PROFESSIONAL DEVELOPMENT PROGRAMME

Tutor Professional Development Handbook: B.Ed. in Initial Teacher Education - Mathematics Year 3 Semester 2

HANDBOOK FOR **COORDINATORS**

Wisdom, Knowledge and Prudence

GHANA TERTIARY EDUCATION COMMISSION

NATIONAL TEACHING COUNCIL
NTC
Building Confidence, Raising Teaching Standards

The Government of Ghana

Foreword

In Ghana we have made great strides in transforming our teacher education system over the past few years. With each passing year the changes brought about through these reforms are maturing, embedding, and sustaining. Once the first B.Ed. graduates from Colleges of Education enter basic school classrooms from 2022 onwards, I am sure that as a nation, we will truly start to see the benefits of these reforms.

The success of national reforms depends on individual tutors and individual teachers working in classrooms across the country every day. The progress that we want to see will only be brought about through the consistent and regular application of the professional knowledge, professional practice and professional values and attitudes set out in the National Teachers' Standards (NTS).

This is where the Tutor Professional Development Handbooks, written by tutors and university lecturers, have an important role to play in helping tutors to reflect critically on their methods of teaching and learning.

Critical thinking and reflection is an area of weakness in parts of our current education system. Colleges of Education take secondary school graduates and, over four years of the B.Ed., shape them into professional teachers. A recent '21st Century Skills assessment' of a representative sample of Ghanaian Senior High School students found that 'critical thinking and problem solving' was the area where they performed least well. Lesson observation of these students' teachers in the same Senior High Schools found that 'employs a variety of instructional strategies that encourage student participation and critical thinking' was the area of the NTS where these teachers consistently scored lowest.

Teaching matters. If we want our Colleges of Education to develop teachers who can think critically and solve problems then tutors must model these expected behaviours in their lessons so that they create an environment where our teachers develop these competencies and, ultimately, use these competencies to develop critical thinking in our basic schools.

This latest set of Professional Development Handbooks, developed by four mentoring universities (University for Development Studies, University of Education, Winneba, University of Ghana and Kwame Nkrumah University of Science and Technology) and tutors from their affiliated Colleges of Education, are the third set of Professional Development Handbooks to be developed since Transforming Teaching, Education & Learning (T-TEL) became 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 making all this possible.

Robin Todd
Executive Director, T-TEL
February 2022

Age Level(s):

a. Upper Grade
b. JHS (Core)
c. JHS (Elective)

Name of Subject(s):

a. Mathematics: Teaching and Assessing
b. Teaching and Assessing JHS Mathematics
c. Mathematics

Tutor PD Session for Lesson 1 in the Course Manual

Lesson Tittle:

a. Upper Primary: The Four Basic Operations (Teaching and Assessing)
b. JHS (Core): Measurement, Shape and Space: (Teaching and Assessing)
c. JHS (Elective): Teaching Investigations with Shapes and Space

Focus: the bullet points provide the frame for what is to be done in the session. The SWL should use the bullets to guide what they write for the SL/HoD and tutors to do and say during each session. Each bullet needs to be addressed and specific reference should be made to the course manual/s.	**Guidance notes on Leading the session. *What the SL/HoDs will have to say during each stage of the session***	**Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each stage of the session.**	**Time in session**
1a: Introduction to the semester – in session one • Introduction to the purpose of the specialisms: EG, UP and JHS • Overview of subject/s age level/s to be covered in the PD sessions and guidance on grouping tutors according to the subject/s, age levels/s.	**1a: Introduction** 1.1 Ice breaker activity: Ask each tutor to estimate the number of handspans that could make the height of the Subject Lead and prove by measuring. 1.2 Lead tutors to discuss the overview of the phases to be covered in the course manual in this PD session. Upper Primary: Place value (Teaching and Assessing).	**1a: Introduction** 1.1 Ice breaker: Estimate the number of handspans that can make the height of Subject Lead and prove by measuring. 1.2 Discuss the overview of the phases to be covered in the course this PD session. Upper Primary: Place value (Teaching and Assessing)	**20 mins**

• Introduction to the course manual/s • Overview of course learning outcomes • Introduction to the two continuous assessment components to be undertaken in each subject during the semester (See Course Assessment Components at a Glance Appendix 2) NB: in subjects where there are no assessment components in the course manuals examples will need to be provided for SL/HoD.	JHS (Core) - Measurement, Shape and Space: (Teaching and Assessing). JHS (Elective) – Teaching investigations with shapes and space. *NB:* *Remember to put members into groups according to the phases to be taught in the semester.* 1.3 Guide tutors to scan through the course manual and indicate the purpose of the specialisms: UP, JHS (Core) and JHS (Elective) i. Upper Primary & JHS (Core) Both courses consider how student teachers will: be provided with the concepts and pedagogy required to teach in Upper Primary and Junior High School; support the learning of pupils between the ages of 9-11 and 12-14; gain understanding of human development and the developmental milestones associated with Upper Primary and JHS. ii. JHS (Elective): The course considers how student teachers will: a) identify the learning outcomes of the JHS 1-3 Mathematics curriculum;	JHS (Core) - Measurement, Shape and Space: (Teaching and Assessing) JHS (Elective) – Teaching investigations with shapes and space *NB:* *Please work in your phase group and contribute in the whole group.* 1.3 Individually, scan through the course manual and identify the purpose of the specialisms (Upper Primary, JHS Core and JHS Elective) and share with the whole group.	

	b) assess the four domains in the curriculum, that is, Number, Algebra, Geometry and Handling Data. c) design and analyse the development of micro lesson plans and concept development, practice, assessment strategies and trialling in micro-teaching sessions. d) translate current Mathematics theory into practice. *e)* integrate ICT tools in the teaching and learning of Mathematics *NB:* *Draw tutors' attention to all NTS references and salient points necessary for the development of their teaching plan.* 1.4 Ask tutors to read the introduction of the various course manuals and discuss the Course learning Outcomes (CLOs) in groups as appropriate. 1.5 Ask tutors to discuss the two continuous assessment (CA) components to be undertaken during the course in line with the NTEAP making reference to the Appendix 2 of this PD Manual to be abreast with:	*NB*: *Pay attention to all NTS references and salient points necessary for the development of their teaching plan*. 1.4 Read the introduction of your course manual and discuss the Course learning Outcomes (CLOs) in groups as appropriate. 1.5 With reference to Appendix 2 of this PD manual, discuss the two continuous assessment components to be undertaken during the course in line with the NTEAP to be abreast with:	

	i. the scope of the subject project and subject portfolio ii. the percentage/ weight distributions iii. alternative tools for CA. *Example of a subject project activity may include:* *α. Samples of problem - solving tasks with written explanations of how the problems were solved and how this can be taught.* *β. Charts and graphs with written explanations of how and why they were created and how this can be taught.* *γ. Use of computer analyses conducted as well as use of software to teach mathematics and evaluate how effective they are.* *δ. Use of indigenous mathematics (ethnomathematics) in teaching formal mathematics* *An example of a subject portfolio activity is to: design a TLR for teaching calculation or pre-calculation and ask colleague students to use it.* *Provide a rationale for the design; do an evaluation of its impact on students' learning; and state what would have made the TLR usage effective.*	i. the scope of the subject project and subject portfolio ii. the percentage/ weight distributions iii. alternative tools for CA. *Example of a subject project activity may include:* *α. Samples of problem - solving tasks with written explanations of how the problems were solved and how this can be taught.* *β. Charts and graphs with written explanations of how and why they were created and how this can be taught.* *γ. Use of computer analyses conducted as well as use of software to teach mathematics and evaluate how effective they are.* *δ. Use of indigenous mathematics (ethnomathematics) to teach formal mathematics.* *An example of a subject portfolio activity is to: design a TLM for teaching calculation or pre-calculation and ask colleague students to use it.* *Provide a rationale for the design; do an evaluation of its impact on students' learning; and state what would have made the TLM usage effective.*	

1b Introduction to the session • Review prior learning • Reading and discussion of the introductory sections of the lesson up to and including learning outcomes and indicators • Overview of content and identification of any distinctive aspects of the lesson/s, NB: The guidance for SL/HoD should identify and address any areas where tutors might require clarification on any aspect of the lesson. NB: SL/HoD should ask tutors to plan for their teaching as they go through the PD session	**1b Introduction to the Lesson** 1.6 Ask tutors to tell how useful the previous semester's PD session was and how it influenced their teaching in year 3 semester 1. Lead them to provide examples of how students were prepared to employ the various strategies and skills during the basic school classroom work including STS Field Experience in year 3 semester 1 and how student teachers will be prepared to employ the various strategies and skills during the basic school classroom work in STS Field Experience in year 4 semester 1. 1.7 Ask tutors to read and discuss the introductory section of lesson 1 in the course manual including the Learning Outcomes (LOs) in phase groups. 1.8 Ask tutors in phase groups to discuss the important or distinctive aspects of lesson 1 including vocabulary and fundamental concepts. *Distinctive aspects* *Example:* *a. Upper Primary:*	**1b Introduction to the Lesson** 1.6 Tell how useful the previous semester's PD session was and how it influenced your teaching in year 3 semester 1. Provide examples of how students employed the various strategies and skills during the basic school classroom work including STS Field Experience in year 3 semester 1 and how student teachers will be prepared to employ the various strategies and skills during the basic school classroom work in STS Field Experience in year 4 semester 1. 1.7 Read and discuss the introductory section of lesson 1 in the course manual including the Learning Outcomes (LOs) in your phase groups. 1.8 In your phase group, discuss the important or distinctive aspects of lesson 1 including vocabulary and fundamental concepts. *Distinctive aspects* *Example:* *a. Upper Primary:*	

<table>
<tr>
<td></td>
<td>Place value in numeration systems; counting and representing numbers in multiple of ways and indifferent bases.
b. JHS (Core): –
Spatial sense; concept of measurement; types of angles;
finding perimeter and area of 2-D shapes; volumes of prisms and pyramids.
c. JHS (Elective) –
Assessment strategies; Investigating perimeters and areas of polygons; Investigating the relationship between the volumes of prisms and pyramids.

NB:
Encourage tutors to see leaners as knowledge constructors but not as passive listeners in the learning environment.</td>
<td>Place value in numeration systems; counting and representing numbers in multiple of ways and indifferent bases.

NB:
Consider leaners as knowledge constructors but not as passive listeners in the learning environment.</td>
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<td>2. Concept Development (New learning likely to arise in lesson/s):
• Identification and discussion of new learning, potential barriers to learning for student teachers or students, concepts or pedagogy being introduced in the lesson, which need to be explored with the SL/HoD
NB: The guidance for SL/HoD should set out</td>
<td>Concept Development

2.1 Ask tutors to identify familiar and unfamiliar concepts in their lessons and discuss with the larger group.
<table>
<tr><th>Familiar Concepts</th><th>Unfamiliar concepts</th></tr>
<tr><td>Place value of Whole Numbers</td><td>Place value of decimals</td></tr>
<tr><td>Measurement of length and area</td><td>Measurement of volume</td></tr>
<tr><td>Counting to establish quantities</td><td>Estimation of quantities</td></tr>
<tr><td>Addition, subtraction and multiplication of numbers</td><td>Division of numbers</td></tr>
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</td>
<td>Concept Development

2.1 Identify familiar and unfamiliar concepts in your lesson and discuss with the larger group.</td>
<td>15 mins</td>
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what they need to do to introduce and explain the issues/s with tutors	2.2 Lead tutors to draw connections among concepts in the various lessons in line with the basic school curriculum. *Example.* JHS*: The connection is that solids have shape and occupy space (BSC: B 5.3.1.1; 5.3.2.1).* *UPPER PRIMARY: Repeated addition is a fundamental concept of multiplication; repeated subtraction is a fundamental concept of division; addition as the inverse of subtraction and vice versa; Multiplication as the inverse of division and vice versa irrespective of the phase of study (BSC B 3.1.2.6; 2.2.1.2; B 4.1.2.5; B 4.1.2.2).* 2.3 Guide tutors to use Think-Pair-Share to outline possible challenging areas in teaching their lessons. Example: *Upper Primary (Teaching place value): non-availability of place value resource materials for teaching decimals.* *JHS Core/Elective (Shape, Space and Measurement)* • *Inadequate pedagogical content knowledge for teaching volume of prisms and pyramids*.	2.2 In your phase groups, draw connections among concepts in the lesson and in line with the basic school curriculum. 2.3 Individually, outline the challenging areas in teaching your lesson, share with a member of the same phase group and then with the whole group.	

	• *Teaching a lesson without the relevant resources including ICT tools.* *Each of the above can be addressed through further reading and advance preparation – e.g. searching the internet for solutions to the identified challenging areas.* 2.4 Lead tutors to discuss misconceptions and barriers to learning in the lesson. *Example:* *a. UPPER PRIMARY: –* *In place-value students do not consider the place of number as showing the value of the number. They read numbers as individual digit. i.e 143 as one-four-three instead of one hundred and forty-three* *b. JHS (Core/Elective)– misconception of space shape and measurement is that a square is not a rectangle; a square is not a rhombus; slant height of a pyramid is considered as the actual height of the pyramids.* *Barriers to learning may include: weak prior knowledge, students engaging in non-academic activities to the detriment of academic engagement, lack of appropriate resources, lack of opportunity to use ICT tools due to power outages, interrupted internet connectivity,*	2.4 In whole group, discuss misconceptions and barriers to learning in the lesson. *Example*: *a. UPPER PRIMARY: – In place-value, students do not consider the place of a number as showing the value of the number; numbers are read as individual digit. i.e 143 as one-four-three instead of one hundred and forty-three* *b. JHS (Core/Elective) – misconception of space shape and measurement is that a square is not a rectangle; a square is not a rhombus; slant height of a pyramid is considered as the actual height of the pyramids.* *Barriers to learning may include: weak prior knowledge, students engaging in non-academic activities to the detriment of academic engagement, lack of appropriate resources, lack of opportunity to use ICT tools due to power outages, interrupted internet connectivity, unavailability*	

	unavailability of internet bundle for accessing the internet, inadequate contact time due to staff meetings.	*of internet bundle for students, inadequate contact time due to staff meetings.*	
3. Planning for teaching, learning and assessment activities for the lesson/s • Reading and discussion of the teaching and learning activities • Noting and addressing areas where tutors may require clarification • Noting opportunities for making links to the Basic School Curriculum • Noting opportunities for integrating: GESI responsiveness and ICT and 21st Century skills • Reading, discussion, and identification of continuous assessment opportunities in the lesson. Each lesson should include at least two opportunities to use continuous assessment to support student teacher learning • Resources:	**Planning for Teaching and learning Activities for the Lesson** 3.1 Ask tutors in their phase groups, to suggest teaching and learning activities for the lesson by ensuring; i. Provision is made for SEN. ii. Both genders take leading roles in group task. iii. Even distribution of questions to different categories of learners based on gender, ability, previous experience, etc. referring to NTS 1a, b, c, d, 2b, e, f, 3b, c. 3.2 Ask tutors to read the activities outlined in their course manuals and identify areas that require clarification. *NB*: *Refer to the Basic School Curriculum (BSC 4.1.1.1; 4.1.3.2; 5.1.1.1; 5.3.3.1-2;) and search through "IXL Math" and GeoGebra to clarify the otherwise dark spots in "Geometry and Algebra".* 3.3 Lead tutors to brainstorm to come up with some GESI responsive pedagogical	**Planning for Teaching and learning activities for the Lesson** 3.1 Suggest teaching and learning activities for the lesson by ensuring; i. Provision is made for SEN ii. Both genders take leading roles in group task, etc making reference to NTS 1a, b, c, d, 2b, e, f, 3b, c. 3.2 Read the activities outlined in your course manual and identify areas that require clarification. *NB*: *Refer to the Basic School Curriculum (BSC 4.1.1.1; 4.1.3.2; 5.1.1.1; 5.3.3.1-2;) and search through "IXL Math" and GeoGebra to clarify the otherwise dark spots in "Geometry and Algebra".* 3.3 Brainstorm to come up with some pedagogical approaches that can be employed during the	**40 mins**

○ links to the existing PD Themes, for example, action research, questioning and to other external reference material: literature, on web, Utube, physical resources, power point; how they should be used. Consideration needs to be given to local availability ○ guidance on any power point presentations, TLM or other resources which need to be developed to support learning • Tutors should be expected to have a plan for the next lesson for student teachers	approaches and their impact on the learning of the concepts under consideration. *Example:* *i) The use of inquiry to explore successfully how Geometry relate to all members of the society.* *(ii) The use of differentiation and scaffolding to ensure that no learner is left behind (BSC pp. xv)* *iii) Being patient with stutterers* *iv) Using tactile or braille for persons with SEN, providing peer support for those who might need support, while you pay attention to all Phases.* 3.4 Ask tutors to explain some suggested teaching strategies that can help inculcate core competencies in student teachers and for that matter Basic School learners (i.e. during STS). *Example: Using* *a) Group Work to discuss how Geometry relate to the society: Social and Leadership Skills, Collaborative Learning,* *b) Using Investigation to identify generalizations on properties to consider when studying geometrical shape and space to inculcate Critical Thinking; Problem Solving Skills, Justification of Ideas; Digital Literacy, etc.*	lesson and their impact on learning of the concepts under consideration. *Example:* *i) The use of inquiry to explore successfully how Geometry relate to all members of the society.* *(ii) The use of differentiation and scaffolding to ensure that no learner is left behind (BSC pp. xv)* *iii) Being patient with stutterers* *iv) Using tactile or braille for persons with SEN, providing peer support for those who might need support, while you pay attention to all Phases.* 3.4 Suggest teaching strategies that can help inculcate core competencies in student teachers and for that matter Basic School learners (i.e. during STS). *Example: Using Group Work to discuss how Geometry relate to the society: Social and Leadership Skills, Collaborative Learning, etc.*	

	3.5 Ask tutors to mention some GESI responsive and culturally relevant resources that can be used with the suggested approaches and strategies to achieve the LOs. Example: *Resources may include supporting staff with experts in sign language as well as resources such as teacher and learner resource packs, dienes block, abacus, cartons, empty-can, textbooks, course manual, projectors, flip charts, sticky notes, braille, tactile materials, audio and audio-visuals that can be used in the teaching and learning of the concepts mentioned above (NTS 3j)* NB: Encourage tutors to give other examples that is not captured in the above. 3.6 Lead tutors to discuss assessment strategies ('as' and 'for') to be used during teaching of the lesson. *NB: Continuous assessment activities (assignments, quizzes, group presentations, etc. should be used to create subject projects and build subject portfolios)*. *Example: A project on how to develop and use a*	3.5 Mention some GESI responsive and culturally relevant resources that can be used with the suggested approaches and strategies to achieve the LOs. Example: *Resources may include supporting staff with experts in sign language as well as resources such teacher and learner resource packs, textbooks, etc* 3.6 Discuss assessment strategies ('as' and 'for') to be used during teaching of the lesson. *NB: Continuous assessment activities (assignments, quizzes, group presentations, etc. should be used to create subject projects and build subject portfolios)*. *Example: A project on how to develop and use a known*	

	known place value material in teaching place value - UPPER PRIMARY *A project on investigation of space and shape between prism and pyramid (JHS).* *A project on investigating measurement in leaner's community using non-standard unit (JHS).* *Make reference to assessment in the course manual and NTEAP* 3.7 Ask each tutor to develop a sample of assessment item based on the LOs and share with the whole group. *Example:* *Upper and JHS Grades – Interview 10 basic school teachers during the STS activity on place value and geometry that basic school learners are exposed to:* *a) at home* *b) during play* 3.8 Lead tutors to discuss the various ways they can support student teachers to build their subject portfolio. *Example:* *i) Encouraging student teachers to file all their assignments, presentation, quizzes, reports, pictures of activities/events, etc with feedback in their folders.*	*place value material in teaching place value - UPPER PRIMARY* *A project on investigation of space and shape between prism and pyramid (JHS).* *A project on investigating measurement in leaner's community using non-standard unit (JHS).* *Make reference to assessment in the course manual and NTEAP* 3.7 Develop a sample of assessment items based on the LOs and share with the whole group. *Example:* *Upper and JHS Grades – Interview 10 basic school teachers during the STS activity on place value and geometry that basic school learners are exposed to:* *a) at home* *b) during play* 3.8 Discuss the various ways you can support student teachers to build their subject portfolio. *Example:* *i) Encouraging student teachers to file all their assignments, presentation, quizzes, reports, pictures of activities/events, etc with feedback in their folders.*	

	ii) Encouraging students to take notes in class and filing them 3.9 Ask a tutor to model a presentation of an activity using projector, internet search and taking into consideration both genders take leading roles in their groups and equity provided for all (NTS 1a, b, 2b, e, 3b, c, J; BSC pp. iii).	*ii) Encouraging students to take notes in class and filing them.* 3.9 Prepare and model a presentation of an activity using projector, internet search and taking into consideration both genders take leading roles in their groups and equity provided for all (NTS 1a, b, 2b, e, 3b, c, J; BSC pp. iii).	
4. Evaluation and review of session: • Tutors need to identify critical friends to observe lessons and report at next session • Identifying and addressing any outstanding issues relating to the lesson/s for clarification	**Evaluation and review of session:** 4.1 Engage tutors in providing feedback of the PD session taking into consideration – Clarity of content, ICT integration, GESI, Twenty First Century Skills (NTS 1a, 3i, BSC pp. x-xvi) and make notes that will help them to teach Lesson 1 4.2 Engage tutors to identify unresolved issues relating to this lesson for clarification. *NB: Take note of all unresolved issues that may need further research or consultation and use any of following strategies to address them.* *i. put on SL/SWL WhatsApp/ Telegram platform for discussion* *ii. tutors to research for the next PD session for discussion*	**Evaluation and review of session:** 4.1 Reflect and provide feedback on this PD session taking into consideration – Clarity of content, pedagogical approaches employed, ICT integration, GESI, Twenty First Century Skills (NTS 1a, 3i, BSC pp. x-xvi)? and make notes that will help you to teach Lesson 1 4.2 Identify unresolved issues relating to this lesson for clarification. NB: *Put your unresolved issues unto* the department's *WhatsApp/ Telegram platform and research into the issues raised.*	**15 mins**

	4.3 Ask tutors to identify a critical friend from the same or related discipline to observe the enactment of their lesson and provide feedback during the next PD Session (NTS 1a). Advance Preparation 4.4 Ask tutors to remember to prepare a teaching plan for Lesson 1 taking note of important or distinctive aspects of the lesson and crosscutting issues and read Lesson 2 of the Course Manual on: Upper Primary - The four Basic Operations: (Teaching and Assessing) JHS(Core) - Construction, Angles and Polygons: (Teaching and Assessing 2) JHS (Elective) – Operations and Properties of Integers (number sense): Learning, teaching and applying NB: *i. Read the course manual the PD session guide, the NTEAP, and the NTS ahead of time to identify any outstanding issues relating to the lesson for clarification.* *ii. Collect all-inclusive resources (such as projector, flip chart and sticky notes) you need ahead of time, prepare samples of TLMs you may*	4.3 Identify a critical friend from the same or related discipline to observe the enactment of your lesson and to provide feedback during the next PD Session (NTS 1a). Advance Preparation 4.4 Remember to prepare a teaching plan for the Lesson 1 taking note of important or distinctive aspects of the lesson and crosscutting issues and read Lesson 2 of the Course Manual on: Upper Primary - The four Basic Operations: (Teaching and Assessing) JHS(Core) - Construction, Angles and Polygons: (Teaching and Assessing 2) JHS (Elective) – Operations and Properties of Integers (number sense): Learning, teaching and applying NB: *i. Read the course manual the PD session guide, the NTEAP, and the NTS ahead of time to identify any outstanding issues relating to the lesson for clarification.*	

	need and rehearse how these may be used to support the achievement of your goals		

Age Level

a. Upper Primary
b. JHS (Core)
c. JHS (Elective)

Name of Subject/s:

a. Mathematics: Teaching and Assessing
b. Teaching and Assessing JHS Mathematic
c. Mathematics

Tutor PD Session for Lesson 2 in the Course Manual

Lesson Tittle:

a. Upper Primary: The Four Basic Operations (Teaching and Assessing)
b. JHS (Core): Construction, Angles and Polygons (Teaching and Assessing 2)
c. JHS (Elective): Teaching Mensuration: Learning, Teaching And Applying

