the lesson. 	<ol style="list-style-type: none"> 3. As the critical friend, share with members feedback on your observation of the last enacted lesson. 4. State the purpose of the lesson and state your expectations of the lesson. 5. Outline the important features of the lesson in the course manual. 6. Read the introductory sections (up to learning outcomes) and in pairs/groups discuss the important or distinctive aspects of the lesson <ul style="list-style-type: none"> a. Early Grade – Subtraction of whole numbers up to 99 b. Upper Grade – Shape, space and Measurement 2 c. JHS – Fractions 2 d. JHS – Sine and cosine rules: Learning and Applying 2, with other lessons and the use of relevant resources including the basic school curriculum) and suggest the relevant students' previous knowledge that can support the teaching and learning of the lesson. 	
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	<p>See Course Manual for:</p> <p>a. Early Grade – lesson 11 b. Upper Grade – lesson 11 c. JHS; Assessment – lesson 11 d. JHS; Euclidean – lesson 11</p> <p>BSC Content Standards B4.1.1.1 B5.1.1.1 B6.1.1.1 B4.1.3.1 CCP-B8.3.2.1 (PD Theme 1, 3 & 4)</p>	<p>See Course Manual for:</p> <p>a. Early Grade – lesson 11 b. Upper Grade – lesson 11 c. JHS; Assessment – lesson 11 d. JHS; Euclidean – lesson 11</p> <p>BSC Content Standards B4.1.1.1 B5.1.1.1 B6.1.1.1 B4.1.3.1 CCP-B8.3.2.1 (PD Theme 1, 3 & 4) (PD Theme 1, 3 & 4)</p>	
<p>2. Concept Development (New learning likely to arise in this lesson):</p> <ul style="list-style-type: none"> • Identification and discussion of concepts • Identification of possible challenging areas in teaching of the concept. This may include GESI and ICT related concepts • Identification of needed GESI responsive and ICT resources for the teaching and learning of the concept. 	<p>Concept Development</p> <ol style="list-style-type: none"> 1. Lead tutors to identify familiar and unfamiliar concepts in the lesson and discuss relevant connections among concepts in the lesson with other lessons and the use of relevant resources. 2. Engage tutors to identify and discuss various strategies for the development of conceptual understanding of <ol style="list-style-type: none"> a. Early Grade – Subtraction of whole numbers up to 99 b. Upper Grade – Shape, space and Measurement 2 c. JHS – Fractions 2 d. JHS – Sine and cosine rules: Learning and Applying 2 3. Engage tutors to identify and discuss familiar and unfamiliar concepts in the lesson 	<p>Concept Development</p> <ol style="list-style-type: none"> 1. Identify familiar and unfamiliar concepts in the lesson and discuss relevant connections among concepts in the lesson with other lessons and the use of relevant resources. 2. Identify and discuss various strategies for the development of conceptual understanding of <ol style="list-style-type: none"> a. Early Grade – Shape, Space, and Measurement b. Upper Grade – Problems solving and logical reasoning c. JHS; Assessment – Fraction 2 d. JHS; Euclidean – Applications of Euclidean Geometry and Trigonometry 3. tutors identify and discuss familiar and unfamiliar concepts in the lesson 	25 mins