Focus: the bullet points provide the frame for what is to be done in the session. The SWL should use the bullets to guide what they write for the SL/HoD and tutors to do and say during each session. Each bullet needs to be addressed and specific reference should be made to the course manual/s.	**Guidance notes on Leading the session. *What the SL/HoDs will have to say during each stage of the session***	**Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each stage of the session.**	**Time in session**
1. Introduction to the session • Review prior learning • A critical friend to share findings for a short discussion and lessons learned • Reading and discussion of the introductory sections of the lesson up to and including learning outcomes and indicators • Overview of content and identification of any	**Introduction** 1.1 Ice breaker activity: Begin with an investigational activity. Example: speed work in turns - What fraction of the circumference of a cylindrical tank is its diameter? 1.2 Ask tutors to tell how useful the PD session of lesson 1 was and how it influenced their teaching over the week. Lead them to provide examples of how student teachers were prepared to	**Introduction** 1.1 Ice breaker activity: participate in an investigational activity. Example: speed work in turns - What fraction of the circumference of a cylindrical tank is its diameter? 1.2 Tell how useful the previous PD session was and how it influenced your teaching over the week. Provide examples of how student teachers were prepared to employ the	**20 mins**

distinctive aspects of the lesson/s, NB The guidance for SL/HoD should identify and address any areas where tutors might require clarification on any aspect of the lesson. NB SL/HoD should ask tutors to plan for their teaching as they go through the PD session	employ the various strategies and skills during the basic school classroom work in STS Field Experience in year 4 semester 1. 1.3 Ask a critical friend to give feedback on observation during enactment of the previous lesson. *NB:* *Things tutor might have observed; tutor's choice of words, pedagogical content knowledge, content knowledge subject matter, use of ICT tools, consideration of GESI issues and the use of NTEAP* 1.4 As tutors in phase groups, ask them to read and discuss the introductory section of the lesson including the Learning Outcomes (LOs). *NB:* *Suggest relevant previous knowledge of students that will support effective teaching and learning of the lesson.* 1.5 Ask tutors to identify the purpose of the lesson from the course manual and state their expectations of the PD Session 1.6 Ask tutors in phase groups to discuss the	various strategies and skills during the basic school classroom work in STS Field Experience in year 4 semester 1. 1.3 As a critical friend, share your observation on the previous lesson. *NB:* *Things tutor might have observed; tutor's choice of words, pedagogical content knowledge, content knowledge subject matter, use of ICT tools, consideration of GESI issues and the use of NTEAP* 1.4 Read and discuss the introductory section of the lesson up to Learning Outcomes (Los). *NB:* *Suggest relevant previous knowledge of students that will support effective teaching and learning of the lesson.* 1.5 Identify the purpose of the lesson from the course manual and state your expectations of the PD Session. 1.6 In phase groups, discuss the distinctive	

	important or distinctive aspects of the lesson including vocabulary and fundamental concepts. <u>Distinct Fundamental Concepts</u> a. Upper Primary - Building an understanding of operations on numbers up to 10,000,000. b. JHS (Core) - Constructing perpendicular and parallel lines, constructing angles, copying and bisecting angles and lines c. JHS (Elective) – lengths, surface area and volumes of 3-D shapes <u>Vocabulary</u> Upper Primary - Basic operations JHS (core) – Construct, perpendicular, parallel, bisect JHS (Elective): surface area, volume	aspects of the s lesson including vocabulary and fundamental concepts. <u>Distinct Fundamental Concepts</u> a. Upper Primary - Building an understanding of operations on numbers up to 10,000,000. b. JHS (Core) - Constructing perpendicular and parallel lines, constructing angles, copying and bisecting angles and lines c. JHS (Elective) – lengths, surface area and volumes of 3-D shapes <u>Vocabulary</u> Upper Primary - Basic operations JHS (core) – Construct, perpendicular, parallel, bisect JHS (Elective): surface area, volume	
2. Concept Development (New learning likely to arise in lesson/s): • Identification and discussion of new learning, potential barriers to learning for student teachers or students, concepts or pedagogy being introduced in the lesson, which need to be explored with the SL/HoD NB The guidance for SL/HoD should set out	**Concept Development** 2.1 Ask tutors to identify familiar and unfamiliar concepts in their lessons and discuss with the larger group. <u>Familiar and Unfamiliar Concepts</u> Upper Primary Familiar Concepts: operations on numbers up to 9,999 Unfamiliar concepts: operations on numbers up to 10,000,000 JHS (core) Familiar Concepts:	**Concept Development** 2.1 Identify familiar and unfamiliar concepts in their lessons and discuss with the larger group. <u>Familiar and Unfamiliar Concepts</u> Upper Primary Familiar Concepts: operations on numbers up to 9,999 Unfamiliar concepts: operations on numbers up to 10,000,000 JHS (core) Familiar Concepts:	**15 mins**

what they need to do to introduce and explain the issues/s with tutors	Constructing lines and angles Unfamiliar concepts: Copying and bisecting lines and angles JHS (Elective): Familiar Concepts: Teaching lengths and surface area of 3-D shapes Unfamiliar concepts: Teaching volumes of 3-D shapes 2.2 Lead tutors to draw connections among concepts in the various lessons in line with the Basic School Curriculum. *Example: In operations, repeated addition is multiplication while repeated subtraction is division. Operations are everyday life actions (Bsc:B6.1.2.5). Volumes is a product of base area and height (B5.3.2.2).* 2.3 Engage tutors in think-pair-share strategies to outline possible challenging areas in developing understanding of: • division of multi-digit numbers (*Upper Primary*) • Copying angles (*JHS-Core*) • Volumes of pyramids *NB:* *Encourage tutor to makes sure challenges are discussed by considering*	Constructing lines and angles Unfamiliar concepts: Copying and bisecting lines and angles JHS (Elective): Familiar Concepts: Teaching lengths and surface area of 3-D shapes Unfamiliar concepts: Teaching volumes of 3-D shapes 2.2 Draw connections among concepts in the various lessons in line with the basic school curriculum. *Example: In operations, repeated addition is multiplication while repeated subtraction is division. Operations are everyday life actions (Bsc:B6.1.2.5). Volumes is a product of base area and height (B5.3.2.2).* 2.3 Individually, outline the challenging areas in your lesson, share with a member of the same phase group and then with the whole group. *NB:* *Encourage tutor to makes sure challenges are discussed by considering*	

	students learning styles inclusivity. 2.4 Lead tutors to discuss misconceptions and barriers in teaching and learning of the lesson. Misconceptions *Example:* *a. Upper Primary – Multiplication and division cannot be done by low achievers* *b. JHS (Core) – Perpendicular occurs only when a vertical and horizontal lines meet.* *c. JHS (Elective) –Plane shapes have faces* <u>Barriers</u> *Some possible barriers* • *Inadequate relevant previous knowledge of students* • *Unavailability learning Resources* • *Lack of content knowledge of the teacher* *NB:* *Guide tutors to discuss how learning resource, time and teacher competence could be barrier to teaching and learning Fraction and Rigid motion.* 2.5 Support tutors to identify GESI responsive resources such as supporting staff with experts in sign language as well as resources such	*students learning styles inclusivity.* 2.4 Participate actively in the discussion on misconceptions and barriers in teaching and learning of the lesson Misconceptions *Example:* *a. Upper Primary – Multiplication and division cannot be done by low achievers* *b. JHS (Core) – Perpendicular occurs only when a vertical and horizontal lines meet.* *c. JHS (Elective) –Plane shapes have faces* <u>Barriers</u> *Some possible barriers* • *Inadequate relevant previous knowledge of students* • *Unavailability learning Resources* • *Lack of content knowledge of the teacher* *NB:* *Guide tutors to discuss how learning resource, time and teacher competence could be barrier to teaching and learning Fraction and Rigid motion.* 2.5 Identify as many GESI responsive resources such as supporting staff with experts in sign language as well as resources such teacher and learner	

	teacher and learner resource packs, textbooks, course manual, Posters illustrating people using mathematics in the jobs; video clips downloaded from the internet (NTS 3j, PD Manual pp.38)	resource packs, textbooks, course manual, Posters illustrating people using mathematics in the jobs; video clips downloaded from the internet. (NTS 3j, PD Manual pp.38)	
3. Planning for teaching, learning and assessment activities for the lesson/s • Reading and discussion of the teaching and learning activities • Noting and addressing areas where tutors may require clarification • Noting opportunities for making links to the Basic School Curriculum • Noting opportunities for integrating: GESI responsiveness and ICT and 21st C skills • Reading, discussion, and identification of continuous assessment opportunities in the lesson. Each lesson should include at least two opportunities to use continuous assessment to support student teacher learning	**Teaching and learning activities** 3.1 Ask tutors to suggest teaching and learning activities for the lesson taking into account slow learners, learners who are dyscalculia, students who suppress the opposite sex during lessons. Suggested Learning Activities *<u>Upper Primary</u>: Engage student teachers series of number game in building an understanding of basic operations.* *<u>JHS core:</u> Employ the principle of multiple embodiment in building an understanding bisection of angles* *JHS(Elective):* *Engage student teachers in a discussion towards building an understanding of volumes of 3-Ds using variety of TLRs* *NB: Be conscious of:* *i. Provision made for slow learners challenged*	**Teaching and learning activities** 3.1 Suggest teaching and learning activities for the lesson taking into consideration slow learners, learners who are dyscalculia, students who suppress the opposite sex during lessons. Suggested Learning Activities *<u>Upper Primary</u>: Engage student teachers series of number game in building an understanding of basic operations.* *<u>JHS core:</u> Employ the principle of multiple embodiment in building an understanding bisection of angles* *JHS(Elective):* *Engage student teachers in a discussion towards building an understanding of volumes of 3-Ds using variety of TLRs* *NB: Be conscious of:* *i. Provision made for physically challenged*	**40 mins**

• Resources: ○ links to the existing PD Themes, for example, action research, questioning and to other external reference material: literature, on web, Utube, physical resources, power point; how they should be used. Consideration needs to be given to local availability ○ guidance on any power point presentations, TLM or other resources which need to be developed to support learning • Tutors should be expected to have a plan for the next lesson for student teachers	*ii. Both genders taking leading roles in group task* *iii. Even distribution of questions to different categories of learners based on gender, ability, previous experience, etc* *NTS 1a, b, c, d, 2b, e, f, 3b, c* 3.2 Let tutors read the activities outlined in their course manuals and identify areas that require clarification. NB: *Refer to the Basic School Curriculum (BSC pp. xv – xvii) Identify challenging areas that require clarification, using GeoGebra to clarify the otherwise dark spots in "Rid motion".* 3.3 Lead tutors to brainstorm to come up with some pedagogical approaches and their related core competencies likely to be inculcated in students and for that matter Basic School learners. *Example* *<u>(a) Upper Primary:</u>* *Strategy: Expository, Think pair Share, Discussion and Brainstorming* *Core Competencies: Problem solving, critical and creative thinking and communication.* *<u>(b)HS (core)</u>*	*ii. Both genders taking leading roles in group task* *iii. Even distribution of questions to different categories of learners based on gender, ability, previous experience, etc* *NTS 1a, b, c, d, 2b, e, f, 3b, c* 3.2 Read the activities outlined in your course manual and identify areas that require clarification. NB: *Refer to the Basic School Curriculum (BSC pp. xv – xvii) Identify challenging areas that require clarification, using GeoGebra to clarify the otherwise dark spots in "Rid motion".* 3.3 Brainstorm some pedagogical approaches and their related core competencies likely to be inculcated in students and for that matter Basic School learners. *Example* *<u>(a) Upper Primary:</u>* *Strategy: Expository, Think pair Share, Discussion and Brainstorming* *Core Competencies: Problem solving, critical and creative thinking and communication.* *<u>(b)HS (core)</u>*	

	Strategy: Expository, Think pair Share, group project, internet search *Core Competencies: Problem solving, critical and creative thinking and communication.* *<u>(c) JHS (Elective)</u>* *Strategy: interactive and Collaborative group work, Discussion* *Core Competencies: Critical thinking skills, Collaborative learning and Problem-Solving Skills.* 3.4 Ask tutors to mention some GESI responsive resources that can be used with the suggested approaches and strategies in achieving the LOs. Example: *Resources may include supporting staff with experts in sign language as well as resources such teacher and learner resource packs, textbooks, course manual, projectors, flip charts, sticky notes, braille, tactile materials, audio and audio-visuals that can be used in the teaching and learning of the concepts mentioned above (NTS 3j)* 3.5 Using discussion, lead tutors to come out with assessment strategies ('as' and 'for') to be used during teaching of the lesson.	*Strategy: Expository, Think pair Share, group project, internet search* *Core Competencies: Problem solving, critical and creative thinking and communication.* *<u>(b) JHS (Elective)</u>* *Strategy: interactive and Collaborative group work, Discussion* *Core Competencies: Critical thinking skills, Collaborative learning and Problem-Solving Skills.* 3.4 Mention some GESI responsive resources that can be used with the suggested approaches and strategies in achieving the LOs. Example: *Resources may include supporting staff with experts in sign language as well as resources such teacher and learner resource packs, textbooks, course manual, projectors, flip charts, sticky notes, braille, tactile materials, audio and audio-visuals that can be used in the teaching and learning of the concepts mentioned above (NTS 3j)* 3.5 Discuss to come up with assessment strategies ("as and "for") to be used during the lesson.	

	NB: *Assessment must involve; the subject project and Subject Portfolio.* *Examples of subject project and subject portfolio* *<u>Upper Primary</u>* *Subject project: Use any known strategy to demonstrate multiplication of 5-digit and a 2-digit number.* *Subject Portfolio: Project on using any 3 concrete material to teach division of 3 digit numbers by a 1 digit number* *<u>JHS (Core)</u>* *Subject project: Construct a triangle. Bisect all its angles and write any conclusions that you can draw from it.* *Subject Portfolio: Write step by step how you will teach a JHS learner how to copy and draw angles.* *<u>JHS (Elective)</u>* *Subject Project: Assignment – Write the relationship between volume of a cone and cinder.* *Subject Portfolio: Search on the internet to come out with 5 sites which talks about measurement of total surface area of solids.* *NB: Assessment must be aligned to the NTEAP. Continuous assessment activities (assignments, quizzes, group*	*NB:* *Assessment must involve; the subject project and Subject Portfolio.* *Examples of subject project and subject portfolio* *<u>Upper Primary</u>* *Subject project: Use any known strategy to demonstrate multiplication of 5-digit and a 2-digit number.* *Subject Portfolio: Project on using any 3 concrete material to teach division of 3 digit numbers by a 1 digit number* *<u>JHS (Core)</u>* *Subject project: Construct a triangle. Bisect all its angles and write any conclusions that you can draw from it.* *Subject Portfolio: Write step by step how you will teach a JHS learner how to copy and draw angles.* *<u>JHS (Elective)</u>* *Subject Project: Assignment – Write the relationship between volume of a cone and cinder.* *Subject Portfolio: Search on the internet to come out with 5 sites which talks about measurement of total surface area of solids.* *NB: Assessment must be aligned to the NTEAP. Continuous assessment activities (assignments, quizzes, group*	

	presentations, etc, should be used to create subject projects and build subject portfolios (See, Appendix II) 3.6 Ask each tutor to develop a sample of assessment item based on the LOs and share with the whole group. 3.7 Lead tutors to discuss the various ways they can support student teachers to build their subject portfolio. *Example: Encouraging student teachers to file all their assignments with feedback in their folders.* 3.8 Let a tutor model a presentation of an activity using Power point and making sure that both genders take leading roles in their groups and in the demonstration of the use of power point.	*presentations, etc, should be used to create subject projects and build subject portfolios (See, Appendix II)* 3.6 Develop a sample of assessment items based on the LOs and share with the whole group. 3.7 Discuss the various ways you can support student teachers to build their subject portfolio. *E.g. encouraging student teachers to file all their assignme0nts with feedback in their folders.* 3.8 Model presentation of an activity using Power point and making sure that both genders take leading roles in their groups and in the demonstration of the use of power point. (NTS 1a, b, 2b, e, 3b, c, J; BSC pp. 23)	
4. Evaluation and review of session: • Tutors should Identifying critical friends to observe lessons and report at next session. • Identifying and addressing any outstanding issues relating to the lesson/s for clarification	**Reflective Activity** 4.1 Engage tutors in self-evaluation as well as encourage tutors to provide feedback of the PD session taking into consideration inclusivity – how to be patient with Stutterers, using tactile and audio devices for visually	**Reflective Activity** 4.1 Show by fingers/nods of 5 or 3 or 1 as to those who “really got it”, “got some of it” or “didn’t get it” respectively. Explain how you really got the lesson.	**15 mins**

	challenged, paying attention to all courses, etc. Ask tutors to show by fingers/nods their level of satisfaction with the session. (NTS 1a, 3i).		
	4.2 Engage tutors to identify unresolved issues relating to this lesson for clarification *NB:* *Take note of all unresolved issues and use any of following strategies to address them:* – *put on SL/SWL WhatsApp platform for discussion* – *tutors to research and submit it in the next PD session for discussion*	4.2 Reflect on the activities in the session and outline unresolved issues relating to the lesson *NB:* *Take note of all unresolved issues and use any of following strategies to address them:* – *put on SL/SWL WhatsApp platform for discussion* – *research and submit it in the next PD session for discussion*	
	4.3 Ask tutors to identify a critical friend of the same or related discipline to observe their teaching and record their findings to be presented after delivery or in the Next PD session. (NTS 1a)	4.3 Identify critical friend of the same or related discipline observes teaching and record his/her findings to be presented after delivery or in the Next PD session. (NTS 1a)	
	Advance Preparation NB: Ask tutors to read Lesson 4 of the Course Manual on: Upper Primary - Fraction Concepts (Teaching and Assessment) JHS(Core) - Fraction concepts (Teaching and Assessment)	Advance Preparation NB: Read Lesson 4 of the Course Manual on: Upper Primary - Fraction Concepts 2: (Teaching and Assessment) JHS(Core) - Operations on fractions: (Teaching and Assessment)	

	JHS(Elective) – Teaching Rigid Motion *NB:* *Read the course manual, the PD session guide ahead of time to identify any outstanding issues relating to the lesson for clarification.* *Collect all-inclusive resources (such as projector, flip chart and sticky notes) you need ahead of time, prepare samples of TLMs you may need.*	JHS(Elective) – Teaching Indices and logarithms1 *NB:* *Read the course manual, the PD session guide ahead of time to identify any outstanding issues relating to the lesson for clarification.* *Collect all-inclusive resources (such as projector, flip chart and sticky notes) you need ahead of time, prepare samples of TLMs you may need.*	

Age Level

a. Upper Primary
b. JHS (Core)
c. JHS (Elective)

Name of Subject/s:

a. Mathematics: Teaching and Assessing
b. Teaching and Assessing JHS Mathematic
c. Mathematics

Tutor PD Session for Lesson 3 in the Course Manual

Lesson Tittle:

a. Upper Primary: Fraction concepts1 (Teaching and Assessing)
b. JHS (Core): Fraction concepts (Teaching and Assessing)
c. JHS (Elective): Teaching Rigid Motion

Focus: the bullet points provide the frame for what is to be done in the session. The SWL should use the bullets to guide what they write for the SL/HoD and tutors to do and say during each session. Each bullet needs to be addressed and specific reference should be made to the course manual/s.	**Guidance notes on Leading the session. *What the SL/HoDs will have to say during each stage of the session***	**Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each stage of the session.**	**Time in session**
1. Introduction to the session • Review prior learning • A critical friend to share findings for a short discussion and lessons learned • Reading and discussion of the introductory sections of the lesson up to and including learning outcomes and indicators • Overview of content and	**Introduction** 1.1 Ice breaker activity: Begin with an investigational activity: for example, if the hour hand of a clock is on 12 and minute hand is on 3 what fractions does the space between the hands show. 1.2 Ask tutors to tell how useful the previous PD session was and how it influenced their teaching in the previous lesson.	**Introduction** 1.1 Ice breaker activity: participate in an investigational activity: for example, if the hour hand of a clock is on 12 and minute hand is on 3 what fractions does the space between the hands show. 1.2 Tell how useful the previous PD session was and how it influenced their teaching in the previous lesson.	**20 mins**

identification of any distinctive aspects of the lesson/s, NB The guidance for SL/HoD should identify and address any areas where tutors might require clarification on any aspect of the lesson. NB SL/HoD should ask tutors to plan for their teaching as they go through the PD session	Lead them to provide examples of how students were prepared to employ the various strategies and skills during the basic school classroom work in STS Field Experience in year 4 semester 1 1.3 Ask a critical friend to give feedback on observation during enactment of the previous lesson. *NB:* *Things tutor might have observed; tutor's choice of words, pedagogical content knowledge, content knowledge subject matter, ICT tools, GESI and the use of NTEAP* 1.4 Ask tutors to read and discuss the introductory section of the lesson including the Learning Outcomes (LOs) in phase groups. *NB:* *Suggest relevant previous knowledge of students that will support effective teaching and learning of the lesson.* 1.5 Ask tutors to identify the purpose of the lesson from the course manual and state their expectations of the PD Session	Provide examples of how students were prepared to employ the various strategies and skills during the basic school classroom work in STS Field Experience in year 4 semester 1 1.3 As a critical friend share your observation on the previous lesson. *NB:* *Things tutor might have observed; tutor's choice of words, pedagogical content knowledge, content knowledge subject matter, ICT tools, GESI and the use of NTEAP* 1.4 Read and discuss the introductory section of the lesson up to Learning Outcomes (Los)). *NB:* *Suggest relevant previous knowledge of students that will support effective teaching and learning of the lesson.* 1.5 Identify the purpose of the lesson from the course manual and state your expectations of the PD Session.	

	PURPOSE OF THE LESSON Upper Primary & JHS(CORE) • Introduce student teachers to the course manual to enable them develop awareness of what they are expected of in this lesson. • develop student teachers' understanding of the nature and importance of mathematics, as well as, meaning of fractions; Building an understanding of common fractions and finding equivalent fraction. • It also introduces the student teachers to the relationship between common fractions, equivalent, decimal numbers, and percent. JHS (Elective) • build on student teachers' knowledge and experiences on polygons and their properties • expose student teachers to the development of conceptual understanding of rigid motion by using manipulatives and practical activities	PURPOSE OF THE LESSON Upper Primary & JHS(CORE) • Introduce student teachers to the course manual to enable them develop awareness of what they are expected of in this lesson. • develop student teachers' understanding of the nature and importance of mathematics, as well as, meaning of fractions; Building an understanding of common fractions and finding equivalent fraction. • It also introduces the student teachers to the relationship between common fractions, equivalent, decimal numbers, and percent. JHS (Elective) • build on student teachers' knowledge and experiences on polygons and their properties • expose student teachers to the development of conceptual understanding of rigid motion by using manipulatives and practical activities	

	1.6 Ask tutors in phase groups to discuss the important or distinctive aspects of the lesson including vocabulary and fundamental concepts. <u>Distinct Aspects</u> a. Upper Primary/JHS (core): Building an understanding of common fractions, b. JHS (Elective) - Teaching Number plane, scale drawing <u>Vocabulary</u> Upper Primary/JHS (core) Examples: Fraction, Equivalent, decimals, comparing and ordering JHS (Elective): Number, plane, rotation, scale factor and symmetry. <u>Fundamental Concepts</u> Upper Primary/JHS (core) • Meaning of Common Fraction • Finding Equivalent Fraction • Comparing and ordering of fractions JHS (Elective) Teaching: • Number plane • Rotations (through given angles of rotation about a given point) • Enlargement with given scale factor	1.6 In phase groups, discuss the distinctive aspects of the s lesson including vocabulary and fundamental concepts. <u>Distinct Aspects</u> a. Upper Primary/JHS (core): Building an understanding of common fractions, b. JHS (Elective) - Teaching Number plane, scale drawing <u>Vocabulary</u> Upper Primary/HS (core) Examples: Fraction, Equivalent, decimals, comparing and ordering JHS (Elective): Number, plane, rotation, scale factor and symmetry. <u>Fundamental Concepts</u> Upper Primary/JHS (core) • Meaning of Common Fraction • Finding Equivalent Fraction • Comparing and ordering of fractions JHS (Elective) Teaching: • Number plane • Rotations (through given angles of rotation about a given point) • Enlargement with given scale factor	
2. Concept Development (New learning likely to arise in lesson/s): • Identification and discussion of new learning, potential	**Concept Development** 2.1 Ask tutors to identify familiar and unfamiliar concepts in their lessons and discuss with the larger group.	**Concept Development** 2.1 Identify familiar and unfamiliar concepts in their lessons and discuss with the larger group.	**15 mins**

barriers to learning for student teachers or students, concepts or pedagogy being introduced in the lesson, which need to be explored with the SL/HoD NB The guidance for SL/HoD should set out what they need to do to introduce and explain the issues/s with tutors	<u>Familiar and Unfamiliar Concepts</u> Upper Primary/JHS (core) Examples of Familiar Concepts: Commons Fraction($\frac{1}{2}, \frac{3}{5}, \frac{3}{7}\ etc.$) and Equivalent Fractions ($\frac{1}{2}, \frac{2}{4}, \frac{4}{8}$ etc,) Unfamiliar concepts: JHS (Elective): Application of fractions in real life situations. Examples of Familiar Concepts: Rotation through a given angle Unfamiliar concepts: Scale drawing 2.2 Lead tutors to draw connections among concepts in the various lessons in line with the Basic School Curriculum. *Example: The connection or the relationship among the concepts: Common Fraction and Angles is that angles can be converted into fractions, while fractions can also be converted to angle. (Bsc:B5.1.5.1)* 2.3 Ask tutors to use Think-Pair-Share to outline possible challenging areas in: • Developing an understanding of decimal fractions and to build relationship between common fractions decimal fractions	<u>Familiar and Unfamiliar Concepts</u> Upper Primary/JHS (core) Examples of Familiar Concepts: Commons Fraction($\frac{1}{2}, \frac{3}{5}, \frac{3}{7}\ etc.$) and Equivalent Fractions ($\frac{1}{2}, \frac{2}{4}, \frac{4}{8}$ etc,) Unfamiliar concepts: JHS (Elective): Application of fractions in real life situations. Examples of Familiar Concepts: Rotation through a given angle Unfamiliar concepts: Scale drawing 2.2 Draw connections among concepts in the various lessons in line with the basic school curriculum. *Example: The connection or the relationship among the concepts: Common Fraction and Angles is that angles can be converted into fractions, while fractions can also be converted to angle. (Bsc:B5.1.5.1)* 2.3 Individually, outline the challenging areas in your lesson, share with a member of the same phase group and then with the whole group.	

	• Teaching line and rotational symmetry and orders of rotation *NB:* *Tutor makes sure Challenges are discussed by considering students learning styles. Also taking into consideration GESI.* 2.4 Lead tutors to discuss misconceptions and barriers in teaching and learning of the lesson. <u>MISCONCEPTIONS</u> *Example:* *a. UP/JHS (core) – A common misconception is that learners believe the numerator and denominator are the same.* *b. JHS(Elective) –Learners believe that Rigid Motion and Coordinate Geometry are the same.* <u>BARRIERS</u> *Some possible barriers* • *Time* • *Learning Resources* • *Teacher Competence* *NB:* *Guide tutors to discuss how learning resource, time and teacher competence could be barrier to teaching and learning Fraction and Rigid motion.* 2.5 Support tutors to identify GESI responsive resources	*NB:* *Tutor makes sure Challenges are discussed by considering students learning styles. Also taking into consideration GESI.* 2.4 Participate actively in the discussion on misconceptions and barriers in teaching and learning of the lesson <u>MISCONCEPTIONS</u> *Example:* *a. UP/JHS (core) – A common misconception is that learners believe the numerator and denominator are the same.* *b. JHS(Elective) –Learners believe that Rigid Motion and Coordinate Geometry are the same.* <u>BARRIERS</u> *Some possible barriers* • *Time* • *Learning Resources* • *Teacher Competence* *NB:* *Guide tutors to discuss how learning resource, time and teacher competence could be barrier to teaching and learning Fraction and Rigid motion.* 2.5 Identify as many GESI responsive resources such as supporting	

	such as supporting staff with experts in sign language as well as resources such teacher and learner resource packs, textbooks, course manual, Posters illustrating people using mathematics in the jobs; video clips downloaded from the internet (NTS 3j, PD Manual pp.38)	staff with experts in sign language as well as resources such teacher and learner resource packs, textbooks, course manual, Posters illustrating people using mathematics in the jobs; video clips downloaded from the internet. (NTS 3j, PD Manual pp.38)	
3. Planning for teaching, learning and assessment activities for the lesson/s • Reading and discussion of the teaching and learning activities • Noting and addressing areas where tutors may require clarification • Noting opportunities for making links to the Basic School Curriculum • Noting opportunities for integrating: GESI responsiveness and ICT and 21st C skills • Reading, discussion, and identification of continuous assessment opportunities in the lesson. Each lesson should include at least two opportunities to use continuous	**Teaching and learning activities** 3.1 Ask tutors to suggest teaching and learning activities for the lesson taking into account GESI issues. Suggested Learning Activities Upper Primary/JHS core: Engage student teachers in a discussion towards building an understanding of common fractions using variety of TLRs. JHS(Elective): Engage student teachers in a number game as a starter. NB: Be conscious of: *i. Provision made for physically challenged* *ii. Both genders take leading roles in group task* *iii. Even distribution of questions to different categories of learners based on gender, ability, previous experience, etc* *NTS 1a, b, c, d, 2b, e, f, 3b, c*	**Teaching and learning activities** 3.1 Suggest teaching and learning activities for the lesson taking into consideration GESI Suggested Learning Activities Upper Primary/JHS core: Engage student teachers in a discussion towards building an understanding of common fractions using variety of TLRs. JHS(Elective): Engage student teachers in a number game as a starter. NB: Be conscious of: *i. Provision made for physically challenged* *ii. Both genders take leading roles in group task* *iii. Even distribution of questions to different categories of learners based on gender, ability, previous experience, etc* *NTS 1a, b, c, d, 2b, e, f, 3b, c*	**40 mins**

assessment to support student teacher learning • Resources: ○ links to the existing PD Themes, for example, action research, questioning and to other external reference material: literature, on web, Utube, physical resources, power point; how they should be used. Consideration needs to be given to local availability ○ guidance on any power point presentations, TLM or other resources which need to be developed to support learning • Tutors should be expected to have a plan for the next lesson for student teachers	3.2 Let tutors read the activities outlined in their course manuals and identify areas that require clarification. NB: *Refer to the Basic School Curriculum (BSC pp. xv – xvii) Identify challenging areas that require clarification, using GeoGebra to clarify the otherwise dark spots in "Rid motion".* 3.3 Lead tutors to brainstorm to come up with some pedagogical approaches and their related core competencies likely to be inculcated in students and for that matter Basic School learners. Example (a) Upper Primary/JHS (core) Strategy: Expository, Think pair Share, Discussion and Brainstorming Core Competencies: Problem solving, critical and creative thinking and communication. (b) JHS (Elective) Strategy: interactive and Collaborative group work, Discussion Core Competencies: Critical thinking skills, Collaborative learning and Problem-Solving Skills. 3.4 Ask tutors to explain some suggested teaching strategies	3.2 Read the activities outlined in your course manual and identify areas that require clarification. NB: *Refer to the Basic School Curriculum (BSC pp. xv – xvii) Identify challenging areas that require clarification, using GeoGebra to clarify the otherwise dark spots in "Rid motion".* 3.3 Brainstorm to come up with some pedagogical approaches and their related core competencies likely to be inculcated in students and for that matter Basic School learners. Example (a) Upper Primary/JHS (core) Strategy: Expository, Think pair Share, Discussion and Brainstorming Core Competencies: Problem solving, critical and creative thinking and communication. (b) JHS (Elective) Strategy: interactive and Collaborative group work, Discussion Core Competencies: Critical thinking skills, Collaborative learning and Problem-Solving Skills. 3.4 Suggest teaching strategies to be used in achieving the Los of the	

	that can help inculcate core competencies in student teachers and for that matter Basic School learners. *Example:* *Using (a) Group Work* Assign student teachers in groups to explore equivalent fractions– *Social and Leadership Skills (b)* collaborative group discussion on scale drawing– *Communication Skills and Critical Thinking* 3.5 Ask tutors to mention some GESI responsive resources that can be used with the suggested approaches and strategies in achieving the LOs. Example: *Resources may include supporting staff with experts in sign language as well as resources such teacher and learner resource packs, textbooks, course manual, projectors, flip charts, sticky notes, braille, tactile materials, audio and audio-visuals that can be used in the teaching and learning of the concepts mentioned above (NTS 3j)* 3.6 Using discussion, lead tutors to come out with assessment strategies ('as' and 'for') to be used during teaching of the lesson.	lesson and explain how they can help inculcate core competencies in student teachers and for that matter Basic School learners. *Example:* *Using (a) Group Work* Assign student teachers in groups to explore equivalent fractions– *Social and Leadership Skills (b)* collaborative group discussion on scale drawing– *Communication Skills and Critical Thinking* 3.5 Mention some GESI responsive resources that can be used with the suggested approaches and strategies in achieving the LOs. Example: *Resources may include supporting staff with experts in sign language as well as resources such teacher and learner resource packs, textbooks, course manual, projectors, flip charts, sticky notes, braille, tactile materials, audio and audio-visuals that can be used in the teaching and learning of the concepts mentioned above (NTS 3j)* 3.6 Discuss to come up with assessment strategies ("as and "for") to be used during the lesson.	

	NB: *Assessment must involve; the subject project and Subject Portfolio.* Examples of subject project and subject portfolio UP/JHS: subject project (class exercise): Arrange the following fractions in an ascending order $\frac{3}{5}, \frac{2}{3}, \frac{1}{5}\ and\ \frac{3}{7}$ (5 marks). Subject Portfolio: Project on using any five manipulatives to represent fractions as rational numbers, equivalent, and/or operator. (15 marks). JHS (Elective): Subject Project: (Assignment): State the involves in rotating object in 90^o (5 marks) Subject Portfolio: A project on using the google search to Find student. *NB: Assessment must be aligned to the NTEAP. Continuous assessment activities (assignments, quizzes, group presentations, etc, should be used to create subject projects and build subject portfolios (See, Appendix II)* 3.7 Ask each tutor to develop a sample of assessment item based on the LOs and share with the whole group.	*NB:* *Assessment must involve; the subject project and Subject Portfolio.* Examples of subject project and subject portfolio UP/JHS: subject project (class exercise): Arrange the following fractions in an ascending order $\frac{3}{5}, \frac{2}{3}, \frac{1}{5}\ and\ \frac{3}{7}$ (5 marks). Subject Portfolio: Project on using any five manipulatives to represent fractions as rational numbers, equivalent, and/or operator. (15 marks). JHS (Elective): Subject Project: (Assignment): State the involves in rotating object in 90^o (5 marks) Subject Portfolio: A project on using the google search to Find student. *NB: Assessment must be aligned to the NTEAP. Continuous assessment activities (assignments, quizzes, group presentations, etc, should be used to create subject projects and build subject portfolios (See, Appendix II)* 3.7 Develop a sample of assessment items based on the LOs and share with the whole group.	

	Example: Upper Primary and JHS (Core) Grades – Interview 6 basic school teachers during the STS activity to tell eight practical applications of fractions in the classroom *JHS Grade – In groups of three, use examples to differentiate rotational symmetry and orders of rotation* 3.8 Lead tutors to discuss the various ways they can support student teachers to build their subject portfolio. *E.g. encouraging student teachers to file all their assignments with feedback in their folders.* 3.9 Let a tutor model a presentation of an activity using Power point and making sure that both genders take leading roles in their groups and in the demonstration of the use of power point. Upper Primary/JHS(Core)- Developing conceptual understanding of multiplication and division of common and decimal fraction. *Examples:* $\frac{3}{7} \times \frac{1}{7} = \frac{3}{7}$ $\frac{1}{2} \div \frac{1}{6} = \frac{1}{2} \times \frac{6}{1} = 3$ JHS (Elective)- Teaching line and	*Example: Upper Primary and JHS (Core) Grades – Interview 6 basic school teachers during the STS activity to tell* eight practical applications of fractions in the classroom *JHS Grade – In groups of three, use examples to differentiate rotational symmetry and orders of rotation* 3.8 Discuss the various ways you can support student teachers to build their subject portfolio. *E.g. encouraging student teachers to file all their assignments with feedback in their folders.* 3.9 Model presentation of an activity using Power point and making sure that both genders take leading roles in their groups and in the demonstration of the use of power point. (NTS 1a, b, 2b, e, 3b, c, J; BSC pp. 23) Upper Primary/JHS(Core)- Developing conceptual understanding of multiplication and division of common and decimal fraction. *Examples:* $\frac{3}{7} \times 2 = \frac{6}{7}$ $\frac{1}{2} \div \frac{1}{6} = \frac{1}{2} \times \frac{6}{1} = 3$ JHS (Elective)- Teaching line and	

	rotational symmetry and orders of rotation (NTS 1a, b, 2b, e, 3b, c, J; BSC pp. 23 PD manual 21)	rotational symmetry and orders of rotation (NTS 1a, b, 2b, e, 3b, c, J; BSC pp. 23 PD manual 21*)*	
4. Evaluation and review of session: • Tutors should Identifying critical friends to observe lessons and report at next session. • Identifying and addressing any outstanding issues relating to the lesson/s for clarification	**Reflective Activity** 4.1 Engage tutors in self-evaluation as well as encourage tutors to provide feedback of the PD session taking into consideration inclusivity – how to be patient with Stutterers, using tactile and audio devices for visually challenged, paying attention to all courses, etc. Ask tutors to show by fingers/nods their level of satisfaction with the session. (NTS 1a, 3i). 4.2 Engage tutors to identify unresolved issues relating to this lesson for clarification *NB:* *Take note of all unresolved issues and use any of following strategies* – *put on SL/SWL WhatsApp platform for discussion* – *tutors to research for the next PD session for discussion*	**Reflective Activity** 4.1 Show by fingers/nods of 5 or 3 or 1 as to those who "really got it", "got some of it" or "didn't get it" respectively. Explain if you really got the lesson 4.2 Reflect on the activities in the session and outline unresolved issues relating to the lesson *NB:* *Take note of all unresolved issues and use any of following strategies* – *put on SL/SWL WhatsApp platform for discussion* – *tutors to research for the next PD session for discussion*	**15 mins**

	4.3 Ask a critical friend to observe your teaching and record his/her findings to be presented after delivery or in the Next PD session. NB: *Remind tutors to identify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a)* Advance Preparation 4.4 Ask tutors to read Lesson 4 of the Course Manual on: Upper Primary - Fraction Concepts 2: (Teaching and Assessment) JHS(Core) - Operations on fractions: (Teaching and Assessment) JHS(Elective) – Teaching Indices and logarithms1 *NB:* *Read the course manual, the PD session guide ahead of time to identify any outstanding issues relating to the lesson for clarification.* *Collect all-inclusive resources (such as projector, flip chart and sticky notes) you need ahead of time, prepare samples of TLMs you may need.*	4.3 Identify critical friend observes teaching and record his/her findings to be presented after delivery or in the Next PD session. NB: I*dentify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a)* Advance Preparation 4.4 Read Lesson 4 of the Course Manual on: Upper Primary - Fraction Concepts 2: (Teaching and Assessment) JHS(Core) - Operations on fractions: (Teaching and Assessment) JHS(Elective) – Teaching Indices and logarithms1 *NB:* *Read the course manual, the PD session guide ahead of time to identify any outstanding issues relating to the lesson for clarification.* *Collect all-inclusive resources (such as projector, flip chart and sticky notes) you need ahead of time, prepare samples of TLMs you may need.*	

Age Levels/s:	Name of Subject/s:
a. Upper Grade	a. Mathematics: Teaching and Assessing
b. JHS (Core)	b. Teaching and Assessing JHS Mathematics
c. JHS (Elective)	c. Mathematics

Tutor PD Session for Lesson 4 in the Course Manual

Lesson Title:

a. Upper Grade: Fraction Concepts 2: (Teaching and Assessment)
b. JHS (Core): Operations on fractions: (Teaching and Assessment)
c. JHS (Electives): Teaching Indices and logarithms1

Focus: the bullet points provide the frame for what is to be done in the session. The SWL should use the bullets to guide what they write for the SL/HoD and tutors to do and say during each session. Each bullet needs to be addressed and specific reference should be made to the course manual/s.	**Guidance notes on Leading the session. *What the SL/HoDs will have to say during each stage of the session***	**Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each stage of the session.**	**Time in session**
1. Introduction to the session • Review prior learning • Reading and discussion of the introductory sections of the lesson up to and including learning outcomes and indicators • Overview of content and identification of any distinctive aspects of the lesson/s,	**Introduction** 1.1 Ice breaker activity: Engage tutors in an investigational activity (e.g. Express the unshaded region as a fraction and in the exponent form).  1.2 Ask tutors to tell how useful the week 3 PD session (NTS 1b) influenced their	**Introduction** 1.1 Ice breaker: Express the fraction representing the unshaded in the exponent form).  1.2 Ask tutors to tell how useful the week 3 PD session (NTS 1b) influenced their	**20 mins**

NB: The guidance for SL/HoD should identify and address any areas where tutors might require clarification on any aspect of the lesson. NB: SL/HoD should ask tutors to plan for their teaching as they go through the PD session	teaching over the week. Lead them to provide examples of how students were prepared to employ the various strategies and skills during the basic school classroom work in STS Field Experience in year 4 semester 1 1.3 Ask a critical friend to share with members, observation made during the enactment of lesson 3. Upper Primary: Fraction Concept I (Teaching and Assessing) JHS (Core): UP: Fraction Concept I (Teaching and Assessing) JHS (Elective): Teaching Rigid Motion 1.4 Lead tutors to discuss any challenges that arose during the enactment. Eg In what ways did the students appreciate the need to consider equality and equity during the lesson and during STS activities? *NB:* ➢ *Remember to put members into groups according to the phases to be taught in the semester and contribute to the whole group discussion.* ➢ *Pay attention to all NTS references and salient points necessary for the*	teaching over the week. Lead them to Provide examples of how students were prepared to employ the various strategies and skills during the basic school classroom work in STS Field Experience in year 4 semester 1 1.3 As a critical friend, share with members, feedback on the observation you made during the enactment of lesson 3. UP: Fraction Concept I (Teaching and Assessing) JHS (Core): UP: Fraction Concept I (Teaching and Assessing) JHS (Elective): Teaching Rigid Motion 1.4 Discuss any challenges that arose during the enactment. Eg In what ways did the students appreciate the need to consider equality and equity during the lesson and during STS activities? *NB:* ➢ *Work in your phase group and contribute to the whole group discussion.* ➢ *Pay attention to all NTS references and salient points necessary for the development of your teaching plan.*	

	development of their teaching plan. 1.5 Ask tutors to silently read the introductory sections of lesson 4 in the course manual (including the learning outcomes-LOs). Let tutors suggest relevant previous knowledge of students that will support effective teaching and learning of the lesson. 1.6 Guide tutors to read the course manual and identify the purpose and state their expectations of the lesson 4 PD session on post-in cards and share with the whole group. NTS 2b 1.7 Ask tutors in phase groups to discuss the important or distinctive aspects of lesson 4 including vocabulary and fundamental concepts. *Distinctive aspects* *a. Upper Primary- Developing the concepts of and relationships among percent, ratio and proportion;* *Exploring basic applications of fractions, percent, ratio, and proportion to real life.* *b. JHS (core) – Mental strategies for adding,*	1.5 Silently read the introductory sections of lesson 4 in the course manual (including the LOs. Suggest relevant previous knowledge of students that will support effective teaching and learning of the lesson. 1.6 Read the course manual silently and identify the purpose of lesson 4 and state your expectations on post-in cards and share with the whole group. NTS 2b (NTS 2b). 1.7 Identify the important features of lesson 4 in the course manual taking note of cross cutting themes (including developing awareness of equity and diversity issues and issues on ICT). *Distinctive aspects* *a. Upper Primary- Developing the concepts of and relationships among percent, ratio and proportion;* *Exploring basic applications of fractions, percent, ratio, and proportion to real life.* *b. JHS (core) – Mental strategies for adding,*	

<table>
<tr>
<td></td>
<td>subtracting, multiplying and dividing by fractions; Basic applications of fractions to real life.
c. JHS (Elective) – Teaching powers of numbers; Teaching prime power factorization</td>
<td>subtracting, multiplying and dividing by fractions; Basic applications of fractions to real life.
c. JHS (Elective) – Teaching powers of numbers; Teaching prime power factorization</td>
<td></td>
</tr>
<tr>
<td>2. Concept Development (New learning likely to arise in lesson/s):
• Identification and discussion of new learning, potential barriers to learning for student teachers or students, concepts or pedagogy being introduced in the lesson, which need to be explored with the SL/HoD
NB: The guidance for SL/HoD should set out what they need to do to introduce and explain the issues/s with tutors</td>
<td>Concept Development

2.1 Ask tutors to identify familiar and unfamiliar concepts in their lessons and discuss with the larger group.
Examples:
<table>
<tr><th>Familiar Concepts</th><th>Unfamiliar concepts</th></tr>
<tr><td>The concept of fractions and percent</td><td>Application of ratio and proportion to real life</td></tr>
<tr><td>Mental strategies for adding and subtracting</td><td>Mental strategies for multiplying and dividing fractions</td></tr>
<tr><td>Powers of numbers</td><td>Prime power factorization</td></tr>
</table>
2.2 Lead tutors to draw connections among concepts in the various lessons in line with the basic school curriculum.
NB: Encourage tutors to give examples beyond the suggested ones.
Eg.
Upper Primary: Percentages and ratios are forms of fractions. A combination of 2 or more ratios gives a proportion
JHS (Core): Multiplication is repeated Addition</td>
<td>Concept Development

2.1 Identify familiar and unfamiliar concepts in your lesson and discuss with the larger group.
Examples:
<table>
<tr><th>Familiar Concepts</th><th>Unfamiliar concepts</th></tr>
<tr><td>The concept of fractions and percent</td><td>Application of ratio and proportion to real life</td></tr>
<tr><td>Mental strategies for adding and subtracting</td><td>Mental strategies for multiplying and dividing fractions</td></tr>
<tr><td>Prime power factorization</td><td>Powers of numbers,</td></tr>
</table>
2.2 In your phase group, draw connections among concepts in the lesson and in line with the basic school curriculum.</td>
<td>15 mins</td>
</tr>
</table>

	whereas division is repeated subtraction; Subtraction is the inverse of addition and vice versa whiles multiplication is the inverse of division and vice versa *JHS (ELECTIVE): Repeated multiplication of the same factor generates powers of numbers*		
	2.3 Ask tutors through Think-Pair-Share to outline possible challenging areas in teaching and assessing the lesson. *Example:* *Upper Primary: Clearing learners' misconceptions on ratios as two different numbers to develop the concept of ratio as a form of fraction.* *JHS (Core): Developing practical project for ratios and proportion.* *JHS (Elective): Developing real life application of powers of numbers*	2.3 Individually, outline the challenging areas in your lesson, share with a member of the same phase group and then with the whole group.	
	2.4 Lead tutors to discuss misconceptions and barriers in teaching and learning of the lesson. *Example:* *Upper Primary: – Ratio shows 2 distinct whole numbers; Ratio is not a fraction.* *b. JHS – Mental strategies do not support learning of the concept of multiplying and dividing by fractions*	2.4 In whole group, discuss misconceptions and barriers in teaching and learning of the lesson. *Example:* *Upper Primary: – Ratio shows 2 distinct whole numbers; Ratio is not a fraction.* *b. JHS – Mental strategies do not support learning of the concept of multiplying and dividing by fractions*	