	<p>Refer to Course Manual, Lesson 11</p> <p>4. Lead tutors to discuss misconceptions and barriers in teaching and learning of the concepts in the lesson.</p> <p>a. Early Grade – Subtraction of whole numbers up to 99</p> <p>b. Upper Grade – Shape, space and Measurement 2</p> <p>c. JHS – Fractions 2</p> <p>d. JHS – Sine and cosine rules: Learning and Applying 2</p>	<p>4. Discuss some potential misconceptions and barriers with respect to the teaching and learning of concepts in the lesson.</p>	
<p>3. Teaching, learning and assessment activities for the lesson</p> <ul style="list-style-type: none"> • Reading of teaching and learning activities and identification of areas that require clarification especially GESI related activities. • Reading of teaching and learning activities and identification of GESI and ICT issues that require clarification. 	<p>Teaching and learning activities</p> <p>1. Ask tutors to suggest teaching and learning activities for the lesson taking into account GESI issues (e.g. making adjustments for physically challenged learners, and getting both male and female participants to play leading roles in group work and even distribution of questions)</p> <p>(Writing the Weekly PD Session-p 3., NTS 1a, b, c, d, 2b, e, f, 3b, c;</p> <p>2. Lead tutors to brainstorm and come up with some pedagogical approaches and their related core competencies likely to be inculcated in CoE</p>	<p>Teaching and learning activities</p> <p>1. Suggest teaching and learning activities that can be used in teaching the lesson taking into account GESI issues (e.g. making adjustments for physically challenged learners, and getting both male and female participants to play leading roles in group work and even distribution of questions).</p> <p>(Writing the Weekly PD Session-p 3., NTS 1a, b, c, d, 2b, e, f, 3b, c; (NTS 1a, b, c, d, 2b, e, f, 3b, c; BSC p. iii)</p> <p>2. Brainstorm and come up with some pedagogical approaches and their likely related core competencies to be inculcated in CoE</p>	40 mins

	<p>students and extended to basic school learners through STS activities. (Students can ascertain the extent to which methods are used during STS activities in schools.)</p> <p>3. Engage tutors in a discussion of strengthen core competencies (e.g. difficulty identifying the places of digits and their values beyond hundreds).</p> <p>4. Engage tutors to work through one or two of the activities to ensure understanding.</p> <p>5. Ask a tutor to model alternative strategies for the activities using ICT tools, taking into consideration GESI (eg. both male and female participants playing the leading roles in group work, even distribution of questions and in the demonstration of the use of ICT tools by both male and female participants) in the B.ED and the Basic School Curricula (BSC). NTS 1a, b, c, d, 2b, e, 3b, c, J; BSC pp. iii).</p>	<p>students and extended to basic school learners through STS activities. (Students can ascertain the extent to which methods are used during STS activities in schools.)</p> <p>3. Discuss the strategies to strengthen core competencies.</p> <p>4. Work through one or two of the suggested activities to ensure understanding.</p> <p>5. Model alternative strategies for the activities using ICT tools, taking into consideration GESI (eg. both male and female participants playing the leading roles in group work, even distribution of questions and in the demonstration of the use of ICT tools by both male and female participants) in B.ED and Basic School Curricula.</p>	
<p>Review of Assessment component Reading of assessment opportunities and</p>	<p>Review of Assessment Component</p> <p>1. Ask tutors to review the assessment components of the lesson in the course</p>	<p>Review of Assessment Components</p> <p>1. Ask tutors to review the assessment components of the lesson in the course</p>	<p>15 mins</p>

<p>ensuring they are aligned to the NTEAP and required course assessment: subject project (30%), subject portfolio (30%) and end of semester examination (40%) Working through one or two activities.</p>	<p>manual focusing on assessment of, as and for in line with the NTEAP:</p> <ol style="list-style-type: none"> a. Early Grade – lesson 11 b. Upper Grade – lesson 11 c. JHS; Assessment – lesson 11 d. JHS; Euclidean – lesson 11 <ol style="list-style-type: none"> 2. Let tutors discuss the assessment strategies to be used during enactment of the lesson referring to the NTEAP at the various levels (KG, UP, JHS) (NTS 3k). 3. Lead tutors to discuss the various ways they can support student teachers to build their portfolios before/during/ after lessons. 	<p>manual focusing on assessment of, as and for in line with the NTEAP:</p> <ol style="list-style-type: none"> a. Early Grade – lesson 11 b. Upper Grade – lesson 11 c. JHS; Assessment – lesson 11 d. JHS; Euclidean – lesson 11 <ol style="list-style-type: none"> 2. Discuss the assessment strategies to be used during enactment of the lesson making reference to the NTEAP at the various levels (KG, UP, JHS) (NTS 3k). 3. Discuss the various ways you can support student teachers to build their portfolios before/during/ after lessons. 	
<p>Resources</p> <p>Guidance notes for SL/HoD should</p> <ul style="list-style-type: none"> • Identify any aspect of the lesson that might be challenging for tutors in terms of new learning, and which needs to be considered prior to taking tutors through the lesson activities “walk through”. 	<p>Resources</p> <ol style="list-style-type: none"> 1. Support tutors to identify inclusive resources such as tactile materials, audio-visuals, visuals, audio, teachers and learners resource packs, textbooks, course manual, pairs of compasses and ruler and addition mat, that can be used in the teaching and learning 	<p>Resources</p> <ol style="list-style-type: none"> 1. Identify inclusive resources such as tactile, audio-visuals, visuals, audio, teachers and learners resource packs, textbooks, course manual, pairs of compasses and ruler and addition mat, that can be used in the teaching and learning of the concepts in the lesson: 	<p>10 mins</p>