	JHS (Electives): Repeated addition can be written in the exponent form. Barriers may include weak prior knowledge, lack of appropriate resources, lack of opportunity to use ICT due to failure of electric power (lights-out), bad/interrupted network, unavailability of internet bundle for students, inadequate contact time due to staff meetings.	*JHS (Electives): Repeated addition can be written in the exponent form. Barriers may include weak prior knowledge, lack of appropriate resources, lack of opportunity to use ICT due to failure of electric power (lights-out), bad/ interrupted network, unavailability of internet bundle for students, inadequate contact time due to staff meetings.*	
3. Planning for teaching, learning and assessment activities for the lesson/s • Reading and discussion of the teaching and learning activities • Noting and addressing areas where tutors may require clarification • Noting opportunities for making links to the Basic School Curriculum • Noting opportunities for integrating: GESI responsiveness and ICT and 21st C skills • Reading, discussion, and identification of continuous assessment opportunities in the lesson. Each lesson should include at least two opportunities to use	**Planning for Teaching and learning Activities for the Lesson** 3.1 Ask tutors in their phase groups to suggest teaching and learning activities for the lesson ensuring; i. Provision is made for SEN ii. Both genders take leading roles in group task iii. Even distribution of questions to different categories of learners based on gender, ability, previous experience, etc. referring to NTS 1a, b, c, d, 2b, e, f, 3b, c 3.2 Ask tutors to read the activities outlined in their course manuals and identify areas that require clarification. NB: *Refer to the Basic School Curriculum (BSC pp. xv – xvii) and http://uk.sagepub.com for explanations on "The*	**Planning for Teaching and learning activities** 3.1 In your phase group, suggest teaching and learning activities for teaching the lesson ensuring; i. Provision is made for SEN ii. Both genders take leading roles in group task, etc referring to NTS 1a, b, c, d, 2b, e, f, 3b, c 3.2 Read the activities outlined in your course manual and identify areas that require clarification. NB: *Refer to the Basic School Curriculum (BSC pp. xv – xvii) and http://uk.sagepub.com for explanations on "The*	**40 mins**

continuous assessment to support student teacher learning • Resources: ○ links to the existing PD Themes, for example, action research, questioning and to other external reference material: literature, on web, Utube, physical resources, power point; how they should be used. Consideration needs to be given to local availability ○ guidance on any power point presentations, TLM or other resources which need to be developed to support learning • Tutors should be expected to have a plan for the next lesson for student teachers	*concept and operations on fraction" and search through "IXL Math".* 3.3 Lead tutors to brainstorm some pedagogical approaches and their impact on learning of the concepts taking into consideration inclusivity. *Example:* *i) The use of inquiry to explore generalizations for powers of numbers.* *(ii) The use of differentiation and scaffolding to ensure that no learner is left behind (BSC pp. xv)* *iii) Being patient with stutterers, using tactile or braille for visually challenged, providing peer support for those who might need, while you pay attention to all Phases.* 3.4 Ask tutors to explain some suggested teaching strategies that can help inculcate core competencies in student teachers and for that matter Basic School learners. *Example.* *a)* <u>Pedagogical approaches:</u> *Group Work to explore the relationship among fractions, percentages, percentages, ratio and proportions –*	*concept and operations on fraction" and search through "IXL Math".* 3.3 Brainstorm some pedagogical approaches that can be employed during the lesson and their effectiveness towards learning of the concepts. Mention any GESI issues that need consideration while using those approaches 3.4 Suggest teaching strategies to be used in achieving the Los of the lesson and explain how they can help inculcate core competencies in student teachers and for that matter Basic School learners. *Example* *a)* <u>Pedagogical approaches:</u> *Group Work to explore the relationship among fractions, percentages, percentages, ratio and proportions –*	

	Associated 21st century skills: Social and Leadership Skills *b)* Pedagogical approaches: *Using investigation to identify generalizations on laws of indices* *Associated 21st century skills: Critical Thinking* *NB: Let tutors suggest more examples beyond those suggested above.* 3.5 Ask tutors to mention some GESI responsive resources that can be used with the suggested approaches and strategies in achieving the LOs. *Example* *Resources may include supporting staff with experts in sign language as well as resources such as teacher and learner resource packs, textbooks, course manual, projectors, flip charts, sticky notes, braille, tactile materials, audio and audio-visuals that can be used in the teaching and learning of the concepts mentioned above (NTS 3j)* 3.6 Lead tutors to discuss assessment strategies ('as' and 'for') to be used during teaching of the lesson. *NB: Continuous assessment activities (assignments, quizzes, group presentations, etc. should be used to create*	*Associated 21st century skills: Social and Leadership Skills* *b)* Pedagogical approaches: *Using investigation to identify generalizations on laws of indices* *Associated 21st century skills: Critical Thinking* *NB: Suggest more examples beyond those suggested above.* 3.5 Mention some GESI responsive resources that can be used with the suggested approaches and strategies in achieving the LOs. *Example* *Resources may include supporting staff with experts in sign language as well as resources such as teacher and learner resource packs, textbooks, etc* 3.6 Using discussion, lead tutors to come out with assessment strategies ('as' and 'for') to be used during teaching of the lesson. *NB: Continuous assessment activities (assignments, quizzes, group presentations, etc.*	

	subject projects and build subject portfolios). *Example: A project on how to teach to depict the relationship among fraction, decimal, ratio and percentages (UP).* *A project on investigation of the operations and applications on fraction, decimal, ratio and percentages to real life (JHS - Core)* *A project on developing an understanding of Prime power factorization to teach any (JHS – Elective)* *NB: Make reference to assessment in the course manual and NTEAP* 3.7 Ask each tutor to develop a sample of assessment item based on the LOs and share with the whole group. *Example:* *Upper Primary – Develop a game that can be used in teaching the concept of fractions* *JHS (Core) – Write a report on the steps you will use to teach operations on fractions* *JHS (Elective) – Interview 10 JHS teachers on how they introduce powers of numbers to learners.*	*should be used to create subject projects and build subject portfolios)*. *Example: A project on how to teach to depict the relationship among fraction, decimal, ratio and percentages (UP).* *A project on investigation of the operations and applications on fraction, decimal, ratio and percentages to real life (JHS - Core)* *A project on developing an understanding of Prime power factorization to teach any (JHS – Elective)* *NB: Make reference to assessment in the course manual and NTEAP* 3.7 Develop a sample of assessment items based on the LOs and share with the whole group. *Example:* *Upper Primary – Develop a game that can be used in teaching the concept of fractions* *JHS (Core) – Write a report on the steps you will use to teach operations on fractions* *JHS (Elective) – Interview 10 JHS teachers on how they introduce powers of numbers to learners.*	

	3.8 Lead tutors to discuss the various ways they can support student teachers to build their subject portfolio. *E.g. Encouraging student teachers to file all feedback on micro teaching in their folders.* 3.9 Ask a tutor to model a presentation of an activity using projector, internet search and taking into consideration equality and equity in assigning roles and in choosing material for teaching) NTS 1a, b, 2b, e, 3b, c, J; BSC pp. iii)	3.8 Discuss the various ways you can support student teachers to build their subject portfolio. *E.g. Encouraging student teachers to file all feedback on micro teaching in their folders.* 3.9 Prepare and model a presentation of an activity using projector, internet search and taking into consideration equality and equity in assigning roles and in choosing material for teaching) NTS 1a, b, 2b, e, 3b, c, J; BSC pp. iii)	
4. Evaluation and review of session: • Tutors need to identify critical friends to observe lessons and report at next session • Identifying and addressing any outstanding issues relating to the lesson/s for clarification	**Evaluation and review of session:** 4.1 Engage tutors in providing feedback of the PD session taking into consideration – Clarity of content, ICT integration, GESI, Twenty First Century Skills (NTS 1a, 3i, BSC pp. x-xvi) and make notes that will help them to teach Lesson 1 4.2 Engage tutors to identify unresolved issues relating to this lesson for clarification. *NB: Take note of all unresolved issues that may need further research*	**Evaluation and review of session:** 4.1 Reflect and provide feedback on this PD session taking into consideration – Clarity of content, pedagogical approaches employed, ICT integration, GESI, Twenty First Century Skills (NTS 1a, 3i, BSC pp. x-xvi)? and make notes that will help you to teach Lesson 1 4.2 Identify unresolved issues relating to this lesson for clarification. NB: *Put your unresolved issues unto* the department's *WhatsApp/*	**15 mins**

	or consultation and use any of following strategies to address them. *i. put on SL/SWL WhatsApp/ Telegram platform for discussion* *ii. tutors to research for the next PD session for discussion* 4.3 Ask tutors to identify a critical friend from the same or related discipline to observe the enactment of their lesson and provide feedback during the next PD Session (NTS 1a). Advance Preparation NB: Inform tutors to remember to prepare their teaching plan for Lesson 4 taking note of important or distinctive aspects of the lesson and crosscutting issues. Inform tutors to read Lesson 5 of the Course Manual on: Upper Primary - Micro Lessons and use of technology across Primary school numeracy: (Teaching and Assessing) JHS (Core) - Micro Lessons and use of technology across JHS numeracy: (Teaching and Assessing) JHS (Elective) – Concept of Sets: Learning, teaching and applying NB: *i. Read the course manual the PD session guide, the NTEAP, and the NTS*	*Telegram platform and research into the issues raised.* *i. put on SL/SWL WhatsApp/ Telegram platform for discussion* *ii. tutors to research for the next PD session for discussion* 4.3 Identify a critical friend from the same or related discipline to observe the enactment of your lesson and to provide feedback during the next PD Session (NTS 1a). Advance Preparation NB: Remember to prepare their teaching plan for Lesson 4 taking note of important or distinctive aspects of the lesson and crosscutting issues. Inform tutors to read Lesson 5 of the Course Manual on: Upper Primary - Micro Lessons and use of technology across Primary school numeracy: (Teaching and Assessing) JHS (Core) - Micro Lessons and use of technology across JHS numeracy: (Teaching and Assessing) JHS (Elective) – Concept of Sets: Learning, teaching and applying NB: *i. Read the course manual the PD session guide, the NTEAP, and the NTS ahead*	

	ahead of time to identify any outstanding issues relating to the lesson for clarification. *ii. Collect all-inclusive 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*	*of time to identify any outstanding issues relating to the lesson for clarification.* *ii. Collect all-inclusive 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*	

Age Levels/s:	Name of Subject/s:
a. Upper Primary	a. Mathematics: Teaching and Assessing
b. JHS (Core)	b. Teaching and Assessing JHS Mathematics
c. JHS (Elective)	c. Mathematics

Tutor PD Session for Lesson 5 in the Course Manual

Lesson Tittle:

a. Upper Primary: Micro Lessons and u se of technology across Primary school numeracy: (Teaching and Assessing).

b. JHS (CORE) - Micro Lessons and use of technology across JHS numeracy: (Teaching and Assessing).

c. JHS (Elective) - Learning, teaching and applying Indices and Logarithm

Focus: the bullet points provide the frame for what is to be done in the session. The SWL should use the bullets to guide what they write for the SL/HoD and tutors to do and say during each session. Each bullet needs to be addressed and specific reference should be made to the course manual/s.	**Guidance notes on Leading the session. *What the SL/HoDs will have to say during each stage of the session***	**Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each stage of the session.**	**Time in session**
1. Introduction to the session • Review prior learning • A critical friend to share findings for a short discussion and lessons learned • Reading and discussion of the introductory sections of the lesson up to and including learning outcomes and indicators	**Introduction** 1.1 Ice breaker activity: Ask tutors to share any experience they have had with a mathematics teacher during their early school days which has influences their perception of the subject. 1.2 Ask tutors to tell how useful the lesson 4 of the PD session was and how it influenced their	**Introduction** 1.1 Share your experience you have had with a mathematics teacher during your early school days which has influences your perception of the subject. 1.2 Tell how useful the previous PD session was and how it influenced your	**20 mins**

• Overview of content and identification of any distinctive aspects of the lesson/s, NB: The guidance for SL/HoD should identify and address any areas where tutors might require clarification on any aspect of the lesson. NB: SL/HoD should ask tutors to plan for their teaching as they go through the PD session	teaching over the week. Lead them to provide examples of how students were prepared to employ the various strategies and skills during the basic school classroom work in STS Field Experience in year 4 semester 1 NB: *Draw tutors' attention to all NTS references and salient points necessary for the development of their proforma.* 1.3 Ask the critical friend to give feedback on his/her observation of the last enacted lesson laying emphasis on clarity of concepts explained, assessment strategies, ICT integration, GESI, Twenty First Century Skills. 1.4 Lead tutors to discuss any challenges that arose during the enactment. For example, how do explanations obtained by students through Internet research complicate the comprehension of concepts? 1.5 Ask the tutors to read individually and discuss the introduction sections of the lesson in pairs	teaching over the week. Provide examples of how students were prepared to employ the various strategies and skills during the basic school classroom work in STS Field Experience in year 4 semester 1 NB: *Pay attention to NTS references and salient points necessary for the development of your proforma.* 1.3 As a critical friend, describe how the previous lesson observed went laying emphasis on clarity of concepts explained, assessment strategies, ICT integration, GESI, Twenty First Century Skills. 1.4 Discuss any challenges encountered during enactment. 1.5 Read one-on-one and discuss the introductory sections of the lesson up to the learning outcomes.	

	through to the learning outcomes. 1.6 Lead tutors in pairs to discuss the distinctive aspects of Lesson 5 such as fundamental concepts and awareness of equity and diversity issues and issues in ICT. *Distinctive aspects include the interactive nature of the activities, emphasizing connection concepts:* *a. Upper Primary: eg. classroom assessment resources and evaluation and recording, interpretation of performance data and reports.* *b. JHS (Core) – eg. Plan and design micro lessons.* *c. JHS (Elective) – eg. Logarithms and its properties.* NB *1. Be ready to answer tutor questions for clarification.* *Anticipated questions:* *i. How will TLM be used to teach indices and logarithms?* *ii. What are the likely RPK's for solving logarithms?* *2. Guide tutors to discuss the possible responses to the anticipated questions, bearing in mind pedagogy, mixed paired, ICT*	1.6 In pairs, discuss the distinctive features of Lesson 5, such as fundamental concepts and awareness of equity and diversity issues and ICT issues. *Distinctive aspects include the interactive nature of the activities, emphasizing connection concepts:* *a. Upper Primary: eg. classroom assessment resources and evaluation and recording, interpretation of performance data and reports.* *b. JHS (Core) – eg. Plan and design micro lessons.* *c. JHS (Elective) – eg. Logarithms and its properties.*	

<table>
<tr>
<td>2. Concept Development (New learning likely to arise in lesson/s):
• Identification and discussion of new learning, potential barriers to learning for student teachers or students, concepts or pedagogy being introduced in the lesson, which need to be explored with the SL/HoD
NB The guidance for SL/HoD should set out what they need to do to introduce and explain the issues/s with tutors</td>
<td>Concept Development

2.1 Lead tutors in their phase group to identify familiar and unfamiliar concepts in their lessons and discuss with the larger group.
<table>
<tr><td>Familiar Concepts</td><td>Unfamiliar concepts</td></tr>
<tr><td>Micro lesson, collecting and interpreting data, Logarithms</td><td>Converting indices into logarithms</td></tr>
<tr><td>Indices,</td><td></td></tr>
</table>
2.2 Ask tutors to make connections between the concepts of the various lessons in accordance with the Basic School Curriculum (BSC).
Example: Upper Primary/JHS core – Activity on assessment procedures. JHS (Elective) – Linking indices in JHS to logarithm expressions.

2.3 Using Think-Pair-Share ask tutors to outline possible challenging areas in teaching and assessing the lesson.

Example:
Giving examples of application of logarithm to real life.

2.4 Lead tutors to discuss misconceptions and</td>
<td>Concept Development

2.1 In your phase group identify familiar and unfamiliar concepts in your lessons and discuss with the larger group.

2.2 In your phase groups, make connections between the lesson concepts and in accordance with the Basic School Curriculum.

2.3 Individually, describe the difficult points of your lesson, share them with one member of the same phase group and then with the entire group.
Example:
Giving examples of application of logarithm to real life.

2.4 Discuss the misconceptions and</td>
<td>15 mins</td>
</tr>
</table>

	barriers to teaching and learning of the lesson. *Example:* *a. Upper Prim & JHS (Core) Grade: – relating theory to practical by applying teaching pedagogy.* *b. JHS (Elective) – Logarithm and indices are not related.* Barriers: *Insufficient basic knowledge of indices in SHS. Lack of appropriate resources, lack of opportunity to use ICT due to failure of electric power (lights-out), bad/weak network, unavailability of internet bundle for students and emergency academic staff meetings.*	barriers to teaching and learning this lesson.	
3. Planning for teaching, learning and assessment activities for the lesson/s • Reading and discussion of the teaching and learning activities • Noting and addressing areas where tutors may require clarification • Noting opportunities for making links to the Basic School Curriculum • Noting opportunities for integrating: GESI responsiveness and ICT and 21st C skills	**Planning for teaching, learning and assessment activities** 3.1 In their phase groups, ask tutors to suggest teaching and learning activities for the lesson ensuring; i. equal opportunity is given to persons with SEN to ask and answer questions in Class. ii. both genders take leading roles in group task. iii. even distribution of questions to different categories of learners based on gender, ability, previous experience, etc. iv. constructing verbal feedback is to both	**Planning for teaching, learning and assessment activities** 3.1 Suggest teaching and learning activities in your phase groups to teach the lesson ensuring; i. equal opportunity is given to persons with SEN to ask and answer questions in Class. ii. both genders take leading roles in group task. iii. even distribution of questions to different categories of learners based on gender, ability, previous experience, etc. iv. constructing verbal feedback is to both	**40 mins**

• Reading, discussion, and identification of continuous assessment opportunities in the lesson. Each lesson should include at least two opportunities to use continuous assessment to support student teacher learning • Resources: ○ links to the existing PD Themes, for example, action research, questioning and to other external reference material: literature, on web, Utube, physical resources, power point; how they should be used. Consideration needs to be given to local availability ○ guidance on any power point presentations, TLM or other resources which need to be developed to support learning • Tutors should be expected to have a plan for the next	females and males in class, referring to NTS 1a, b, c, d, 2b, e, f, 3b, c. 3.2 Ask tutors to read the activities outlined in their course manuals and identify areas that require clarification. NB: *Refer to https://www.21caf.org and* https://www.researchgate.net *for explanations on "Connections between the theoretical perspectives and learning of mathematics" and search through https://www.mathsisfun.com to clarify the otherwise dark spots in "logarithms ".* 3.3 Lead tutors to brainstorm to come up with some pedagogical approaches and their impact on learning of the concepts taking into consideration inclusivity. *Example: i) The use of inquiry to explore Connections between the theoretical perspectives and learning of mathematics.* *(ii) The use of differentiation and scaffolding to ensure that no learner is left behind (SBC pp. xv)*	females and males in class, referring to NTS 1a, b, c, d, 2b, e, f, 3b, c. 3.2 Read the activities outlined in your course manuals and identify areas that require clarification. NB: *Refer to https://www.21caf.org &* https://www.researchgate.net *for explanations on "Connections between the theoretical perspectives and learning of mathematics" and search through https://www.mathsisfun.com to clarify the otherwise dark spots in "Quadratic Equations". dark spots in "Logarithms".* 3.3 Brainstorm to come up with some pedagogical approaches that can be employed during the lesson and their effectiveness towards learning of the concepts. Mention any GESI issues that need consideration while using those approaches. *Example: i) The use of inquiry to explore Connections between the theoretical perspectives and learning of mathematics.* *(ii) The use of differentiation and scaffolding to ensure that no learner is left behind (SBC pp. xv)*	

lesson for student teachers	*Engage students in meaningful "hands-on" activities to explore logarithm equation.* *iii) Being patient with stutterers, using tactile or braille for persons with low/no vision, providing peer support for those who might need, while you pay attention to all phases, marginalized learners are encouraged to work with peers, speak to make learners with hearing difficulty to read their lips, teaching and learning resources are devoid of gender biases, etc.* 3.4 Ask tutors to explain some suggested teaching strategies that can help inculcate core competencies in student teachers and for that matter Basic School learners. *Example: Using* *a) Internet Search in their group to identify the Connections between the theoretical perspectives and learning of Mathematics – use of Digital Literacy Skills, Leadership Skills. Collaborative Skills,* *b) Exploring Logarithm by graphing – Critical Thinking, Problem Solving* 3.5 Ask tutors to mention some GESI responsive resources that can be used with the	*Engage students in meaningful "hands-on" activities to explore logarithm equation.* *iii) Being patient with stutterers, using tactile or braille for persons with low/no vision, providing peer support for those who might need, while you pay attention to all phases, marginalized learners are encouraged to work with peers, speak to make learners with hearing difficulty to read their lips, teaching and learning resources are devoid of gender biases, etc.* 3.4 Suggest teaching strategies to be used in achieving the LOs of the lesson and explain how they can help inculcate core competencies in student teachers and for that matter Basic School learners. 3.5 Mention some GESI responsive resources that can be used with the suggested	

	suggested approaches and strategies in achieving the LOs. Example: *Resources may include supporting staff with experts in sign language as well as resources such teacher and learner resource packs, textbooks, course manual, projectors, flip charts, sticky notes, braille, tactile materials, audio and audio-visuals that can be used in the teaching and learning of the concepts mentioned above (NTS 3j)* 3.6 Using discussion, lead tutors to come out with assessment strategies ('as' and 'for') to be used during teaching of the lesson. *NB: Continuous assessment activities (assignments, quizzes, group presentations, etc. should be used to create subject projects and build subject portfolios).* *E.g. Project on how to plan, design, and prepare manipulatives and other models to teach selected concepts in Primary School/JHS mathematics using locally available and/or IT resources* *• Prepare and model interactive, and innovative ways of teaching mathematics, including, micro-teaching to Primary School/JHS learners, with*	approaches and strategies in achieving the LOs. Example: *Resources may include supporting staff with experts in sign language as well as resources such teacher and learner resource packs, textbooks, etc* 3.6 Using discussion, lead tutors to come out with assessment strategies ('as' and 'for') to be used during teaching of the lesson. *NB: Continuous assessment activities (assignments, quizzes, group presentations, etc. should be used to create subject projects and build subject portfolios).* *E.g. Project on how to plan, design, and prepare manipulatives and other models to teach selected concepts in Primary School/JHS mathematics using locally available and/or IT resources* *• Prepare and model interactive, and innovative ways of teaching mathematics, including, micro-teaching to Primary School/JHS learners, with*	

	emphasis on multiple teaching strategies that promote equity and inclusivity. (UP and JHS Core) *A project on investigation of logarithm application (JHS Elective).* *Make reference to assessment in the course manual and NTEAP* 3.7 Ask each tutor to develop a sample of assessment item based on the LOs and share with the whole group. *Example:* *Upper Primary and JHS (Core): Interview at least 5 basic school teachers during the STS activity on which theory support their philosophy of teaching.* *JHS Elective: In groups of four, draw three different logarithms graphs and write a report on the difference and similarities in the graphs.* 3.8 Lead tutors to discuss the various ways they can support student teachers to build their subject portfolio. *Example: Encouraging student teachers to i) file all their assignments with feedback in their folders.* *ii. file all reports and presentation.*	*emphasis on multiple teaching strategies that promote equity and inclusivity. (UP)* *Make reference to assessment in the course manual and NTEAP* 3.7 Develop a sample of assessment items based on the LOs and share with the whole group. *Example:* *Upper Primary and JHS (Core): Interview at least 5 basic school teachers during the STS activity on which theory support their philosophy of teaching.* *JHS Elective: In groups of four, draw three different logarithms graphs and write a report on the difference and similarities in the graphs.* 3.8 Discuss the various ways you can support student teachers to build their subject portfolio. *Example: Encouraging student teachers to i) file all their assignments with feedback in their folders.* *ii. file all reports and presentation.*	

	3.9 Ask a tutor to model a presentation of an activity using projector, internet search and ensuring both genders take leading roles in the groups, teaching and learning resources are devoid of gender biases, persons with physical challenged is called to work examples, give equal access to teaching and learning resources, etc. NTS 1a, b, 2b, e, 3b, c, J; BSC pp. iii)	3.9 Prepare and model a presentation of an activity using projector, internet search and ensuring both genders take leading roles in the groups, teaching and learning resources are devoid of gender biases, persons with physical challenged is called to work examples. NTS 1a, b, 2b, e, 3b, c, J; BSC pp. iii)	
4. Evaluation and review of session: • Tutors should Identifying critical friends to observe lessons and report at next session • Identifying and addressing any outstanding issues relating to the lesson/s for clarification	**Evaluation and review of session** 4.1 Engage tutors in providing feedback of the PD session taking into consideration – Clarity of content, ICT integration, GESI, Twenty First Century Skills (NTS 1a, 3i, BSC pp. x-xvi) and make notes that will help them to teach Lesson 5 4.2 Engage tutors to identify unresolved issues relating to this lesson for clarification. *NB: Take note of all unresolved issues that may need further research or consultation and use any of following strategies to address them.*	**Evaluation and review of session** 4.1 Reflect and provide feedback on this PD session taking into consideration – Clarity of content, pedagogical approaches employed, ICT integration, GESI, Twenty First Century Skills (NTS 1a, 3i, BSC pp. x-xvi)? and make notes that will help you to teach Lesson 5 4.2 Identify unresolved issues relating to this lesson for clarification. *NB*: *Put your unresolved issues unto* the *department's WhatsApp/ Telegram platform and research into the issues raised.*	**15 mins**

	i. put on SL/SWL WhatsApp/ Telegram platform for discussion *ii. tutors to research for the next PD session for discussion* 4.3 Ask tutors to identify a critical friend from the same or related discipline to observe the enactment of their lesson and provide feedback during the next PD Session (NTS 1a). Advance Preparation 4.4 Ask tutors to remember to prepare teaching plan for Lesson 5 taking note of important or distinctive aspects of the lesson and crosscutting issues and read Lesson 6 of the Course Manual on: Upper Primary - Diagnosis and remediation; assessment resources/records, and monitoring progress: (Teaching and Assessing. JHS(Core): Diagnosis and remediation; assessment resources/records, and monitoring progress: (Teaching and Assessing). JHS (Elective.): Teaching handling data. NB: *i. Read the course manual and the PD session guide ahead of time to identify*	4.3 Identify a critical friend from the same or related discipline to observe the enactment of your lesson and to provide feedback during the next PD Session (NTS 1a). Advance Preparation 4.4 Remember to prepare teaching plan for the lesson 5 taking note of important or distinctive aspects of the lesson and crosscutting issues and read Lesson 6 of the Course Manual on: Upper Primary - Diagnosis and remediation; assessment resources and monitoring progress: (Teaching and Assessing. JHS (Core): Diagnosis and remediation; assessment resources and monitoring progress: (Teaching and Assessing). JHS (Elective): Teaching Handling Data. NB: *Read the course manual and the PD session guide ahead of time*	

	any outstanding issues relating to the lesson for clarification. *ii. Collect all-inclusive 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*		

Age Levels/s:	Name of Subject/s:
a. Upper Grade	a. Mathematics: Teaching and Assessing
b. JHS (Core)	b. Teaching and Assessing JHS Mathematics
c. JHS (Elective)	c. Mathematics

Tutor PD Session for Lesson 6 in the Course Manual

Lesson Title:

a. Upper Grade - Diagnosis and remediation; assessment resources/records, and monitoring progress: (Teaching and Assessing)
b. JHS (Core) - Diagnosis and remediation; assessment resources/records, and monitoring progress: (Teaching and Assessing)
c. JHS(Specialism) - Teaching Handling Data:

Focus: the bullet points provide the frame for what is to be done in the session. The SWL should use the bullets to guide what they write for the SL/HoD and tutors to do and say during each session. Each bullet needs to be addressed and specific reference should be made to the course manual/s.	**Guidance notes on Leading the session. *What the SL/HoDs will have to say during each stage of the session***	**Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each stage of the session.**	**Time in session**
1. Introduction to the session • Review prior learning • Reading and discussion of the introductory sections of the lesson up to and including learning outcomes and indicators • Overview of content and identification of any distinctive aspects of the lesson/s,	**Introduction to the session** 1.1 Icebreaker activity: Begin with an investigational activity according to the subjects and age phases. Eg i. Ask tutors to mention the best food or ages or shoes size, . . . 1.2 Ask tutors to tell how useful the previous PD session was and how it	**Introduction to the session** 1.1 Ice breaker activity: Begin with an investigational activity according to the subjects and age phases Eg. Mention: i. the food you like best ii. your ages iii. your shoes size 1.2 Discuss how useful the previous PD session influenced your	**20 mins**

NB The guidance for SL/HoD should identify and address any areas where tutors might require clarification on any aspect of the lesson. NB SL/HoD should ask tutors to plan for their teaching as they go through the PD session	influenced their teaching in lesson 5. Lead them to provide examples of how students were prepared to employ the various strategies and skills during the basic school classroom work in STS Field Experience in year 4 semester 1 1.3 Lead tutors to discuss the overview of the subject age phases to be covered in this PD session and how it will be organised. *i. Upper grade and JHS (Core) lessons focus on children understand & develop mathematical concept which will be applied in micro lessons planning and teaching and the use of technology across primary & JHS school numeracy and associated theories as well as psychological factors influencing learning.* *ii. JHS (Elective) lesson seeks to develop student teachers' conceptual understanding of handling data in the JHS mathematics curriculum* 1.4 Ask a critical friend to give feedback on observation during the enactment of lesson 6.	teaching over the week. Provide examples of how students were prepared to employ the various strategies and skills during the basic school classroom work in STS Field Experience in year 4 semester 1 1.3 Discuss the overview of the subject age phases to be covered in this PD session and how it will be organised. 1.4 Participate in the critiquing of the feedback on observation during the enactment of lesson 6.	

	1.5 Ask tutors to suggest the purpose of the lesson and state their expectations of the PD Session. 1.6 Guide tutors to establish the linkage between CLOs and the LOs of the lesson for each of the Phases. 1.7 Ask tutors in phase groups to discuss the important or distinctive aspects of the lesson including vocabulary and fundamental concepts. *Distinctive aspects include the interactive nature of the activities, emphasis on connecting concepts:* *a. Upper Prim & JHS (Core) Grade: – eg.* *Investigation on theories and theoretical principles that are relevant to the learning and teaching of mathematics.* *b. JHS (Elective): – eg. The exploration of different ways of understanding of relevant theories and principles of learning and their implications for teaching data handling.* *Be ready for likely questions from tutors for clarification.* *Anticipated questions:* *i. Is it not enough for students to mentally*	1.5 Engage tutors to suggest the purpose of the lesson and state your expectations of the PD Session. 1.6 Participate in the linkage of the CLOs and the LOs of the lesson for each of the phases. 1.7 In pairs discuss the distinctive aspects of the lesson including vocabulary and fundamental concepts related to the components of the front matters.	

<table>
<tr>
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<td>count and readily identify them?
ii. Should students memorise formula or learn how to apply formula?
iii. Why do we have to worry students with algebraic expression in data handling?

N/B: Guide tutors to discuss the possible answers to the anticipated questions, bearing in mind pedagogy, GESI, ICT – E.g. the most appropriate methods depend on age and previous knowledge of learners, objective of lesson.</td>
<td></td>
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<tr>
<td>2. Concept Development (New learning likely to arise in lesson/s):
• Identification and discussion of new learning, potential barriers to learning for student teachers or students, concepts or pedagogy being introduced in the lesson, which need to be explored with the SL/HoD
NB The guidance for SL/HoD should set out what they need to do to introduce and explain the issues/s with tutors</td>
<td>Concept Development (New learning likely to arise in lesson/s)

2.1 Ask tutors to identify familiar and unfamiliar concepts in the lesson and discuss with the larger group.

<table><tr><td>Familiar Concept</td><td>Unfamiliar Concept</td></tr><tr><td>central tendency</td><td></td></tr><tr><td>descriptive</td><td></td></tr><tr><td>variables</td><td></td></tr></table>
2.2 Lead tutors to draw connections among concepts in the various lessons in line with the basic school curriculum.</td>
<td>Concept Development (New learning likely to arise in lesson/s)

2.1 Participate in the identification of familiar and unfamiliar concepts in the lesson and discuss with the larger group.

<table><tr><td>Familiar Concept</td><td>Unfamiliar Concept</td></tr><tr><td>coding</td><td></td></tr><tr><td>descriptive</td><td></td></tr><tr><td>variables</td><td></td></tr></table>
2.2 Draw connections among concepts in the various lessons in line with the basic school curriculum.</td>
<td>15 mins</td>
</tr>
</table>

	Example: *Upper Prim & JHS (Core) Grade:* *Connecting logical and psychological approaches to learning mathematics in understanding mathematical theories and concept; Ability to count verbally; Recognizing numerals; Understanding one-to-one correspondence.* (PD Theme 3) *JHS(Elective): establish and analyse the relationship between the concepts; handling data and how this can be used to plan a micro lesson based on similar concepts.* 2.3 Ask tutors to use Think-Pair-Share to outline possible challenging areas in teaching and assessing of: *a. Upper Prim & JHS (Core) Grade:* theoretical principles that explains children's learning of mathematics *b. JHS (Elective)* application of central tendency in real life. N/B Eg. *The use of differentiated instruction to cater for the needs of all children in the early and upper grade and JHS classrooms, including*	Example: *Upper Prim & JHS (Core) Grade: Connecting logical and psychological approaches to learning mathematics in understanding mathematical theories and concept; Ability to count verbally; Recognizing numerals; Understanding one-to-one correspondence.* (PD Theme 3) *JHS (Elective): establish and analyse the relationship between the concepts; handling data and how this can be used to plan a micro lesson based on similar concepts.* 2.3 Individually, outline the challenging areas in your lesson, share with a member of the same phase group and then with the whole group. *a. Upper Prim & JHS (Core) Grade:* theoretical principles that explains children's learning of mathematics. *b. JHS (Elective)* application of central tendency in real life.	

	those with special educational needs (SEN) and creating a safe, secure environment to stimulate learning (NTS 3c 3f, pg. 14). 2.4 Lead tutors to discuss misconceptions and barriers in teaching and learning of the lesson. *Example:* *Misconceptions* *a. Upper Prim & JHS (Core) Grade: Some mathematics topics are not related to real life.* *b. JHS (Elective): the use of bar graph for continuous data representation instead of discrete data.* *Barriers* *Barriers may include weak prior knowledge, lack of appropriate resources, lack of opportunity to use ICT due to failure of electric power (lights-out), bad/weak network, unavailability of internet bundle for students, inadequate contact time due to staff meetings, Different entry behaviours, Socio-cultural issues, different learning needs, misconceptions about the lesson*	2.4 Discuss the misconceptions and barriers in teaching and learning of the lesson. *Example:* *Misconceptions* *a. Upper Prim & JHS (Core) Grade: Some mathematics topics are not related to real life.* *b. JHS (Elective): the use of bar graph for continuous data representation instead of discrete data.* *Barriers* *Barriers may include weak prior knowledge, lack of appropriate resources, lack of opportunity to use ICT due to failure of electric power (lights-out), bad/weak network, unavailability of internet bundle for students, inadequate contact time due to staff meetings, Different entry behaviours, Socio-cultural issues, different learning needs, misconceptions about the lesson*	

3. Planning for teaching, learning and assessment activities for the lesson/s • Reading and discussion of the teaching and learning activities • Noting and addressing areas where tutors may require clarification • Noting opportunities for making links to the Basic School Curriculum • Noting opportunities for integrating: GESI responsiveness and ICT and 21st C skills • Reading, discussion, and identification of continuous assessment opportunities in the lesson. Each lesson should include at least two opportunities to use continuous assessment to support student teacher learning • Resources: o links to the existing PD Themes, for example, action research, questioning and to other external reference material: literature, on	**Planning for teaching, learning and assessment activities for the lesson/s** 3.1 In their phase groups, ask tutors to suggest teaching and learning activities for the lesson. i. Provision is made for physically challenged persons and persons with other forms of disability ii. Both genders take leading roles in group task iii. Even distribution of questions to different categories of learners based on gender, ability, previous experience, etc. referring to NTS 1a, b, c, d, 2b, e, f, 3b, c. 3.2 Ask tutors to go through the lesson in the course manual and identify areas that require clarification. *Eg.* *Strategies to clarify the otherwise dark spots may include investigation, internet search, etc.* 3.3 Ask tutors to brainstorm and explain how a. theoretical perspectives and principles of learning are relevant to children's learning b. relates handling data to real life problem for improvement learners understanding of the central tendency. Refer	**Planning for teaching, learning and assessment activities for the lesson/s** 3.1 Suggest teaching and learning activities for the lesson. 3.2 Read the activities outlined in your course manual and identify areas that require clarification. 3.3 Brainstorm and explain how a. theoretical perspectives and principles of learning that are relevant to children's learning. b. relates handling data to real life problem for improvement learners understanding of the central tendency. Refer	

web, Utube, physical resources, power point; how they should be used. Consideration needs to be given to local availability ○ guidance on any power point presentations, TLM or other resources which need to be developed to support learning • Tutors should be expected to have a plan for the next lesson for student teachers	to Basic School Curriculum (BSC pp. 93 – 97; 171-173). 3.4 Lead tutors to come up with some pedagogical approaches and their related core competencies likely to be inculcated in students and for that matter Basic School learners. eg. (a) UP/JHS (core): Strategy: Expository, inquiry and Discussion: to explore the effectiveness of children's learning of mathematics through games and understanding size, shape and patterns. Core Competencies: problem formulation and identification, problem solving, critical and creative thinking and communication (b) JHS Elective Strategy: interactive and collaborative group work (with the aid of ICT tools and other manipulatives to collect and analyse data. Core Competencies: critical thinking and problem-solving skills, digital literacy, communication and collaboration, and creativity & innovation. 3.5 Ask tutors to mention some GESI responsive	to Basic School Curriculum (BSC pp. 93 – 97; 171-173). 3.4 Suggest some pedagogical approaches and their related core competencies likely to be inculcated in students and for that matter Basic School learners. 3.5 Mention some GESI responsive resources	

	resources that can be used with the suggested approaches and strategies in achieving the LOs. E.g. *Resources may include supporting staff with experts in sign language as well as resources such teacher and learner resource packs, textbooks, course manual, prisms, pyramids, projectors, flip charts, sticky notes, braille, tactile materials, audio and audio-visuals that can be used in the teaching and learning of the concepts mentioned above (NTS 3j)* 3.6 Ask tutors to identify and discuss Continuous Assessment for the lesson to support student teacher learning (NTS 3k). *NB:* *Assessment must be aligned to the NTEAP and required course* *Assessment to include subject project, subject portfolio and end of semester examination* Example: Upper Primary and JHS (Core) Grades: Interview about 8 basic school teachers during the STS activity on mathematics that basic school learners are exposed to a) at home & b) during play. JHS (Elective): In groups of four, develop any game	that can be used with the suggested approaches and strategies in achieving the LOs. *E.g Resources may include supporting staff with experts in sign language as well as resources such teacher and learner resource packs, textbooks, etc* 3.6 Identify and discuss continues assessment strategies for the lesson to support student teacher learning (NTS 3k). Example: Upper Primary and JHS (Core) Grades: Interview about 8 basic school teachers during the STS activity on mathematics that basic school learners are exposed to a) at home & b) during play. JHS (Elective): In groups of four, develop any game	

	for teaching any concept within your course outline. 3.7 Lead tutors to discuss the various ways they can support student teachers to build their subject portfolio. *E.g. encouraging student teachers to file all their assignments with feedback, presentation, reports in their folders.* *Taking notes in class and filing them.* 3.8 Ask a tutor to model a presentation of an activity using projector, internet search and taking into consideration GESI issues (eg. Both gender taking the leading roles in their groups) NTS 1a, b, 2b, e, 3b, c, J; BSC pp. iii	for teaching any concept within your course outline. 3.7 Discuss the various ways you can support student teachers to build their subject portfolio. *E.g. encouraging student teachers to file all their assignments with feedback, presentation, reports, in their folders.* 3.8 Model a presentation of an activity using projector, internet search and taking into consideration GESI issues (eg. Both gender taking the leading roles in their groups) NTS 1a, b, 2b, e, 3b, c, J; BSC pp. iii	
4. Evaluation and review of session: • Tutors need to identify critical friends to observe lessons and report at next session • Identifying and addressing any outstanding issues relating to the lesson/s for clarification	**Evaluation and review of session:** 4.1 Engage tutors in providing feedback of the PD session taking into consideration – Clarity of concepts, ICT integration, GESI, Twenty First Century Skills (NTS 1a, 3i, BSC pp. x-xvi) and make notes that will help them to teach Lesson 7	**Evaluation and review of session:** 4.1 Reflect and provide feedback on this PD session taking into consideration – Clarity of concepts, pedagogical approaches employed, ICT integration, GESI, Twenty First Century Skills (NTS 1a, 3i, BSC pp. x-xvi)? and make notes that will help you to teach Lesson 7	**15 mins**

	4.2 Engage tutors to identify unresolved issues relating to this lesson for clarification. *N/B: Take note of all unresolved issues that may need further research or consultation and use any of following strategies to address them.* *i. put on SL/SWL WhatsApp platform for discussion* *ii. tutors to research for the next PD session for discussion* 4.3 Ask tutors to identify a critical friend from the same or related discipline to observe the enactment of their lesson and provide feedback during the next PD Session (NTS 1a). Advance Preparation 4.4 Ask tutors to remember to prepare proforma for Lesson 7 taking note of important or distinctive aspects of the lesson and crosscutting issues and read Lesson 7 of the Course Manual on: Upper Primary: Shape and Space: (Teaching and Assessment) JHS(Core): Shape, Space and Measurement: (Teaching and Assessment) JHS(Elective):	4.2 Identify unresolved issues relating to this lesson for clarification. N/B: *Put your unresolved issues unto* the department's *WhatsApp/ Telegram platform and research into the issues raised.* 4.3 Identify a critical friend from the same or related discipline to observe the enactment of your lesson and to provide feedback during the next PD Session (NTS 1a). Advance Preparation 4.4 Remember to prepare proforma for the Lesson 7 taking note of important or distinctive aspects of the lesson and crosscutting issues and read Lesson 7 of the Course Manual on: Upper Primary: Shape and Space: (Teaching and Assessment) JHS(Core): Shape, Space and Measurement: (Teaching and Assessment) JHS(Elective):	

	Teaching Probability NB: *i. Read the course manual and the PD session guide ahead of time to identify any outstanding issues relating to the lesson for clarification.* *ii. Collect needed resources (such as projector, flip chart and sticky notes) you need ahead of time, prepare samples of TLRs you may need and rehearse how these may be used to support the achievement of your goals.*	Teaching Probability NB: *Take note of the PD session guide ahead of time to identify any outstanding issues relating to the lesson for clarification.*	

Age Level(s)

a. Upper Primary
b. JHS (Core)
c. JHS (Elective)

Name of Subject(s):

a. Mathematics: Teaching and Assessing
b. Teaching and Assessing JHS Mathematic
c. Mathematics

Tutor PD Session for Lesson 7 in the Course Manual

Lesson Tittle:

a. Upper Primary: Shape and Space: (Teaching and Assessment)
b. JHS (Core): Shape, Space and Measurement: (Teaching and Assessment)
b. JHS (Elective): Teaching Probability

Focus: the bullet points provide the frame for what is to be done in the session. The SWL should use the bullets to guide what they write for the SL/HoD and tutors to do and say during each session. Each bullet needs to be addressed and specific reference should be made to the course manual/s.	**Guidance notes on Leading the session. *What the SL/HoDs will have to say during each stage of the session***	**Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each stage of the session.**	**Time in session**
1. Introduction to the session • Review prior learning • A critical friend to share findings for a short discussion and lessons learned • Reading and discussion of the introductory sections of the lesson up to and including learning outcomes and indicators • Overview of content and identification of any distinctive	**Introduction** 1.1 Ice breaker activity: Begin with mental drills using related games: *Example: When a ludo dice is tossed how many faces is/are likely to show.* 1.2 Ask tutors to tell how useful the previous PD session was and how it influenced their teaching in the previous lesson. Lead them to provide examples of how students were	**Introduction** 1.1 Ice breaker activity: participate in mental drills using related games: *Example: When a ludo dice is tossed how many faces is/are likely to show.* 1.2 Tell to tell how useful the previous PD session was and how it influenced their teaching in the previous lesson. Provide examples of how students were prepared to employ the	**20 mins**

aspects of the lesson/s, NB The guidance for SL/HoD should identify and address any areas where tutors might require clarification on any aspect of the lesson. NB SL/HoD should ask tutors to plan for their teaching as they go through the PD session	prepared to employ the various strategies and skills during the basic school classroom work in STS Field Experience in year 4 semester 1 1.3 Ask a critical friend to give feedback on observation during enactment of the previous lesson. Upper Primary/JHS (Core) a. Diagnosis and remediation; assessment resources/records, and monitoring progress: (Teaching and Assessing) JHS (Elective) b. Teaching Handling Data: *NB:* *Things tutor might have observed; tutor's choice of words, pedagogical content knowledge, content knowledge subject matter, the use of ICT tools, GESI and the use of NTEAP* 1.4 Ask tutors to read and discuss the introductory section of the lesson including the learning outcomes (LOs) in phase groups. *NB: Suggest relevant previous knowledge of students that will support*	various strategies and skills during the basic school classroom work in STS Field Experience in year 4 semester 1 1.3 As a critical friend share your observation on the previous lesson. Upper Primary/JHS (Core) a. Diagnosis and remediation; assessment resources/records, and monitoring progress: (Teaching and Assessing) JHS (Elective) b. Teaching Handling Data: *NB:* *Things tutor might have observed; tutor's choice of words, pedagogical content knowledge, content knowledge subject matter, the use of ICT tools, GESI and the use of NTEAP* 1.4 Read and discuss the introductory section of the lesson (up to learning outcomes). *NB: Suggest relevant previous knowledge of students that will support*	

	effective teaching and learning of the lesson. 1.5 Ask tutors to identify the purpose of the lesson from the course manual and state their expectations of the PD Session **PURPOSE OF THE LESSON** **Upper Primary** | **JHS(CORE)** • Introduce student teachers to the course manual to enable them develop awareness of what they are expected of in this lesson. • Develop student teachers' understanding of spatial visualization; the concept of space; line segments, angles and shapes; 3-D and 2-D Shapes • Introduce the student teachers to prepare and model interactive, and innovative ways of teaching mathematics. • **JHS (Elective)** • expose student teachers to the development of conceptual understanding for teaching probability and related concepts • develop appropriate learning strategies where percentages (taxation, discount, commissions, VAT, etc.) can be applied. 1.6 Ask tutors in phase groups to discuss the important or distinctive aspects of the lesson including vocabulary and fundamental concepts.	*effective teaching and learning of the lesson.* 1.5 Identify the purpose of the lesson from the course manual and state your expectations of the PD Session. **PURPOSE OF THE LESSON** **Upper Primary** | **JHS(CORE)** • Introduce student teachers to the course manual to enable them develop awareness of what they are expected of in this lesson. • Develop student teachers' understanding of spatial visualization; the concept of space; line segments, angles and shapes; 3-D and 2-D Shapes • Introduce the student teachers to prepare and model interactive, and innovative ways of teaching mathematics. **JHS (Elective)** • expose student teachers to the development of conceptual understanding for teaching probability and related concepts • develop appropriate learning strategies where percentages (taxation, discount, commissions, VAT, etc.) can be applied. 1.6 In phase groups, discuss the distinctive aspects of the s lesson including vocabulary and fundamental concepts related to the components of the front matters.	