<p>Equity and inclusion issues as well as ICT resources need consideration</p> <ul style="list-style-type: none"> The resources needed must be identified: literature – page referenced etc, on web, YouTube, physical resources, power point; how they should be used. Consideration needs to be given to local availability This section can build on the PD needs identified from the course manuals 	<p>of the concepts in the lesson:</p> <ol style="list-style-type: none"> Early Grade – Lesson 11 Upper Grade – Lesson 11 JHS; Assessment – Lesson 11 JHS; Euclidean – Lesson 11 <p>(PD themes 1 & 3)</p> <ol style="list-style-type: none"> Let tutors, in pairs (NTS 3h), select a concept and develop the rubrics for designing resources that can be used in the teaching and learning of the concepts selected. 	<ol style="list-style-type: none"> Early Grade – Lesson 11 Upper Grade – Lesson 11 JHS; Assessment – Lesson 11 JHS; Euclidean – Lesson 11 <p>(PD themes 1)</p> <ol style="list-style-type: none"> In pairs (NTS 3h), select a concept and develop the rubrics for designing resources that can be used in the teaching and learning of the concepts selected. NTS 3j 	
<p>Evaluation and review of session Guidance notes for SL/HoD should</p> <ul style="list-style-type: none"> Select activities, linked to CLO and indicators, from the lesson that are likely to be most different from tutors’ previous experience. These could involve applying new content, e.g. from section 2, or approaches to teaching, learning and assessment, incl. gender responsive, differentiation and inclusive approaches and 	<p>Reflective Activity</p> <ol style="list-style-type: none"> Engage tutors in the evaluation of the session and encourage them to provide feedback on the PD session (NTS 1a, 3i). Take note of all unresolved issues and use any of following strategies <ul style="list-style-type: none"> discuss with SL/SWL put on SL/SWL WhatsApp platform for discussion tutors to research and report findings on shared platforms. 	<p>Reflective Activity</p> <ol style="list-style-type: none"> Show by 5 or 3 or 1 finger(s) if you “really got it”, “got some of it” or “didn’t get it” respectively. If you showed 5 fingers, share your experience with your colleagues. Deal with unresolved issues through sharing the issues on the various electronic platforms and/or seeking solutions through research. 	<p>5 mins</p>

<p>use of appropriate ICT tools.</p> <ul style="list-style-type: none"> • Identify how any assessments during the lesson relate to course assessment components • The selected activities should be done with tutors in real or close to real time • Anticipate any issues for clarification or questions which might arise as the tutors work through the activities and provide guidance on these. • Identify where, and which, core and transferable skills, including digital skills, are being developed or applied • Makes links to the existing PD Themes with page reference where they can support teaching, for example: action research, questioning and to other external reference material • Identify where power point presentations or other resources need to be developed to 	<p>Advance Preparation Ask tutors to read Lesson 12 of the Course Manual</p> <ol style="list-style-type: none"> Early Grade – <i>Shape, Space, and Measurement</i> Upper Grade – Problems solving and logical reasoning: JHS; Assessment – Fractions 2: JHS; Euclidean – Applications of Euclidean Geometry and Trigonometry <p>N.B</p> <ul style="list-style-type: none"> ✓ <i>Remind tutors to identify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a).</i> ✓ <i>Read the course manual for the next PD lesson, ahead of time to identify any outstanding issues relating to this lesson for clarification.</i> ✓ <i>Collect all resources (such as projector, flip chart and sticky notes) you need ahead of time, prepare samples of TLMs you may need and rehearse how these may be used to support the achievement of your goals</i> 	<p>Advance Preparation Read Lesson 12 of the Course Manual</p> <ol style="list-style-type: none"> Early Grade – <i>Shape, Space, and Measurement</i> Upper Grade – Problems solving and logical reasoning: JHS; Assessment – Fractions 2: JHS; Euclidean – Applications of Euclidean Geometry and Trigonometry <p>N.B</p> <ul style="list-style-type: none"> ✓ <i>Get a critical friend from the same or related discipline to observe your lesson during teaching and provide feedback (NTS 1a).</i> ✓ <i>Read the course manual for the next PD lesson, ahead of time to identify any outstanding issues relating to this lesson for clarification.</i> 	
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support learning and provide guidance			
<ul style="list-style-type: none">• Identify resources required for any TLMs and provide guidance on their development			

- Age Phase:** a. Early Grade
 b. Upper Grade
 c. JHS
 d. JHS

- Name of Courses:** a. Teaching and Assessing Numeracy
 b. Teaching and Assessing mathematics for Upper Primary
 c. Teaching and Assessing JHS Mathematics
 d. Euclidean Geometry

Year 2 Semester 2

TUTOR PD SESSION FOR LESSON 12 IN THE COURSE MANUAL

LESSON TOPIC:

- a. **Early Grade** – Shape, Space, and Measurement
 b. **Upper Grade** – Problems solving and logical reasoning
 c. **JHS** – Fractions 2
 d. **JHS** – Applications of Euclidean Geometry and Trigonometry

<i>Focus: the bullets provide the frame for what is to be done. The guidance notes in italics identify the prompt the SL/HoD needs and each one must be addressed</i>	<i>Guidance notes on Leading the session. What the SL/HoDs will have to say during each stage of the session</i>	<i>Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each state of the session)</i>	<i>Time in session</i>
1. Introduction / lesson overview <ul style="list-style-type: none"> • Reflection on previous PD Session (Introduction to the course manual) • Introduction and overview of the main purpose of the lesson in the course manual. • Highlight cross cutting themes i.e., gender equality and social inclusion (GESI), ICT 	Introduction / lesson overview <ol style="list-style-type: none"> 1. Ice breaker activity: Begin with an investigational activity (e.g. EG: Pick a regular shape and obtain its corresponding net) 2. Ask tutors to tell how useful the previous PD session was and how it influenced their teaching over the week. 3. Ask a critical friend to give feedback on 	Introduction / lesson overview <ol style="list-style-type: none"> 1. Engage in an investigational activity (eg. Identify the nets of given shapes) 2. Tell colleagues how useful the previous PD session was and how it influenced your teaching over the week. 3. As the critical friend, share with members feedback on your 	15 mins