	Distinct Aspects Upper Primary/JHS (core): • Informal geometry and spatial sense • Spatial visualization (PD Themes 1 & 3) JHS (Elective): • Outcomes of an Experiment • Probability of an outcome Vocabulary Upper Primary/JHS (core) Examples: Spatial, Sense, Geometry, Visualization, Segment (PD Themes 1 &3) JHS (Elective): Probability, Experiment, Outcome, Fundamental Concepts UP/JHS (core) • Introduce the lesson on integers as shape and space. • Shapes and their properties • Hand sketching of common solids (PD Themes 1 &3) JHS (Elective) Teaching: • Outcomes of an experiment • Probability of an outcome • Probability of a given event in table • Equally likely outcomes	Distinct Aspects Upper Primary/JHS (core): • Informal geometry and spatial sense • Spatial visualization (PD Themes 1 & 3) JHS (Elective): • Outcomes of an Experiment • Probability of an outcome Vocabulary Upper Primary/JHS (core) Examples: Spatial, Sense, Geometry, Visualization, Segment (PD Themes 1 &3) JHS (Elective): Probability, Experiment, Outcome, Fundamental Concepts UP/JHS (core) • Introduce the lesson on integers as shape and space. • Shapes and their properties • Hand sketching of common solids (PD Themes 1 &3) JHS (Elective) Teaching: • Outcomes of an experiment • Probability of an outcome • Probability of a given event in table • Equally likely outcomes	

2. Concept Development (New learning likely to arise in lesson/s): • Identification and discussion of new learning, potential barriers to learning for student teachers or students, concepts or pedagogy being introduced in the lesson, which need to be explored with the SL/HoD NB The guidance for SL/HoD should set out what they need to do to introduce and explain the issues/s with tutors	**Concept Development** 2.1 Ask tutors to identify familiar and unfamiliar concepts in their lessons and discuss with the larger group. <u>Familiar and Unfamiliar Concepts</u> Upper Primary/JHS (core) Familiar Concepts: Shapes and their properties and Hand sketching of common solids Unfamiliar concepts: Spatial visualization and Relationship among faces, edges and vertices. JHS (Elective): Examples of Familiar Concepts: Outcomes of an experiment and Probability of an outcome Unfamiliar concepts: Probability of a given event in table, equally likely outcomes 2.2 Lead tutors to draw connections among concepts in the various lessons in line with the Basic School Curriculum. *NB:* *Anticipated question* *What is the relationship between 2D-shapes and 3D shapes?* (Bsc:B5.1.5.1) 2.3 Ask tutors to use Think-Pair-Share to outline possible challenging areas in: Upper Primary:	**Concept Development** 2.1 Identify familiar and unfamiliar concepts in their lessons and discuss with the larger group. Familiar and <u>Unfamiliar Concepts</u> Upper Primary/JHS (core) Examples of Familiar Concepts: Shapes and their properties and Hand sketching of common solids Unfamiliar concepts: Spatial visualization and Relationship among faces, edges and vertices. JHS (Elective): Examples of Familiar Concepts: Outcomes of an experiment and Probability of an outcome Unfamiliar concepts: Probability of a given event in table, equally likely outcomes 2.2 Draw connections among concepts in the various lessons in line with the basic school curriculum. *NB:* *Anticipated question* *What is the relationship between 2D-shapes and 3D shapes?* (Bsc:B5.1.5.1) 2.3 Individually, outline the challenging areas in your lesson, share with a member of the same phase group and then with the whole group.	**15 mins**

	a. Shape and Space: (Teaching and Assessment) JHS(Core): b. Shape, Space and Measurement: (Teaching and Assessment) c. Teaching Probability *NB:* *Upper Primary/JHS (core)* *In groups let both genders take leading role by using the internet to explore the challenging areas, for example: using models of 3-D shapes for practical investigation to explore the relationship among the number of faces, edges, and vertices of given shapes.* 2.4 Lead tutors to discuss misconceptions and barriers in teaching and learning of the lesson. <u>Misconceptions</u> a. Upper Primary/JHS (core) – Plane Shapes have edges. b. JHS (Elective) – Common shapes are not recognised unless they are upright or in their usual orientation. <u>Possible Barriers</u> Upper Primary/JHS (core) Inability to differentiate between two concepts such as the difference between Sample Space and event. JHS (Elective) Inability to explore the concepts of equally likely	*NB:* *UP/JHS (core)* *In groups let both genders take leading role by using the internet explore the challenging areas, for example: using models of 3-D shapes for practical investigation to explore the relationship among the number of faces, edges, and vertices of given shapes.* 2.4 Participate actively in the discussion on misconceptions and barriers in teaching and learning of the lesson. <u>Misconceptions</u> a. Upper Primary/JHS (core) – Plane Shapes have edges. b. JHS (Elective) –Common shapes are not recognised unless they are upright or in their usual orientation. <u>Possible Barriers</u> Upper Primary/JHS (core) Inability to differentiate between two concepts. e.g., The difference between Sample Space and event. JHS (Elective) Inability to explore the concepts of equally likely	

	and not equally likely outcomes through practical activities. 2.5 Support tutors to identify GESI responsive resources such as supporting staff with experts in sign language as well as resources such teacher and learner resource packs, textbooks, course manual, Posters illustrating people using mathematics in the jobs; video clips downloaded from the internet (NTS 3j, PD Manual pp.38)	and not equally likely outcomes through practical activities. 2.5 Identify as many GESI responsive resources such as supporting staff with experts in sign language as well as resources such teacher and learner resource packs, textbooks, course manual, Posters illustrating people using mathematics in the jobs; video clips downloaded from the internet. (NTS 3j, PD Manual pp.38)	
3. Planning for teaching, learning and assessment activities for the lesson/s • Reading and discussion of the teaching and learning activities • Noting and addressing areas where tutors may require clarification • Noting opportunities for making links to the Basic School Curriculum • Noting opportunities for integrating: GESI responsiveness and ICT and 21st C skills • Reading, discussion, and identification of continuous	**Teaching and learning activities** 3.1 Ask tutors to suggest teaching and learning activities for the lesson taking into account GESI issues. Suggested learning Activities Upper Primary/JHS core: Provide student-teachers with e-learning opportunities to explore the concept of shape and space. JHS(Elective): Example of suggested learning Activities Use interactive and collaborative group work to develop conceptual understanding of the concepts of sample space, events, and the idea of probability of an outcome.	**Teaching and learning activities** 3.1 Suggest teaching and learning activities for the lesson taking into consideration GESI Suggested learning Activities Upper Primary/JHS core: Provide student-teachers with e-learning opportunities to explore the concept of shape and space. JHS(Elective): Example of suggested learning Activities Use interactive and collaborative group work to develop conceptual understanding of the concepts of sample space, events, and the idea of probability of an outcome.	**40 mins**

assessment opportunities in the lesson. Each lesson should include at least two opportunities to use continuous assessment to support student teacher learning • Resources: ○ links to the existing PD Themes, for example, action research, questioning and to other external reference material: literature, on web, Utube, physical resources, power point; how they should be used. Consideration needs to be given to local availability ○ guidance on any power point presentations, TLM or other resources which need to be developed to support learning • Tutors should be expected to have a plan for the next lesson for student teachers	*NB:* *i. Make provision for physically challenged* *ii. Both genders take leading roles in group task* *iii. Even distribution of questions to different categories of learners based on gender, ability, previous experience, etc* *NTS 1a, b, c, d, 2b, e, f, 3b, c* 3.2 Let tutors read the activities outlined in their course manuals and identify areas that require clarification. NB: *Refer to the Basic School Curriculum (BSC pp. xv – xvii) Identify challenging areas that require clarification, using GeoGebra to clarify the otherwise dark spots in "Teaching probability".* 3.3 Lead tutors to brainstorm to come up with some pedagogical approaches and their related core competencies likely to be inculcated in students and for that matter Basic School learners. *Example* *(a) Upper Primary/JHS (core)* *Strategy: Expository, Think pair Share, Discussion and Brainstorming*	*NB:* *i. Make provision for physically challenged* *ii. Both genders take leading roles in group task* *iii. Even distribution of questions to different categories of learners based on gender, ability, previous experience, etc* *NTS 1a, b, c, d, 2b, e, f, 3b, c* 3.2 Read the activities outlined in your course manual and identify areas that require clarification. NB: *Refer to the Basic School Curriculum (BSC pp. xv – xvii) Identify challenging areas that require clarification, using GeoGebra to clarify the otherwise dark spots in "Teaching probability* 3.3 Brainstorm to come up with some pedagogical approaches and their related core competencies likely to be inculcated in students and for that matter Basic School learners. *Example* *(a) Upper Primary/JHS (core)* *Strategy: Expository, Think pair Share, Discussion and Brainstorming*	

	Core Competencies: Problem solving, critical and creative thinking and communication. *(b) JHS (Elective)* *Strategy: interactive and Collaborative group work, Discussion* *Core Competencies: Critical thinking skills, Collaborative learning and Problem-Solving Skills.* 3.4 Ask tutors to explain some suggested teaching strategies that can help inculcate core competencies in the student teachers and for that matter basic school learners. *Example: Discussions on the concept of shape and space- Communication skills* 3.5 Ask tutors to mention some GESI responsive resources that can be used with suggested approaches and strategies in achieving the Los. Example: *Resources may include supporting staff with experts in sign language as well as resources such teacher and learner resource packs, textbooks, course manual, projectors, flip charts, sticky notes, braille, tactile materials, audio and audio-visuals that can be used in the teaching and learning of*	*Core Competencies: Problem solving, critical and creative thinking and communication.* *(b) JHS (Elective)* *Strategy: interactive and Collaborative group work, Discussion* *Core Competencies: Critical thinking skills, Collaborative learning and Problem-Solving Skills.* 3.4 Suggested teaching strategies that can help inculcate core competencies in the student teachers and for that matter basic school learners. 3.5 Mention some GESI responsive resources that can be used with suggested approaches and strategies in achieving the Los. Example: *Resources may include supporting staff with experts in sign language as well as resources such teacher and learner resource packs, textbooks, course manual, projectors, flip charts, sticky notes, braille, tactile materials, audio and audio-visuals that can be used in the teaching and learning of*	

	the concepts mentioned above (NTS 3j) 3.6 Lead tutors to discuss assessment strategies ("as and "for") to be used during the lesson. *NB:* *Assessment must involve; the subject project and Subject Portfolio.* Examples Upper Primary/JHS (Core): *Subject project (class exercise): Hand sketch a rectangle and a square (5 marks).* *Subject Portfolio: Project on investigating the properties of 2D and 3D shapes using manipulatives and Google search.* *JHS (Elective):* *Subject Project:* *(Assignment): Identify the sample spaces for the following:* *a. Dice* *b. Coin* *c. A pack of cards* *Subject Portfolio: A project on using the google search to Find both experimental and theoretical probabilities.* *Assessment must be aligned to the NTEAP. Continuous assessment activities (assignments, quizzes, group presentations, etc, should*	*the concepts mentioned above (NTS 3j)* 3.6 Discuss to come up with assessment strategies ("as and "for") to be used during the lesson. *NB:* *Assessment must involve; the subject project and Subject Portfolio.* Examples Upper Primary/JHS (Core): *Subject project (class exercise): Hand sketch a rectangle and a square (5 marks).* *Subject Portfolio: Project on investigating the properties of 2D and 3D shapes using manipulatives and Google search.* *JHS (Elective):* *Subject Project:* *(Assignment): Identify the sample spaces for the following:* *a. Dice* *b. Coin* *c. A pack of cards* *Subject Portfolio: A project on using the google search to Find both experimental and theoretical probabilities.* *Assessment must be aligned to the NTEAP. Continuous assessment activities (assignments, quizzes, group presentations, etc, should*	

	be used to create subject projects and build subject portfolios (See, Appendix II) 3.7 Ask each tutor to develop a sample of assessment item based on the LOs and share with the whole group. *Example: Upper Primary and JHS (Core) Grades – Interview 8 basic school teachers during the STS activity to tell the relationship among the number of faces, edges, and vertices of given shapes.* *JHS Grade – In groups of three, use different activities to differentiate between sample spaces and event.* 3.8 Lead tutors to discuss the various ways they can support student teachers to build their subject portfolio. *Example Encouraging student teachers to file all their assignments with feedback in their folders* 3.9 Ask a tutor to model a presentation of an activity using projector, internet search and taking into consideration GESI issues (eg. Both genders taking the leading roles in their	*be used to create subject projects and build subject portfolios (See, Appendix II)* 3.7 Develop a sample of assessment items based on the LOs and share with the whole group. *Example: Early, Upper Primary and JHS (Core) Grades – Interview 8 basic school teachers during the STS activity to tell the relationship among the number of faces, edges, and vertices of given shapes.* *JHS Grade – In groups of three, use different activities to differentiate between sample spaces and event.* 3.8 Discuss the various ways you can support student teachers to build their subject portfolio. *Example: Encouraging student teachers to file all their assignments with feedback in their folders.* 3.9 Prepare and model a presentation of an activity using projector, internet search and taking into consideration GESI issues. (eg. Both genders taking the leading roles in their	

	groups) NTS 1a, b, 2b, e, 3b, c, J; BSC pp. iii)	groups) NTS 1a, b, 2b, e, 3b, c, J; BSC pp. iii)	
4. Evaluation and review of session: • Tutors should Identifying critical friends to observe lessons and report at next session. • Identifying and addressing any outstanding issues relating to the lesson/s for clarification	**Reflective Activity** 4.1 Engage tutors in self-evaluation as well as encourage tutors to provide feedback of the PD session taking into consideration inclusivity – how to be patient with Stutterers, using tactile and audio devices for visually challenged, paying attention to all courses, etc. 4.1.1 Ask tutors to show by fingers/nods their level of satisfaction with the session. (NTS 1a, 3i). 4.2 Engage tutors to identify unresolved issues relating to this lesson for clarification *NB:* *Take note of all unresolved issues and use any of following strategies put on SL/SWL WhatsApp platform for discussion* *Tutors to research for the next PD session for discussion* 4.3 Ask a critical friend to observe your teaching and record his/her findings to be presented after delivery or in the Next PD session.	**Reflective Activity** 4.1 Show by fingers/nods of 5 or 3 or 1 as to those who "really got it", "got some of it" or "didn't get it" respectively. Explain if you really got the lesson 4.2 Reflect on the activities in the session and outline unresolved issues relating to the lesson 4.3 Identify critical friend observes teaching and record his/her findings to be presented after delivery or in the Next PD session.	**15 mins**

	NB: *Remind tutors to identify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a)* Advance Preparation 4.4 Ask tutors to read Lesson of the Course Manual on: Upper Primary - Measurement: (Teaching and Assessing) JHS(Core) - Handling Data and Chance: (Teaching and Assessing) JHS(Elective) – Teaching Percentages and its applications *NB:* *Read the course manual, the PD session guide ahead of time to identify any outstanding issues relating to the lesson for clarification.* *Collect all-inclusive resources (such as projector, flip chart and sticky notes) you need ahead of time, prepare samples of TLMs you may need.*	NB: I*dentify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a)* Advance Preparation 4.4 Ask tutors to read Lesson of the Course Manual on: Upper Primary - Measurement: (Teaching and Assessing) JHS(Core) - Handling Data and Chance: (Teaching and Assessing) JHS(Elective) – Teaching Percentages and its applications *NB:* *Read the course manual, the PD session guide ahead of time to identify any outstanding issues relating to the lesson for clarification.* *Collect all-inclusive resources (such as projector, flip chart and sticky notes) you need ahead of time, prepare samples of TLMs you may need.*	

Age Levels/s:

a. Upper Grade
b. JHS (Core)
c. JHS (Elective)

Name of Subject/s:

a. Mathematics: Teaching and Assessing
b. Teaching and Assessing JHS Mathematics
c. Mathematics

Tutor PD Session for Lesson 8 in the Course Manual

Lesson Title:

a. Upper Grade: Measurement (Teaching and Assessing)
b. JHS (Core): Handling Data and Chance (Teaching and Assessing)
c. JHS (Electives): Teaching Percentages and its applications

Focus: the bullet points provide the frame for what is to be done in the session. The SWL should use the bullets to guide what they write for the SL/HoD and tutors to do and say during each session. Each bullet needs to be addressed and specific reference should be made to the course manual/s.	**Guidance notes on Leading the session. *What the SL/HoDs will have to say during each stage of the session***	**Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each stage of the session.**	**Time in session**
1. Introduction to the session • Review prior learning • Reading and discussion of the introductory sections of the lesson up to and including learning outcomes and indicators • Overview of content and identification of any distinctive aspects of the lesson/s,	**Introduction** 1.1 Ice breaker activity: Engage tutors in an investigational activity by responding to the mental task. (eg. Which non-standard unit of measurement is used by a. Gari sellers b. Cloth sellers c. Children during play? 1.2 Ask tutors to tell how useful the week 7 PD session (NTS 1b)	**Introduction** 1.1 Ice breaker: Participate in the investigational activity by responding to the mental task. (eg. Which nonstandard unit of measurement is used by a. Gari sellers b. Cloth sellers c. Children during play? 1.2 Ask tutors to tell how useful the week 7 PD session influenced your	**20 mins**

NB: The guidance for SL/HoD should identify and address any areas where tutors might require clarification on any aspect of the lesson. NB: SL/HoD should ask tutors to plan for their teaching as they go through the PD session	influenced their teaching over the week and how students will employ the various concepts during the STS Field Experience. 1.3 Ask a critical friend to share with members, feedback on the observation made during the enactment of lesson 7. That is: Upper Primary Shape and Space: (Teaching and Assessment) JHS (Core) Shape, Space and Measurement: (Teaching and Assessment) JHS (Elective) Teaching Probability 1.4 Lead tutors to discuss any challenges that arose during the enactment. Eg In what ways did the students appreciate the need to consider equality and equity during the lesson and during STS activities? *NB:* ➢ *Remember to put members into groups according to the phases to be taught in the semester and contribute to the whole group discussion.* ➢ *Pay attention to all NTS references and salient points necessary for the development of their teaching plan.*	teaching and how students will employ the various concepts during the STS Field Experience. 1.3 As a critical friend, share with members, feedback on the observation you made during the enactment of lesson 7. That is: Upper Primary Shape and Space: (Teaching and Assessment) JHS (Core) Shape, Space and Measurement: (Teaching and Assessment) JHS (Elective) Teaching Probability 1.4 Discuss any challenges that arose during the enactment. Eg In what ways did the students appreciate the need to consider equality and equity during the lesson and during STS activities? *NB:* ➢ *Work in your phase group and contribute to the whole group discussion.* ➢ *Pay attention to all NTS references and salient points necessary for the development of your teaching plan.*	

	1.5 Ask tutors to silently read the introductory sections of lesson 8 in the course manual (including the learning outcomes-LOs). Let tutors suggest relevant previous knowledge of students that will support effective teaching and learning of the lesson. 1.6 Guide tutors to read the course manual silently and identify the purpose and state their expectations of the lesson 8 PD session on post-in cards and share with the whole group. NTS 2b 1.7 Ask tutors in phase groups to discuss the important or distinctive aspects of lesson 8 including vocabulary and fundamental concepts. *Distinctive aspects* *a. Upper Primary-* measurement using non-standard and standard units; Measurement of angles *b. JHS (core) – Collecting, interpreting and presenting data in multiple ways; Measures of central tendencies; Chance* c. *JHS (Elective) – Percentage and its*	1.5 Silently read the introductory sections of lesson 8 in the course manual (including the LOs. Suggest relevant previous knowledge of students that will support effective teaching and learning of the lesson. 1.6 Read the course manual silently and identify the purpose of lesson 8 and state your expectations on post-in cards and share with the whole group. NTS 2b (NTS 2b). 1.7 In your phase group, identify the important features of lesson 8 in the course manual taking note of cross cutting themes (including developing awareness of equity and diversity issues and issues on ICT). *Distinctive aspects* *a. Upper Primary-* measurement using non-standard and standard units; Measurement of angles *b. JHS (core) – Collecting, interpreting and presenting data in multiple ways; Measures of central tendencies; Chance* c. *JHS (Elective) – Percentage and its*	

	applications; Money and taxes; Wages, salaries and bank transactions	*applications; Money and taxes; Wages, salaries and bank transactions*	
2. Concept Development (New learning likely to arise in lesson/s): • Identification and discussion of new learning, potential barriers to learning for student teachers or students, concepts or pedagogy being introduced in the lesson, which need to be explored with the SL/HoD NB: The guidance for SL/HoD should set out what they need to do to introduce and explain the issues/s with tutors	**Concept Development** 2.1 Ask tutors to identify familiar and unfamiliar concepts in their lessons and discuss with the larger group. Upper Primary <u>Familiar Concepts:</u> Traditional unit of measuring length <u>Unfamiliar concepts:</u> Referent non-standard units for measuring capacity JHS (Core) <u>Familiar Concepts:</u> Collecting data; Measures of central tendencies <u>Unfamiliar concepts:</u> Interpreting and presenting data in multiple ways; Chance JHS (Elective) <u>Familiar concepts:</u> Concept of Percentage <u>Unfamiliar concepts:</u> Taxation, discount, commissions and VAT 2.2 Lead tutors to draw connections among concepts in the various lessons in line with the basic school curriculum. *NB: Encourage tutors to give examples beyond the suggested ones.* *Example* *Upper Primary: The use of standard units helps eliminate*	**Concept Development** 2.1 Identify familiar and unfamiliar concepts in your lesson and discuss with the larger group. Upper Primary <u>Familiar Concepts:</u> Traditional unit of measuring length <u>Unfamiliar concepts:</u> Referent non-standard units for measuring capacity JHS (Core) <u>Familiar Concepts:</u> Collecting data; Measures of central tendencies <u>Unfamiliar concepts:</u> Interpreting and presenting data in multiple ways; Chance JHS (Elective) <u>Familiar concepts:</u> Concept of Percentage <u>Unfamiliar concepts:</u> Taxation, discount, commissions and VAT 2.2 In your phase group, draw connections among concepts in the lesson and in line with the basic school curriculum. *Example* *Upper Primary: The use of standard units helps eliminate*	**15 mins**

	misunderstanding associated with the use of non-standard units for measuring. *BSC; B4.3.1.1, B5.3.1.1* *JHS (Core): Data can be deduced from charts and graphs. A measure of central tendencies describes a set of data by identifying the central position within that set of data. BSC; B4.4.1.1, B4.4.1.2, B5.4.1.1, B5.4.1.2* *JHS (ELECTIVE): Simple interest, Income tax and compound interest are computed in percentages. BSC; B4.1.5.1, B5.1.5.1* 2.3 Ask tutors through Think-Pair-Share to outline possible challenging areas in teaching and assessing the lesson. *Example:* *Upper Primary: Using appropriate TLMs for measuring angles* *JHS (Core): Availability of grid boards in the basic schools for demonstration by teachers and for student teachers to have the feel of the teaching of the lesson in basic school classroom.* *JHS (Elective): Developing understanding of taxation with available TLMs* 2.4 Lead tutors to discuss misconceptions and barriers in teaching and learning of the lesson.	*misunderstanding associated with the use of non-standard units for measuring.* *BSC; B4.3.1.1, B5.3.1.1* *JHS (Core): Data can be deduced from charts and graphs. A measure of central tendencies describes a set of data by identifying the central position within that set of data. BSC; B4.4.1.1, B4.4.1.2, B5.4.1.1, B5.4.1.2* *JHS (ELECTIVE): Simple interest, Income tax and compound interest are computed in percentages. BSC; B4.1.5.1, B5.1.5.1* 2.3 Individually, outline the challenging areas in your lesson, share with a member of the same phase group and then with the whole group. *Example:* *Upper Primary: Using appropriate TLMs for measuring angles* *JHS (Core): Availability of grid boards in the basic schools for demonstration by teachers and for student teachers to have the feel of the teaching of the lesson in basic school classroom.* *JHS (Elective): Developing understanding of taxation with available TLMs* 2.4 In whole group, discuss misconceptions and barriers in teaching and learning of the lesson.	