<ul style="list-style-type: none"> • Identification of important or distinctive aspects of the lesson • Reading and discussion of the introductory sections up to learning outcomes 	<p>his/her observation of the last enacted lesson.</p> <ol style="list-style-type: none"> 4. Ask tutors to state the purpose of the lesson and state their expectations of the PD Session (NTS 2b) 5. Lead tutors to outline the important features of the lesson in the course manual 6. Ask tutors to read the introductory sections (up to learning outcomes) and discuss the important or distinctive aspects of the lesson (i.e. the interactive nature of the activities with emphasis on connecting concepts ((i) Shape, Space, and Measurement, (ii)Problems solving and logical reasoning, (iii) Fraction 2 and (iv)Applications of Euclidean Geometry and Trigonometry) with other lessons and the use of relevant resources including the basic school curriculum. <p>Course Manual for:</p> <ol style="list-style-type: none"> a. Early Grade – lesson 12 b. Upper Grade – lesson 12 c. JHS; Assessment – lesson 12 d. JHS; Euclidean – lesson 12 	<p>observation of the last enacted lesson.</p> <ol style="list-style-type: none"> 4. State the purpose of the lesson and state your expectations of the lesson 5. Outline the important features of the lesson in the course manual. 6. Read the introductory sections (up to learning outcomes) and in pairs/groups discuss the important or distinctive aspects of the lesson ((i) Shape, Space, and Measurement, (ii)Problems solving and logical reasoning, (iii) Fraction 2 and (iv)Applications of Euclidean Geometry and Trigonometry) with other lessons and the use of relevant resources including the basic school curriculum. <p>Course Manual for:</p> <ol style="list-style-type: none"> a. Early Grade – lesson 12 b. Upper Grade – lesson 12 c. JHS; Assessment – lesson 12 d. JHS; Euclidean – lesson 12 	
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	BSC Content Standards B4.1.1.1 B5.1.1.1 B6.1.1.1 B4.1.3.1 CCP-B8.3.2.1 (PD Theme 1, 3 & 4)	BSC Content Standards B4.1.1.1 B5.1.1.1 B6.1.1.1 B4.1.3.1 CCP- B8.3.2.1 (PD Theme 1, 3 & 4) (PD Theme 1, 3 & 4)	
<p>2. Concept Development (New learning likely to arise in this lesson):</p> <ul style="list-style-type: none"> • Identification and discussion of concepts • Identification of possible challenging areas in teaching of the concept. This may include GESI and ICT related concepts • Identification of needed GESI responsive and ICT resources for the teaching and learning of the concept. 	<p>Concept Development</p> <ol style="list-style-type: none"> 1. Lead tutors to identify familiar and unfamiliar concepts in the lesson and discuss relevant connections among concepts in the lesson with other lessons and the use of relevant resources. <ol style="list-style-type: none"> a. Early Grade – Shape, Space, and Measurement b. Upper Grade – Problems solving and logical reasoning c. JHS; Assessment – Fraction 2 d. JHS; Euclidean – Applications of Euclidean Geometry and Trigonometry 2. Engage tutors to identify and discuss various strategies for the development of conceptual understanding of the lesson. 	<p>Concept Development</p> <ol style="list-style-type: none"> 1. Identify familiar and unfamiliar concepts in the lesson and discuss relevant connections among concepts in the lesson with other lessons and the use of relevant resources. 2. Identify and discuss various strategies for the development of conceptual understanding of <ol style="list-style-type: none"> a. Early Grade – Shape, Space, and Measurement b. Upper Grade – Problems solving and logical reasoning c. JHS; Assessment – Fraction 2 d. JHS; Euclidean – Applications of Euclidean Geometry and Trigonometry 	25 mins

	<p>3. Engage tutors to identify and discuss familiar and unfamiliar concepts in the lesson</p> <p>4. Lead tutors to discuss misconceptions and barriers in teaching and learning</p> <p>a. Early Grade – Shape, Space, and Measurement</p> <p>b. Upper Grade – Problems solving and logical reasoning</p> <p>c. JHS; Assessment – Fraction 2</p> <p>d. JHS; Euclidean – Applications of Euclidean Geometry and Trigonometry</p> <p>(e.g.: Misclassifying a shape due to its orientation. A learner most often sees a square sitting on a side and they will classify a square tipped on its corner as a rhombus.)</p>	<p>3. Groups/pairs identify and discuss familiar and unfamiliar concepts in the lesson</p> <p>4. Discuss some potential misconceptions and barriers with respect to the teaching and learning of</p> <p>a. Early Grade – Shape, Space, and Measurement</p> <p>b. Upper Grade – Problems solving and logical reasoning</p> <p>c. JHS; Assessment – Fraction 2</p> <p>d. JHS; Euclidean – Applications of Euclidean Geometry and Trigonometry</p>	
<p>3. Teaching, learning and assessment activities for the lesson</p> <ul style="list-style-type: none"> • Reading of teaching and learning activities and identification of areas that require clarification especially GESI related activities. • Reading of teaching and learning activities and identification of GESI and ICT 	<p>Teaching and learning activities</p> <p>1. Ask tutors to suggest teaching and learning activities for the lesson taking into account GESI (e.g. making adjustments for physically challenged learners, and getting both male and female participants to play leading roles in group work) NTS 1a, b, c, d, 2b, e, f, 3b, c;</p>	<p>Teaching and learning activities</p> <p>1. Suggest teaching and learning activities that can be used in teaching the lesson taking into account GESI (e.g. making adjustments for physically challenged learners, and getting both male and female participants to play leading roles in group work, even distribution of questions).</p>	<p>40 mins</p>

<p>issues that require clarification.</p>	<p>2. Lead tutors to brainstorm come up with some pedagogical approaches and their related core competencies likely to be inculcated in CoE students and extended to basic school learners through STS activities.</p> <p>Example: Group Work - Collaborative learning Investigation - Critical Thinking Role Play - Communication</p> <p>Students can ascertain the extent to which methods are used during STS activities in schools.</p> <p>3. Engage tutors in a discussion of strategies to strengthen core competencies. (e.g. (a) creating variant tasks and solutions, identifying applications of theorems and postulates making connections between topics and concepts)</p> <p>4. Ask a tutor to model alternative strategies for the activities using ICT tools, taking into consideration GESI issues (eg. Both male</p>	<p>NTS 1a, b, c, d, 2b, e, f, 3b, c; (NTS 1a, b, c, d, 2b, e, f, 3b, c; BSC p. iii)</p> <p>2. Brainstorm to come up with some pedagogical approaches and their likely related core competencies to be inculcated in CoE students and extended to basic school learners through STS activities.</p> <p>3. Discuss the strategies to strengthen core competencies.</p> <p>4. Model alternative strategies for the activities using ICT tools, taking into consideration GESI</p>	
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	and female participants playing the leading roles in their groups and in the demonstration of the use of ICT tools) in the B.ED and the Basic School Curricula (BSC). NTS 1a, b, c, d, 2b, e, 3b, c, J; BSC pp. iii).	issues in B.ED and Basic School Curricula.	
<p>4. Review of Assessment Components</p> <p>Reading of assessment opportunities and ensuring they are aligned to the NTEAP and required course assessment: subject project (30%), subject portfolio (30%) and end of semester examination (40%) Working through one or two activities.</p>	<p>Review of Assessment Components</p> <ol style="list-style-type: none"> 1. Ask tutors to review the assessment components of the lesson in the course manual focusing on assessment of, as and for in line with the NTEAP <ol style="list-style-type: none"> a. Early Grade – lesson 12 b. Upper Grade – lesson 12 c. JHS; Assessment – lesson 12 d. JHS; Euclidean – lesson 12 2. Let tutors discuss the assessment strategies to be used during enactment of the lesson referring to the NTEAP (at the various levels (KG, UP, JHS)– ‘Assessment as’ (NTS 3k). 3. Lead tutors to discuss the various ways they can support student teachers to build their portfolios before/during/ after lessons 	<p>Review of Assessment Components</p> <ol style="list-style-type: none"> 1. Identify the assessment components of the lesson in the new course manual focusing on assessment of, as and for in line with the NTEAP <ol style="list-style-type: none"> a. Early Grade – lesson 12 b. Upper Grade – lesson 12 c. JHS; Assessment – lesson 12 d. JHS; Euclidean – lesson 12 2. Discuss the assessment strategies to be used during enactment of the lesson making reference to the NTEAP at the various levels (KG, UP, JHS)– ‘Assessment as’ (NTS 3k). 3. Discuss the various ways you can support student teachers to build their portfolios before/during/ after lessons 	15 mins