	Example: *Upper Primary: – Measurement is only done with standard units* *b. JHS (Core) – Chance is computed only in common fractions* *JHS (Electives): Taxation is a difficult topic* *Barriers may include weak prior knowledge in the concept of probability, lack of appropriate resources for practicing, lack of opportunity to use ICT due to failure of electric power (lights-out), interrupted network, unavailability of internet bundle for students, inadequate contact time due to staff meetings.*	*Example:* *Upper Primary: – Measurement is only done with standard units* *b. JHS (Core) – An angle is only a figure and not a measure.* *JHS (Electives): Taxation is a difficult topic* *Barriers may include weak prior knowledge in the concept of probability, lack of appropriate resources for practicing, lack of opportunity to use ICT due to failure of electric power (lights-out), interrupted network, unavailability of internet bundle for students, inadequate contact time due to staff meetings.*	
3. Planning for teaching, learning and assessment activities for the lesson/s • Reading and discussion of the teaching and learning activities • Noting and addressing areas where tutors may require clarification • Noting opportunities for making links to the Basic School Curriculum • Noting opportunities for integrating: GESI responsiveness and ICT and 21st C skills	**Planning for Teaching and learning Activities for the Lesson** 3.1 Ask tutors in their phase groups to suggest teaching and learning activities for the lesson ensuring; i. Provision is made for SEN ii. Both genders take leading roles in group task iii. Even distribution of questions to different categories of learners based on gender, ability, previous experience, etc. referring to NTS 1a, b, c, d, 2b, e, f, 3b, c 3.2 Ask tutors to read the activities outlined in lesson 8 of their course	**Planning for Teaching and learning activities** 3.1 In your phase group, suggest teaching and learning activities for teaching the lesson ensuring; i. Provision is made for SEN ii. Both genders take leading roles in group task, etc. referring to NTS 1a, b, c, d, 2b, e, f, 3b, c 3.2 Read the activities outlined in lesson 8 in your course manual	**40 mins**

• Reading, discussion, and identification of continuous assessment opportunities in the lesson. Each lesson should include at least two opportunities to use continuous assessment to support student teacher learning • Resources: ○ links to the existing PD Themes, for example, action research, questioning and to other external reference material: literature, on web, Utube, physical resources, power point; how they should be used. Consideration needs to be given to local availability ○ guidance on any power point presentations, TLM or other resources which need to be developed to support learning • Tutors should be expected to have a plan for the next lesson for student teachers	manuals and identify areas that require clarification. NB: *Refer to the Basic School Curriculum (BSC pp. xv – xvii) and https://statisticsbyjim.com for explanations on "The concept of statistics and operations on fraction" and search through "IXL Math".* 3.3 Lead tutors to brainstorm some pedagogical approaches and their impact on learning of the concepts taking into consideration inclusivity. *Example:* *i) The use of inquiry to explore the range of values that probability takes.* *(ii) The use of differentiation and scaffolding to ensure that no learner is left behind (BSC pp. xv)* *iii) Being patient with stutterers, using tactile or braille for visually challenged, providing peer support for those who might need, while you pay attention to all Phases.* 3.4 Ask tutors to explain some suggested teaching strategies that can help inculcate core competencies in student teachers and	and identify areas that require clarification. NB: *Refer to the Basic School Curriculum (BSC pp. xv – xvii) and* https://statisticsbyjim.com *for explanations on "The concept of statistics and* operations on *fraction" and search through "IXL Math".* 3.3 Brainstorm some pedagogical approaches that can be employed during the lesson and their effectiveness towards learning of the concepts. Mention any GESI issues that need consideration while using those approaches 3.4 Suggest teaching strategies to be used in achieving the LOs of the lesson and explain how they can help inculcate core	

	for that matter Basic School learners. *Example:* *a)* Pedagogical approaches: *Group Work to explore the relationship among Associated 21st century skills:* *Social and Leadership Skills* *b)* Pedagogical approaches: *Using investigation to identify generalizations on laws of indices Associated 21st century skills:* *Critical Thinking* *NB: Let tutors suggest more examples beyond those suggested above.* 3.5 Ask tutors to mention some GESI responsive resources that can be used with the suggested approaches and strategies in achieving the LOs. E.g. *Resources may include supporting staff with experts in sign language as well as resources such as teacher and learner resource packs, grid boards, graph sheets, textbooks, course manual, projectors, flip charts, sticky notes, braille, tactile materials, audio and audio-visuals that can be used in the teaching and learning of the concepts mentioned above (NTS 3j)*	competencies in student teachers and for that matter Basic School learners. *Example:* *a)* Pedagogical approaches: *Group Work to explore the relationship among Associated 21st century skills:* *Social and Leadership Skills* *b)* Pedagogical approaches: *Using investigation to identify generalizations on laws of indices Associated 21st century skills:* *Critical Thinking* *NB: Let tutors suggest more examples beyond those suggested above.* 3.5 Mention some GESI responsive resources that can be used with the suggested approaches and strategies in achieving the LOs. E.g. *Resources may include supporting staff with experts in sign language as well as resources such as teacher and learner resource packs, textbooks, etc*	

	3.6 Lead tutors to discuss assessment strategies ('as' and 'for') to be used during teaching of the lesson. *NB: Continuous assessment activities (assignments, quizzes, report writing, group presentations, etc. should be used to create subject projects and build subject portfolios).* *Example: A project on how to teach measurement of area from non-standard unit up to and including standard unit. (Upper Primary)* *A project on investigation of experiments that will generate P(E)=0; 0<P(E)<1, P(E)=1 (JHS - Core)* *A project on developing an understanding of taxation. (JHS – Elective)* *NB: Make reference to assessment in the course manual and NTEAP* 3.7 Ask each tutor to develop a sample of assessment item based on the LOs and share with the whole group. *Example:* *Upper Primary – Interview 10 basic school learners on 10 non-standard units used in their community*	3.6 Using discussion, lead tutors to come out with assessment strategies ('as' and 'for') to be used during teaching of the lesson. *NB: Continuous assessment activities (assignments, quizzes, report writing, group presentations, etc. should be used to create subject projects and build subject portfolios).* *Example: A project on how to teach measurement of area from non-standard unit up to and including standard unit. (Upper Primary)* *A project on investigation of experiments that will generate P(E)=0; 0<P(E)<1, P(E)=1 (JHS - Core)* *A project on developing an understanding of taxation. (JHS – Elective)* *NB: Make reference to assessment in the course manual and NTEAP* 3.7 Develop a sample of assessment items based on the LOs and share with the whole group. *Example:* *Upper Primary – Interview 10 basic school learners on 10 non-standard units used in their community*	

	JHS (Core) – Write a report on the steps you will use to representation of data on a particular graph. *JHS (Elective) – Develop a game that can be used in teaching the concept of chance* 3.8 Lead tutors to discuss the various ways they can support student teachers to build their subject portfolio. *E.g. Encouraging student teachers to file all feedback on micro teaching in their folders.* 3.9 Ask a tutor to model a presentation of an activity using projector, internet search and taking into consideration equality and equity in assigning roles and in choosing material for teaching) NTS 1a, b, 2b, e, 3b, c, J; BSC pp. iii)	*JHS (Core) – Write a report on the steps you will use to representation of data on a particular graph.* *JHS (Elective) – Develop a game that can be used in teaching the concept of chance* 3.8 Discuss the various ways you can support student teachers to build their subject portfolio. *E.g. Encouraging student teachers to file all feedback on micro teaching in their folders.* 3.9 Prepare and model a presentation of an activity using projector, internet search and taking into consideration equality and equity in assigning roles and in choosing material for teaching) NTS 1a, b, 2b, e, 3b, c, J; BSC pp. iii)	
4. Evaluation and review of session: • Tutors need to identify critical friends to observe lessons and report at next session • Identifying and addressing any outstanding issues relating to the lesson/s for clarification	**Evaluation and review of session:** 4.1 Engage tutors in providing feedback of the PD session taking into consideration – Clarity of content, ICT integration, GESI, Twenty First Century Skills (NTS 1a, 3i, BSC pp. x-xvi) and make notes that will help them to teach Lesson 1	**Evaluation and review of session:** 4.1 Reflect and provide feedback on this PD session taking into consideration – Clarity of content, pedagogical approaches employed, ICT integration, GESI, Twenty First Century Skills (NTS 1a, 3i, BSC pp. x-xvi)? and make notes that will help you to teach Lesson 1	**15 mins**

	4.2 Engage tutors to identify unresolved issues relating to this lesson for clarification. *NB: Take note of all unresolved issues that may need further research or consultation and use any of following strategies to address them.* *i. put on SL/SWL WhatsApp/ Telegram platform for discussion* *ii. tutors to research for the next PD session for discussion* 4.3 Ask tutors to identify a critical friend from the same or related discipline to observe the enactment of their lesson and provide feedback during the next PD Session (NTS 1a). Advance Preparation NB: ➢ *Inform tutors to remember to prepare their teaching plan for Lesson 8 taking note of important or distinctive aspects of the lesson and crosscutting issues.* ➢ *Inform tutors to read Lesson 9 of the Course Manual on:* *<u>LESSON 9</u>* *Upper Primary –* Measurement 2 *(Teaching and Assessing)* *JHS (Core) - Rational and Irrational numbers 1 (Teaching and Assessing)*	4.2 Identify unresolved issues relating to this lesson for clarification. NB: *Put your unresolved issues unto* the department's *WhatsApp/ Telegram platform and research into the issues raised.* *i. put on SL/SWL WhatsApp/ Telegram platform for discussion* *ii. tutors to research for the next PD session for discussion* 4.3 Identify a critical friend from the same or related discipline to observe the enactment of your lesson and to provide feedback during the next PD Session (NTS 1a). Advance Preparation NB: ➢ *Inform tutors to remember to prepare their teaching plan for Lesson 8 taking note of important or distinctive aspects of the lesson and crosscutting issues.* ➢ *Read Lesson 9 of the Course Manual on:* *<u>LESSON 9</u>* *Upper Primary –* Measurement 2 *(Teaching and Assessing)* *JHS (Core) - Rational and Irrational numbers 1 (Teaching and Assessing)*	

	JHS (Elective) – Measurement II *NB:* *i. Read the course manual the PD session guide, the NTEAP, and the NTS ahead of time to identify any outstanding issues relating to the lesson for clarification.* *ii. Collect all-inclusive 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*	*JHS (Elective) – Measurement II* *NB:* *ii. Read the course manual the PD session guide, the NTEAP, and the NTS ahead of time to identify any outstanding issues relating to the lesson for clarification.*	

Age Levels/s:

a. Upper Primary
b. JHS Core)
c. JHS (Elective)

Name of Subject/s:

a. Mathematics: Teaching and Assessing
b. Teaching and Assessing JHS Mathematics
c. Mathematics

Tutor PD Session for Lesson 9 in the Course Manual

Lesson Tittle:

a. Upper Primary: Measurement 2
b. JHS (Core): Rational and Irrational numbers 1
c. JHS (Elective): Money and taxes, wages, salaries and bank transactions (pay in slips and checks), simple and compound interest,

Focus: the bullet points provide the frame for what is to be done in the session. The SWL should use the bullets to guide what they write for the SL/HoD and tutors to do and say during each session. Each bullet needs to be addressed and specific reference should be made to the course manual/s.	**Guidance notes on Leading the session. *What the SL/HoDs will have to say during each stage of the session***	**Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each stage of the session.**	**Time in session**
1. Introduction to the session • Review prior learning • A critical friend to share findings for a short discussion and lessons learned • Reading and discussion of the introductory sections of the lesson up to and including learning outcomes and indicators • Overview of content and identification of any distinctive	**Introduction** 1.1 Ice breaker activity: Begin with an investigational activity for the lessons. E.g., How will you guide a 12-year-old learner to identify the number of fives (5s) in 16. 1.2 Ask tutors to discuss how useful the previous PD session was and how it influenced their teaching in lesson 8. Lead them to provide examples of how students were	**Introduction** 1.1 Demonstrate with any relevant learning resources to determine the number of fives in 16. 1.2 Discuss the usefulness the previous semester's PD session was and how it influenced your teaching in lesson 8. Provide examples of how students were prepared to employ the	**20 mins**

aspects of the lesson/s, NB The guidance for SL/HoD should identify and address any areas where tutors might require clarification on any aspect of the lesson. NB SL/HoD should ask tutors to plan for their teaching as they go through the PD session	prepared to employ the various strategies and skills during the basic school classroom work in STS Field Experience in year 4 semester 1 1.3 Ask a critical friend to give feedback on observation during enactment of the seventh (8th) lesson. *NB: Thing's tutor might have observed; tutor's choice of words, pedagogical content knowledge, content knowledge subject matter, ICT tools, GESI and the use of NTEAP.* 1.4 Ask tutors to read and discuss the introductory section of the lesson including the learning outcomes (LOs) in phase groups. 1.5 Ask tutors to identify the purpose of the lesson from the course manual and state their expectations of the PD Session. Upper Primary i. Prepare and model interactive, develop and innovative ways of teaching student teachers' understanding of Perimeter and areas of	various strategies and skills during the basic school classroom work in STS Field Experience in year 4 semester 1 1.3 As a critical friend share his/her observation on the eighth lesson. 1.4 Read and discuss the introductory section of the lesson (up to learning outcomes). Suggest relevant previous knowledge of students that will support effective teaching and learning of the lesson. 1.5 Identify the purpose of the lesson from the course manual and state your expectations of the PD Session. Upper Primary i. Prepare and model interactive, develop and innovative ways of teaching student teachers' understanding of Perimeter and areas of triangle,	

	triangle, Circumference and areas of circular regions; Surface area and volumes of prisms and pyramids. JHS Core ii. Prepare and model interactive, develop and innovative ways of teaching student teachers' understanding of student teachers' understanding of the nature and importance of Rational and Irrational numbers, future Mathematics to JHS learners. JHS (Elective) Expose student teachers to: i. develop the understanding of money and taxes and other related concepts; ii. investigate activities to develop the concept of money and taxes, wages, salaries and bank transactions. 1.6 Ask tutors in phase groups to discuss the important or distinctive aspects of the lesson including vocabulary and fundamental concepts. <u>Distinct Aspects</u> Upper Primary Perimeter and areas of triangles, Circumference and areas of circular	Circumference and areas of circular regions; Surface area and volumes of prisms and pyramids. JHS Core ii. Prepare and model interactive, develop and innovative ways of teaching student teachers' understanding of student teachers' understanding of the nature and importance of Rational and Irrational numbers, future Mathematics to JHS learners. JHS (Elective) Expose student teachers to: i. develop the understanding of money and taxes and other related concepts; ii. investigate activities to develop the concept of money and taxes, wages, salaries and bank transactions. 1.6 In phase groups, discuss the distinctive aspects of the s lesson including vocabulary and fundamental concepts related to the components of the front matters. <u>Distinct Aspects</u> Upper Primary Perimeter and areas of triangles, Circumference and areas of circular	

	regions; Surface area and volumes of prisms and pyramids. JHS(Core) The Real number system, relationships among the various aspects of real number system and Operations and properties of rational numbers application of real number system to real life. JHS(Elective) Money and taxes, wages, salaries and bank transactions (pay in slips and checks), simple and compound interest. <u>Vocabulary</u> Upper Primary: measurement, area, volume, prism, pyramid, etc JHS (core): rational, irrational, denominator, numerator, pi, etc. JHS (Elective): money, bank, taxes, compound, depreciates, payment, etc. <u>Fundamental Concepts</u> Upper Primary: Measurement of Area, Volume, JHS (Core): Addition, Subtraction, Multiplication and Division of Rational and Irrational Numbers, etc JHS (Elective): Money, taxation, etc.	regions; Surface area and volumes of prisms and pyramids. JHS(Core) The Real number system, relationships among the various aspects of real number system and Operations and properties of rational numbers application of real number system to real life. JHS(Elective) Money and taxes, wages, salaries and bank transactions (pay in slips and checks), simple and compound interest. <u>Vocabulary</u> Upper Primary: measurement, area, volume, prism, pyramid, etc JHS (core): rational, irrational, denominator, numerator, pi, etc. JHS (Elective): money, bank, taxes, compound, depreciates, payment, etc. <u>Fundamental Concepts</u> Upper Primary: Measurement of Area, Volume, JHS (Core): Addition, Subtraction, Multiplication and Division of Rational and Irrational Numbers, etc JHS (Elective): Money, taxation, etc.	
2. Concept Development (New learning likely to arise in lesson/s): • Identification and discussion of new	**Concept Development** 2.1 Ask tutors to identify familiar and unfamiliar concepts in their	**Concept Development** 2.1 Identify familiar and unfamiliar concepts in your lesson and	**15 mins**

<table>
<tr>
<td>learning, potential barriers to learning for student teachers or students, concepts or pedagogy being introduced in the lesson, which need to be explored with the SL/HoD
NB The guidance for SL/HoD should set out what they need to do to introduce and explain the issues/s with tutors</td>
<td>lessons and discuss with the larger group.
<table><tr><td>Familiar Concepts</td><td>Unfamiliar concepts</td></tr><tr><td>Measurement of money.</td><td>Measurement of Taxation</td></tr><tr><td>Measurement of length and area</td><td>Measurement of volume</td></tr><tr><td>Counting to establish quantities</td><td>Estimation of quantities</td></tr><tr><td>Addition, subtraction and multiplication of rational numbers</td><td>Division of rational numbers</td></tr></table>
2.2 Lead tutors to draw connections among concepts in the various lessons in line with the basic school curriculum.
Eg.
UPPER PRIMARY: estimating and measuring perimeter, surface area connects to rational numbers which also connect to buying and selling using money (BSC B4.1.3.2; B 5.3.2.2; B9.1.1.2).
JHS: the connection is that estimating quantities is link application of everyday commercial activities (BSC: B 5.1.4.1; B5.1.5.1; B9.1.1.2).

2.3 Lead tutors to use Think-Pair-Share to outline possible challenging areas in teaching their lessons.</td>
<td>discuss with the larger group.

2.2 In your phase groups, draw connections among concepts in the lesson and in line with the basic school curriculum.

2.3 Individually, outline the challenging areas in teaching your lesson, share with a member of the same phase</td>
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	Example: *Upper Primary (Teaching measurement): non-availability of resource materials for teaching shapes and space.* *JHS Core/Elective (rational and irrational & measurement of money and taxation)* • *Inadequate pedagogical content knowledge for teaching volume of taxation and irrational numbers*. • *Teaching a lesson without the relevant resources including ICT tools.* *Each of the above can be addressed through further reading and advance preparation – e.g. searching the internet for solutions to the identified challenging areas.* 2.4 Lead tutors to discuss misconceptions and barriers to learning in the lesson. *Example:* *a. UPPER PRIMARY: – Misconception of space shape and measurement is that a square is not a rectangle; a square is not a rhombus; slant height of a pyramid is considered as the actual height of the pyramids.* *b. JHS (Core/Elective)– Misconception of irrational number is that pi is the same as* $\frac{22}{7}$ *and measurement and*	group and then with the whole group. 2.4 In whole group, discuss misconceptions and barriers to learning in the lesson. *Example*: *a. UPPER PRIMARY: – misconception of space shape and measurement is that a square is not a rectangle; a square is not a rhombus; slant height of a pyramid is considered as the actual height of the pyramids.* *b. JHS (Core/Elective) – Misconception of irrational number is that pi is the same as* $\frac{22}{7}$ *and measurement and*	

	estimation of quantity and money are not the same. *Barriers to learning may include: weak prior knowledge, students engaging in non-academic activities to the detriment of academic engagement, lack of appropriate resources, lack of opportunity to use ICT tools due to power outages, interrupted internet connectivity, unavailability of internet bundle for accessing the internet, inadequate contact time due to staff meetings.*	*estimation of quantity and money are not the same.* *Barriers to learning may include: weak prior knowledge, students engaging in non-academic activities to the detriment of academic engagement, lack of appropriate resources, lack of opportunity to use ICT tools due to power outages, interrupted internet connectivity, unavailability of internet bundle for students, inadequate contact time due to staff meetings.*	
3. Planning for teaching, learning and assessment activities for the lesson/s • Reading and discussion of the teaching and learning activities • Noting and addressing areas where tutors may require clarification • Noting opportunities for making links to the Basic School Curriculum • Noting opportunities for integrating: GESI responsiveness and ICT and 21st C skills • Reading, discussion, and identification of continuous	**Teaching and learning activities** 3.1 Ask tutors to suggest teaching and learning activities for the lesson taking into account GESI issues. Example: i. equal opportunity is given to persons with SEN to ask and answer questions in class. ii. ensures equal participation of female and males during role play. iii. positive feedback is given to both males and females, iv. body language does not exclude girls or shows preferential treatment to boys, v. marginalized learners are encouraged to work with	**Teaching and learning activities** 3.1 Suggest teaching and learning activities for the lesson taking into consideration GESI. Example: i. equal opportunity is given to persons with SEN to ask and answer questions in class. ii. ensures equal participation of female and males during role play. iii. positive feedback is given to both males and females, iv. body language does not exclude girls or shows preferential treatment to boys, etc NTS 1a, b, c, d, 2b, e, f, 3b, c.	**40 mins**

assessment opportunities in the lesson. Each lesson should include at least two opportunities to use continuous assessment to support student teacher learning • Resources: ○ links to the existing PD Themes, for example, action research, questioning and to other external reference material: literature, on web, Utube, physical resources, power point; how they should be used. Consideration needs to be given to local availability ○ guidance on any power point presentations, TLM or other resources which need to be developed to support learning • Tutors should be expected to have a plan for the next lesson for student teachers	peers, etc. NTS 1a, b, c, d, 2b, e, f, 3b, c 3.2 Let tutors read the activities outlined in their course manuals and identify areas that require clarification. *Strategies to clarify the otherwise dark spots may include investigation, internet search, etc.* 3.3 Lead tutors to brainstorm to come up with some pedagogical approaches and their related core competencies likely to be inculcated in students and for that matter Basic School learners. eg. (a)UP/JHS (core) Strategy: Expository and Discussion Core Competencies: Problem solving, critical and creative thinking and communication. (b) JHS (Elective) Strategy: interactive and Collaborative group work, Discussion Core Competencies: Critical thinking skills, Collaborative learning and Problem-Solving Skills. 3.4 Ask tutors to discuss the assessment strategies to be used during teaching of the lessons. *NB*: *Assessment must involve; the subject project and Subject Portfolio*	3.2 Read the activities outlined in your course manual and identify areas that require clarification. 3.3 Brainstorm to come up with some pedagogical approaches and their related core competencies likely to be inculcated in students and for that matter Basic School learners. 3.4 Discuss the assessment strategies to be used during teaching of the lesson- Subject Project and Subject Portfolio). Assessment must be aligned with the NTEAP.	

	based on: Assign student teachers to complete teacher-made worksheets on operations and properties of rational and irrational numbers as found in the Primary School. UP, JHS (Core): Mathematics Curriculum JHS (Elective): *Project based on money and taxes and also answer questions on worksheets based on simple and compound interests*. *Assessment must be aligned to the NTEAP. Continuous assessment activities (assignments, quizzes, group presentations, etc, should be used to create subject projects and build subject portfolios (See, Appendix II)* 3.5 Lead tutors to discuss the various ways they can support student teachers to build their project and subject portfolio. 3.6 Let a tutor model a presentation of an activity using ICT tools and taking into consideration GESI issues (eg. Have patient for both gender who may be shy or afraid to speak; both genders taking the leading roles	3.5 Discuss the various ways they can support student teachers to build their project and subject portfolios. 3.6 Model a presentation of an activity using ICT tools and taking into consideration GESI issues in the lessons (NTS 1a, b, 2b, e, 3b, c, J; BSC pp. 23).	

	in their groups and in the demonstration of the use of ICT tools) to teach their lessons. (NTS 1a, b, 2b, e, 3b, c, J; BSC pp. 23 PD manual 21)		
4. Evaluation and review of session: • Tutors should Identifying critical friends to observe lessons and report at next session. • Identifying and addressing any outstanding issues relating to the lesson/s for clarification	**Reflective Activity** 4.1 Engage tutors in self-evaluation as well as encourage tutors to provide feedback of the PD session taking into consideration inclusivity – how to be patient with Stutterers, speak to leaners with hearing difficult to read their lips, using tactile and audio devices for person low/no vision is supported with brailed device, paying attention to all courses, etc. Ask tutors to show by fingers/nods their level of satisfaction with the session. (NTS 1a, 3i). 4.2 Engage tutors to identify unresolved issues relating to this lesson for clarification. *NB: Take note of all unresolved issues and use any of following strategies - put on SL/SWL WhatsApp platform for discussion -tutors to research for the next PD session for discussion*	**Reflective Activity** 4.1 Show by fingers/nods of 5 or 3 or 1 as to those who "really got it", "got some of it" or "didn't get it" respectively. Explain if you really got the lesson. 4.2 Reflect on the activities in the session and outline unresolved issues relating to the lesson.	**15 mins**

	4.3 Ask a critical friend to observe your teaching and record his/her findings to be presented after delivery or in the Next PD session. *NB*: *Remind tutors to identify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a)* Advance Preparation 4.4 Ask tutors to remember to prepare proforma for Lesson 9 taking note of important or distinctive aspects of the lesson and crosscutting issues and read Lesson 10 of the Course Manual on: Upper Primary - Handling Data 1 (Teaching and Assessing) JHS(Core) - Fractions 1 (Teaching and assessing). JHS(Elective) – Percentages and its applications *NB*: *i. Read the course manual the PD session guide, the NTEAP, and the NTS ahead of time to identify any outstanding issues relating to the lesson for clarification.* *ii. Collect all-inclusive resources (such as projector, flip chart and sticky notes) you need ahead of time, prepare*	4.3 Identify critical friend observes teaching and record his/her findings to be presented after delivery or in the Next PD session. *NB*: I*dentify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a)* Advance Preparation 4.4 Remember to prepare proforma for the lesson 9 taking note of important or distinctive aspects of the lesson and crosscutting issues and read Lesson 10 of the Course Manual on: Upper Primary - Handling Data 1 (Teaching and Assessing) JHS(Core) - Fractions 1 (Teaching and assessing). JHS(Elective) – Percentages and its applications.	

	samples of TLMs you may need and rehearse how these may be used to support the achievement of your goals.		