<p>Resources Guidance notes for SL/HoD should</p> <ul style="list-style-type: none"> Identify any aspect of the lesson that might be challenging for tutors in terms of new learning, and which needs to be considered prior to taking tutors through the lesson activities “walk through”. Equity and inclusion issues as well as ICT resources need consideration The resources needed must be identified: literature – page referenced etc, on web, YouTube, physical resources, power point; how they should be used. Consideration needs to be given to local availability This section can build on the PD needs identified from the course manuals 	<p>Resources</p> <ol style="list-style-type: none"> Support tutors to identify inclusive resources such as posters with large prints for partially sighted learners, engaging experts in sign language, making use of projectors, flip charts, sticky notes, tactile, audio-visuals, visuals, audio, teachers and learners resource packs, textbooks, course manual, pairs of compasses and ruler and addition mat, that can be used in the teaching and learning of the concepts introduced in the lesson. <ol style="list-style-type: none"> Early Grade – lesson 12 Upper Grade – lesson 12 JHS; Assessment – lesson 12 JHS; Euclidean – lesson 12 <p>(PD themes 1 & 3)</p> Let tutors, in pairs (NTS 3h), select a concept and develop the rubrics for designing resources that can be used in the teaching and learning of the concepts selected. 	<p>Resources</p> <ol style="list-style-type: none"> Identify as many GESI responsive resources as possible that can be used in the teaching and learning of the concepts introduced in the lesson. In pairs (NTS 3h), select a concept and develop the rubrics for designing resources that can be used in the teaching and learning of the concepts selected. NTS 3j 	<p>10 mins</p>
<p>Evaluation and review of session Guidance notes for SL/HoD should</p>	<p>Reflective Activity</p> <ol style="list-style-type: none"> Engage tutors in the evaluation of the session and encourage 	<p>Reflective Activity</p> <ol style="list-style-type: none"> Show by 5 or 3 or 1 finger(s) if you “really got it”, “got some of 	<p>5 mins</p>

<ul style="list-style-type: none"> • Select activities, linked to CLO and indicators, from the lesson that are likely to be most different from tutors' previous experience. These could involve applying new content, e.g. from section 2, or approaches to teaching, learning and assessment, incl. gender responsive, differentiation and inclusive approaches and use of appropriate ICT tools. • Identify how any assessments during the lesson relate to course assessment components • The selected activities should be done with tutors in real or close to real time • Anticipate any issues for clarification or questions which might arise as the tutors work through the activities and provide guidance on these. • Identify where, and which, core and transferable skills, including 	<p>them to provide feedback on the PD session (NTS 1a, 3i).</p> <ol style="list-style-type: none"> 2. Take note of all unresolved issues and use any of following strategies <ul style="list-style-type: none"> – discuss with SL/SWL – put on SL/SWL WhatsApp platform for discussion – tutors to research and report findings on shared platforms. <p>Advance Preparation</p> <ol style="list-style-type: none"> 1. Ask tutors to identify Lesson(s) learners were having challenges with in the Course Manual <ol style="list-style-type: none"> a. Early Grade – Shape, Space, and Measurement b. Upper Grade – Problems solving and logical reasoning c. JHS; Assessment – Fraction 2 d. JHS; Euclidean – Applications of Euclidean Geometry and Trigonometry <p>Geometric construction:</p> 2. Remind tutors to identify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a). 	<p>it" or "didn't get it" respectively. If you showed 5 fingers, share your experience with your colleagues</p> <ol style="list-style-type: none"> 4. Reflect on outstanding issues relating to the lesson. Deal with unresolved issues through sharing the issues on the various electronic platforms and/or seeking solutions through research. <p>Advance Preparation</p> <ol style="list-style-type: none"> 1. Identify Lesson(s) learners were having challenges with in the Course Manual <ol style="list-style-type: none"> a. Early Grade – Shape, Space, and Measurement b. Upper Grade – Problems solving and logical reasoning c. JHS; Assessment – Fraction 2 d. JHS; Euclidean – Applications of Euclidean Geometry and Trigonometry 2. Get a critical friend from the same or related discipline to observe your lesson during teaching and provide feedback (NTS 1a). 	
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<p>digital skills, are being developed or applied</p> <ul style="list-style-type: none"> • Makes links to the existing PD Themes with page reference where they can support teaching, for example: action research, questioning and to other external reference material • Identify where power point presentations or other resources need to be developed to support learning and provide guidance • Identify resources required for any TLMs and provide guidance on their development 	<p>3. Engage tutors in evaluation of the PD sessions and encourage them to provide feedback on the sessions, indicating how the sessions have supported teaching and learning in the subject</p>	<p>3. Evaluate and provide feedback on the PD sessions and indicate how the sessions have supported teaching and learning in the subject</p>	
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College of Education Tutor Professional Development (TPD) Survey – Coordinators Survey

Introduction

This survey should be completed by the TPD Coordinators for each College of Education. This survey will be completed on the College of Education Management Information System (CEMIS). The survey should be completed each week after TPD sessions.

1. Name of College of Education	
2. Please enter the date of the session	

3. Did today's scheduled TPD session take place?		
Yes	1	Go to Q5
No and we did not reschedule.	2	Go to Q4
No but we rescheduled for later this week or for an additional slot next week	3	Go to Q4

4. If the TPD session did not take place, please explain why		
Conflict with other activities	1	End data submission.
No one showed up for the session.	2	
Other (please specify)	3	

5. How many male tutors attended?	Answer must be a number.....
6. How many female tutors attended?	Answer must be a number.....
7. Which session was it?	Answer must be a text.....

8. What was the level of tutor participation during today's session?	
75-100% of the tutors were engaged	1
50-75% of the tutors were engaged	2
25-50% of the tutors were engaged	3
0-25% of the tutors were engaged	4

9. Please rate yourself on how well you facilitated the session	
I was not prepared	1
I could have been better prepared.	2
I felt adequately prepared.	3
I was very prepared and knew the content well	4

10. Did anyone from your mentoring University visit your college to observe and participate in the PD session?		
Yes	1	Go to Q11
No	2	Skip to Q13

11. What kind of support was provided during the visit?	
The University team worked with me to prepare for the session.	1
The University team participated in the PD session.	2
The University team observed the session.	3
After the session, the University team gave feedback on how the session went	4

12. How valuable was the support to you?	
Not Valuable	1
Somewhat Valuable	2
Very Valuable	3

13. Do you think the tutors found the session valuable?	
Not Valuable	1
Somewhat Valuable	2
Very Valuable	3

14. How adequately do you think Gender Equality and Social Inclusion (GESI) issues were addressed throughout the session?	
Not Adequate	1
Somewhat Adequate	2
Very Adequate	3

15. How much impact do you think the session will have on the learning of students?	
Very Good	1

Good	2
Minimal	3

16. Based on the reflection on the session today, what percentage of tutors do you think are applying interactive teaching strategies learnt from the sessions in their classes?	
75-100% of tutors are applying interactive teaching strategies in their classes	1
50-75% of tutors are applying interactive teaching strategies in their classes	2
25-50% of tutors are applying interactive teaching strategies in their classes	3
0-25% of tutors are applying interactive teaching strategies in their classes	4

17. What percentage of tutors do you think are using ICT in their classes as teaching aids e.g., integration of videos, PowerPoint presentations and as a research tool?	
75-100% of tutors are using ICT as teaching aids in their classes	1
50-75% of tutors are using ICT as teaching aids in their classes	2
25-50% of tutors are using ICT as teaching aids in their classes	3
0-25% of tutors are using ICT as teaching aids in their classes	4

18. Did the Principal and/or Vice Principal attend, visit or monitor the PD session? (Choose one or more answer from the list)?	
The Principal	1
The Vice Principal	2
Neither the Principal nor Vice Principal attended	3