Age Levels/s:

a. Upper Grade
b. JHS (Core)
c. JHS (Elective)

Name of Subject/s:

a. Mathematics: Teaching and Assessing
b. Teaching and Assessing JHS Mathematics
c. Mathematics

Tutor PD Session for Lesson 10 in the Course Manual

Lesson Title:

a. Upper Primary: Data 1 (Teaching and Assessing)
b. JHS (Core): Fractions 1 (Teaching and Assessing)
c. JHS (Elective): Percentages and its applications

Focus: the bullet points provide the frame for what is to be done in the session. The SWL should use the bullets to guide what they write for the SL/HoD and tutors to do and say during each session. Each bullet needs to be addressed and specific reference should be made to the course manual/s.	**Guidance notes on Leading the session. *What the SL/HoDs will have to say during each stage of the session***	**Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each stage of the session.**	**Time in session**
1. Introduction to the session • Review prior learning • Reading and discussion of the introductory sections of the lesson up to and including learning outcomes and indicators • Overview of content and identification of any distinctive aspects of the lesson/s, NB: The guidance for SL/HoD should identify	**Introduction** 1.1 Begin with an ice breaker activity by engaging tutors in an investigational activity (e.g. Estimate the number of a group of people in the College as a percentage of a larger group – What percent of teaching staff are females?) 1.2 Ask tutors to tell how useful the week 9 PD session influenced their teaching over the week and how	**Introduction** 1.1 Ice breaker: Estimate the number of a group of people in the College as a percentage of a larger group – Example: What percent of teaching staff are females?) 1.2 Tell how useful the week 9 PD session influenced your teaching and how students will employ	**20 mins**

and address any areas where tutors might require clarification on any aspect of the lesson. NB: SL/HoD should ask tutors to plan for their teaching as they go through the PD session	students will employ the various concepts during the STS Field Experience. 1.3 Ask a critical friend to share with members, observation made during the enactment of lesson 9. Upper Primary: Measurement 2 (Teaching and Assessing) JHS (Core): Rational and Irrational numbers 1 (Teaching and Assessing) JHS (Elective): Money and taxes, wages, salaries and bank transactions 1.4 Lead tutors to discuss any challenges that arose during the enactment. Eg In what ways did the students appreciate the need to consider equality and equity during the lesson and during STS activities? *NB:* ➢ *Remember to put members into groups according to the phases to be taught in the semester and ask them to contribute to whole group discussions.* ➢ *Pay attention to all NTS references and salient points necessary for the development of their teaching plan.* 1.5 Ask tutors to silently read the introductory	the various concepts during the STS Field Experience. 1.3 As a critical friend, share with members, feedback on the observation you made during the enactment of lesson 9. Upper Primary: Measurement 2 (Teaching and Assessing) JHS (Core): Rational and Irrational numbers 1 (Teaching and Assessing) JHS (Elective): Money and taxes, wages, salaries and bank transactions 1.4 Discuss any challenges that arose during the enactment. Eg In what ways did the students appreciate the need to consider equality and equity during the lesson and during STS activities? *NB:* ➢ *Work in your phase group and contribute to the whole group discussion.* ➢ *Pay attention to all NTS references and salient points necessary for the development of your teaching plan.* 1.5 Silently read the introductory sections	

	sections of lesson 4 in the course manual (including the LOs). Let tutors suggest relevant previous knowledge of students that will support effective teaching and learning of the lesson. 1.6 Guide tutors to read the course manual and identify the purpose and state their expectations of the PD session on lesson 10 on post-in cards and share with the whole group. NTS 2b 1.7 Ask tutors in phase groups to discuss the important or distinctive aspects of lesson 10 including vocabulary, fundamental concepts and developing awareness of equity and diversity issues and issues on ICT. *Distinctive aspects* *a. Upper Primary- Developing the concepts of* Collecting, interpreting and presenting data *Exploring various sources of data* *b. JHS (core) – fractional parts, naming fractions and interpreting fractions.* c. *JHS (Elective) – Insurance (types and benefits), income tax, value added tax and custom duties*	of lesson 4 in the course manual (including the LOs. Suggest relevant previous knowledge of students that will support effective teaching and learning of the lesson. 1.6 Read the course manual silently and identify the purpose of lesson 10 and state on post-in cards, your expectations of the PD session of this lesson and share with the whole group. NTS 2b (NTS 2b). 1.7 Identify the important features of lesson 10 in the course manual taking note of cross cutting themes (including vocabulary, fundamental concepts and developing awareness of equity and diversity issues and issues on ICT). *Distinctive aspects* *a. Upper Primary- Developing the concepts of* Collecting, interpreting and presenting data *Exploring various sources of data* *b. JHS (core) – fractional parts, naming fractions and interpreting fractions.* c. *JHS (Elective) – Insurance (types and benefits), income tax, value added tax and custom duties*	

<table>
<tr>
<td>2. Concept Development (New learning likely to arise in lesson/s):
• Identification and discussion of new learning, potential barriers to learning for student teachers or students, concepts or pedagogy being introduced in the lesson, which need to be explored with the SL/HoD
NB: The guidance for SL/HoD should set out what they need to do to introduce and explain the issues/s with tutors</td>
<td>Concept Development

2.1 Ask tutors to identify familiar and unfamiliar concepts in their lessons and discuss with the larger group. Examples:
<table>
<tr><th>Familiar Concepts</th><th>Unfamiliar concepts</th></tr>
<tr><td>Collecting data Upper primary</td><td>Interpreting and presenting data</td></tr>
<tr><td>Naming fractions JHS(Core)</td><td>Interpreting fractions.</td></tr>
<tr><td>Insurance (types and benefits) JHS(Elective)</td><td>Income tax, value added tax and custom duties</td></tr>
</table>
2.2 Lead tutors to draw connections among concepts in the various lessons in line with the basic school curriculum.
NB: Encourage tutors to give examples beyond the suggested ones.
Example.
Upper Primary: Data collected can be presented on charts and graphs. B4.4.1.1
JHS (Core): Fractions expresses equal portions of a unit, a group of objects or as comparison. B4.1.3.1
JHS (ELECTIVE): Insurance and taxes are calculated using percentages. B5.1.5.1</td>
<td>Concept Development

2.1 Ask tutors to identify familiar and unfamiliar concepts in their lessons and discuss with the larger group. Examples:
<table>
<tr><th>Familiar Concepts</th><th>Unfamiliar concepts</th></tr>
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<tr><td>Insurance (types and benefits) JHS(Elective)</td><td>Income tax, value added tax and custom duties</td></tr>
</table>
2.2 In your phase group, draw connections among concepts in the lesson and in line with the basic school curriculum.</td>
<td>15 mins</td>
</tr>
</table>

	2.3 Ask tutors through Think-Pair-Share to outline possible challenging areas in teaching and assessing the lesson. *Example:* *Upper Primary:* *Developing the skill of interpreting data and* graphs in electronic media*.* *JHS (Core): Developing the skill of interpreted fraction through ICT tools.* *JHS (Elective): Developing understanding of the effects of value added tax on the citizens*	2.3 Individually, outline the challenging areas in your lesson, share with a member of the same phase group and then with the whole group.	
	2.4 Lead tutors to discuss misconceptions and barriers in teaching and learning of the lesson. *Example of Misconceptions:* *a. Upper Primary: – All forms of data can be represented by any chart and graph.* *b. JHS (Core) – Fractions expresses on part of a whole* *c. JHS (Electives): Value added tax is the same as custom duties* *Barriers may include weak prior knowledge, lack of appropriate resources, lack of opportunity to use ICT due to failure of electric power (lights-out), bad/interrupted network, unavailability of internet*	2.4 In whole group, discuss misconceptions and barriers in teaching and learning of the lesson. *Example of Misconceptions:* *a. Upper Primary: – All forms of data can be represented by any chart and graph.* *b. JHS (Core) – Fractions expresses on part of a whole* *c. JHS (Electives): Value added tax is the same as custom duties* *Barriers may include weak prior knowledge, lack of appropriate resources, lack of opportunity to use ICT due to failure of electric power (lights-out), bad/ interrupted network, unavailability of internet*	

	bundle for students, inadequate contact time due to staff meetings.	*bundle for students, inadequate contact time due to staff meetings.*	
3. Planning for teaching, learning and assessment activities for the lesson/s • Reading and discussion of the teaching and learning activities • Noting and addressing areas where tutors may require clarification • Noting opportunities for making links to the Basic School Curriculum • Noting opportunities for integrating: GESI responsiveness and ICT and 21st C skills • Reading, discussion, and identification of continuous assessment opportunities in the lesson. Each lesson should include at least two opportunities to use continuous assessment to support student teacher learning • Resources: ○ links to the existing PD Themes, for example, action research, questioning and	**Planning for Teaching and learning Activities for the Lesson** 3.1 Ask tutors in their phase groups to suggest teaching and learning activities for the lesson ensuring; i. Provision is made for SEN ii. Both genders take leading roles in group task iii. Even distribution of questions to different categories of learners based on gender, ability, previous experience, etc. referring to NTS 1a, b, c, d, 2b, e, f, 3b, c 3.2 Ask tutors to read the activities outlined in their course manuals and identify areas that require clarification. *NB: Refer to the Basic School Curriculum (BSC pp. xv – xvii) and http://uk.sagepub.com for explanations on pedagogical approaches" and search through "IXL Math".* 3.3 Lead tutors to brainstorm some pedagogical approaches and their impact on learning of the concepts taking into consideration inclusivity.	**Planning for Teaching and learning activities** 3.1 In your phase group, suggest teaching and learning activities for teaching the lesson ensuring; i. Provision is made for SEN ii. Both genders take leading roles in group task, etc referring to NTS 1a, b, c, d, 2b, e, f, 3b, c 3.2 Read the activities outlined in your course manual and identify areas that require clarification. *NB: Refer to the Basic School Curriculum (BSC pp. xv – xvii) and http://uk.sagepub.com for explanations on pedagogical approaches" and search through "IXL Math".* 3.3 Brainstorm some pedagogical approaches that can be employed during the lesson and their effectiveness towards learning of the concepts. Mention	**40 mins**

to other external reference material: literature, on web, Utube, physical resources, power point; how they should be used. Consideration needs to be given to local availability ○ guidance on any power point presentations, TLM or other resources which need to be developed to support learning • Tutors should be expected to have a plan for the next lesson for student teachers	*Example:* *i) The use of inquiry to explore generalizations for powers of numbers.* *(ii) The use of differentiation and scaffolding to ensure that no learner is left behind (BSC pp. xv)* *iii) Being patient with stutterers, using tactile or braille for visually challenged, providing peer support for those who might need, while you pay attention to all Phases.* 3.4 Ask tutors to explain some suggested teaching strategies that can help inculcate core competencies in student teachers and for that matter Basic School learners. *Example.* *a)* <u>Pedagogical approaches:</u> *Group Work to collect data and present them on graphs –* <u>*Associated 21st century skills*</u>*: Social and Leadership Skills* *b)* <u>Pedagogical approaches:</u> *Using investigation to identify various interpretation of fractions.* <u>*Associated 21st century skills*</u>*: Critical Thinking* *NB: Let tutors suggest more examples beyond those suggested above.*	any GESI issues that need consideration while using those approaches 3.4 Suggest teaching strategies to be used in achieving the Los of the lesson and explain how they can help inculcate core competencies in student teachers and for that matter Basic School learners. *Example.* *a)* <u>Pedagogical approaches:</u> *Group Work to collect data and present them on graphs –* <u>*Associated 21st century skills*</u>*: Social and Leadership Skills* *b)* <u>Pedagogical approaches:</u> *Using investigation to identify various interpretation of fractions.* <u>*Associated 21st century skills*</u>*: Critical Thinking* *NB: Suggest more examples beyond those suggested above.*	

	3.5 Ask tutors to mention some GESI responsive resources that can be used with the suggested approaches and strategies in achieving the LOs. *Example* *Resources may include supporting staff with experts in sign language as well as resources such as teacher and learner resource packs, textbooks, course manual, projectors, flip charts, sticky notes, braille, tactile materials, audio and audio-visuals that can be used in the teaching and learning of the concepts mentioned above (NTS 3j)* 3.6 Lead tutors to discuss assessment strategies ('as' and 'for') to be used during teaching of the lesson. *NB: Continuous assessment activities (assignments, quizzes, group presentations, etc. should be used to create subject projects and build subject portfolios)*. *Example: A project on how collecting discrete data and representing it on a graph* *(Upper Primary).* *A project on investigation of causes of 20 level 100 students' fear for fractions. (JHS - Core)*	3.5 Mention some GESI responsive resources that can be used with the suggested approaches and strategies in achieving the LOs. *Example* *Resources may include supporting staff with experts in sign language as well as resources such as teacher and learner resource packs, textbooks, etc* 3.6 Discuss to come out with assessment strategies ('as' and 'for') to be used during teaching of the lesson. *NB: Continuous assessment activities (assignments, quizzes, group presentations, etc. should be used to create subject projects and build subject portfolios)*. *Example: A project on how collecting discrete data and representing it on a graph* *(Upper Primary).* *A project on investigation of causes of 20 level 100 students' fear for fractions. (JHS - Core)*	

	A project on investigating the type of insurance 10 basic school teachers invest in and why. *(JHS – Elective)* *NB: Make reference to assessment in the course manual and NTEAP* 3.7 Ask each tutor to develop a sample assessment item based on the LOs and share with the whole group. *Example:* *Upper Primary – Develop a game that can be used in collecting data in the basic school classroom.* *JHS (Core) – Describe how to name fractions.* *JHS (Elective) – Use internet search to find 5 types of insurance.* 3.8 Lead tutors to discuss the various ways they can support student teachers to build their subject portfolio. *E.g. Encouraging student teachers to file all feedback on micro teaching in their folders.* 3.9 Ask a tutor to model a presentation of an activity using projector, internet search and taking into consideration equality and equity in assigning roles and in choosing material for teaching) NTS 1a, b, 2b, e, 3b, c, J; BSC pp. iii)	*A project on investigating the type of insurance 10 basic school teachers invest in and why.* *(JHS – Elective)* *NB: Make reference to assessment in the course manual and NTEAP* 3.7 Develop a sample assessment items based on the LOs and share with the whole group. *Example:* *Upper Primary – Develop a game that can be used in collecting data in the basic school classroom.* *JHS (Core) – Describe how to name fractions.* *JHS (Elective) – Use internet search to find 5 types of insurance.* 3.8 Discuss the various ways you can support student teachers to build their subject portfolio. *E.g. Encouraging student teachers to file all feedback on micro teaching in their folders.* 3.9 Prepare and model a presentation of an activity using projector, internet search and taking into consideration equality and equity in assigning roles and in choosing material for teaching) NTS 1a, b, 2b, e, 3b, c, J; BSC pp. iii)	

4. Evaluation and review of session: • Tutors need to identify critical friends to observe lessons and report at next session • Identifying and addressing any outstanding issues relating to the lesson/s for clarification	**Evaluation and review of session:** 4.1 Engage tutors in providing feedback of the PD session taking into consideration – Clarity of content, ICT integration, GESI, Twenty First Century Skills (NTS 1a, 3i, BSC pp. x-xvi) and make notes that will help them to teach Lesson 10. 4.2 Engage tutors to identify unresolved issues relating to this lesson for clarification. *NB: Take note of all unresolved issues that may need further research or consultation and use any of following strategies to address them.* *i. put on SL/SWL WhatsApp/ Telegram platform for discussion* *ii. tutors to research for the next PD session for discussion* 4.3 Ask tutors to identify a critical friend from the same or related discipline to observe the enactment of their lesson and provide feedback during the next PD Session (NTS 1a). Advance Preparation NB: Inform tutors to remember to prepare	**Evaluation and review of session:** 4.1 Reflect and provide feedback on this PD session taking into consideration – Clarity of content, pedagogical approaches employed, ICT integration, GESI, Twenty First Century Skills (NTS 1a, 3i, BSC pp. x-xvi)? and make notes that will help you to teach Lesson 10 4.2 Identify unresolved issues relating to this lesson for clarification. NB: *Put your unresolved issues unto* the department's *WhatsApp/ Telegram platform and research into the issues raised.* 4.3 Identify a critical friend from the same or related discipline to observe the enactment of your lesson and to provide feedback during the next PD Session (NTS 1a). Advance Preparation NB: Remember to prepare your teaching plan for	**15 mins**

	their teaching plan for Lesson 10 taking note of important or distinctive aspects of the lesson and crosscutting issues. Inform tutors to read Lesson 11 of the Course Manual on: Upper Primary - Handling Data 2 (Teaching and Assessing) JHS (Core) - Fractions 2 (Teaching and Assessing) JHS (Elective) – Teaching vectors: Learning, teaching and applying NB: *i. Read the course manual the PD session guide, the NTEAP, and the NTS ahead of time to identify any outstanding issues relating to the lesson for clarification.* *ii. Collect all-inclusive 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*	Lesson 10 taking note of important or distinctive aspects of the lesson and crosscutting issues. Read Lesson 11 of the Course Manual on: Upper Primary - Handling Data 2 (Teaching and Assessing) JHS (Core) - Fractions 2 (Teaching and Assessing) JHS (Elective) – Teaching vectors: Learning, teaching and applying NB: *i. Read the course manual the PD session guide, the NTEAP, and the NTS ahead of time to identify any outstanding issues relating to the lesson for clarification.* *ii. Collect all-inclusive 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*	

Age Level(s)

a. Upper Primary
b. JHS (Core)
c. JHS (Elective)

Name of Subject(s):

a. Mathematics: Teaching and Assessing
b. Teaching and Assessing JHS Mathematic
c. Mathematics

Tutor PD Session for Lesson 11 in the Course Manual

Lesson Tittle:

a. Upper Primary: Handling Data 2
b. JHS (Core): Fractions 2
c. JHS (Elective): Teaching vectors

Focus: the bullet points provide the frame for what is to be done in the session. The SWL should use the bullets to guide what they write for the SL/HoD and tutors to do and say during each session. Each bullet needs to be addressed and specific reference should be made to the course manual/s.	**Guidance notes on Leading the session. *What the SL/HoDs will have to say during each stage of the session***	**Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each stage of the session.**	**Time in session**
1. Introduction to the session • Review prior learning • A critical friend to share findings for a short discussion and lessons learned • Reading and discussion of the introductory sections of the lesson up to and including learning outcomes and indicators • Overview of content and identification of any distinctive	**Introduction** 1.1 Ice breaker activity: Begin with an investigational activity: *Example: A man was travelling and got to the middle of the journey. What numerical value will use to represent the distance covered.* 1.2 Ask tutors to tell how useful the week 9 PD session influenced their teaching over the week and how students will employ the various concepts during the STS Field Experience.	**Introduction** 1.1 Ice breaker activity: Begin with an investigational activity: *Example: A man was travelling and got to the middle of the journey. What numerical value will use to represent the distance covered.* 1.2 Tell how useful the week 9 PD session influenced their teaching over the week and how students will employ the various concepts during the STS Field Experience.	**20 mins**

aspects of the lesson/s, NB The guidance for SL/HoD should identify and address any areas where tutors might require clarification on any aspect of the lesson. NB SL/HoD should ask tutors to plan for their teaching as they go through the PD session	*NB:* *Lead tutors to use their preferred learning styles in reporting how useful the previous PD Session (Lesson 10) was.* 1.3 Ask a critical friend to give feedback on observation during enactment of the previous lesson. Upper Primary Handling Data 1 (Teaching and Assessing) JHS (core) Fractions 1 (Teaching and Assessing) JHS (Elective) Percentages and its applications *NB:* *Let a critical friend provide feedback during enactment of the previous lesson by using power point presentation.* 1.4 Ask tutors to read and discuss the introductory section of the lesson including the learning outcomes (LOs) in phase groups. *NB: Suggest relevant previous knowledge of students that will support effective teaching and learning of the lesson.* 1.5 Ask tutors to identify the purpose of the lesson from the course manual and state their expectations of the PD Session	*NB:* *Lead tutors to use their preferred learning styles in reporting how useful the previous PD Session (Lesson 10) was.* 1.3 Ask a critical friend to give feedback on observation during enactment of the previous lesson. Upper Primary Handling Data 1 (Teaching and Assessing) JHS (core) Fractions 1 (Teaching and Assessing) JHS (Elective) Percentages and its applications *NB:* *Let a critical friend provide feedback during enactment of the previous lesson by using power point presentation.* 1.4 Ask tutors to read and discuss the introductory section of the lesson including the learning outcomes (LOs) in phase groups. *NB: Suggest relevant previous knowledge of students that will support effective teaching and learning of the lesson.* 1.5 Ask tutors to identify the purpose of the lesson from the course manual and state their expectations of the PD Session	

	Purpose of the Lessons Upper Primary • Introduce student teachers to the course manual to enable them develop awareness of what they are expected of in this lesson • Develop student teachers' understanding of ideas of chance and uncertainty • Introduce the student teachers to prepare and model interactive, and innovative ways of teaching mathematics. JHS (core) • Introduce student teachers to the course manual to enable them develop awareness of what they are expected of in this lesson. • develop student teachers' understanding of the nature and importance of mathematics, as well as, how to teach mathematics to JHS learners • Introduce the student teachers to prepare and model interactive, and innovative ways of teaching mathematics, e a. JHS (Elective) • Introduce student teachers to vectors and related concepts and to model adequately how to handle similar concepts in the basic school mathematics curriculum	Purpose of the Lessons Upper Primary • Introduce student teachers to the course manual to enable them develop awareness of what they are expected of in this lesson • Develop student teachers' understanding of ideas of chance and uncertainty • Introduce the student teachers to prepare and model interactive, and innovative ways of teaching mathematics. JHS (core) • Introduce student teachers to the course manual to enable them develop awareness of what they are expected of in this lesson. • develop student teachers' understanding of the nature and importance of mathematics, as well as, how to teach mathematics to JHS learners • Introduce the student teachers to prepare and model interactive, and innovative ways of teaching mathematics, e JHS (Elective) • Introduce student teachers to vectors and related concepts and to model adequately how to handle similar concepts in the basic school mathematics curriculum	

	1.6 Ask tutors in phase groups to discuss the important or distinctive aspects of the lesson including vocabulary and fundamental concepts. <u>Distinct Aspects</u> Upper Primary: • Sample Spaces to Determine Probability • Experimental and theoretical probabilities JHS (core): • Use of manipulative materials and other resources (including ICT tools) in modelling multiplication on of fractions • Connecting common and decimal fractions and percent JHS (Elective): • Concept of vectors • Components of vectors <u>Vocabulary</u> Upper Primary: Chance, Uncertainty, theoretical, Probability and Data JHS (core): Multiplication, Division, Fraction and Percentages. JHS (Elective): Vector, Operation, Magnitude, Direction and Bearings <u>Fundamental Concepts</u> UP/JHS (core) • Introduce the lesson on integers as shape and space. • Shapes and their properties	1.6 Ask tutors in phase groups to discuss the important or distinctive aspects of the lesson including vocabulary and fundamental concepts. <u>Distinct Aspects</u> Upper Primary: • Sample Spaces to Determine Probability • Experimental and theoretical probabilities JHS (core): • Use of manipulative materials and other resources (including ICT tools) in modelling multiplication on of fractions • Connecting common and decimal fractions and percent JHS (Elective): • Concept of vectors • Components of vectors <u>Vocabulary</u> Upper Primary: Chance, Uncertainty, theoretical, Probability and Data JHS (core): Multiplication, Division, Fraction and Percentages. JHS (Elective): Vector, Operation, Magnitude, Direction and Bearings <u>Fundamental Concepts</u> UP/JHS (core) • Introduce the lesson on integers as shape and space. • Shapes and their properties	

	• Hand sketching of common solids (PD Themes 1 &3) JHS (Elective) Teaching: • Outcomes of an experiment • Probability of an outcome • Probability of a given event in table • Equally likely outcomes	• Hand sketching of common solids (PD Themes 1 &3) JHS (Elective) Teaching: • Outcomes of an experiment • Probability of an outcome • Probability of a given event in table • Equally likely outcomes	
2. Concept Development (New learning likely to arise in lesson/s): • Identification and discussion of new learning, potential barriers to learning for student teachers or students, concepts or pedagogy being introduced in the lesson, which need to be explored with the SL/HoD NB The guidance for SL/HoD should set out what they need to do to introduce and explain the issues/s with tutors	**Concept Development** 2.1 Ask tutors to identify familiar and unfamiliar concepts in their lessons and discuss with the larger group. <u>Familiar and Unfamiliar Concepts</u> Upper Primary Familiar Concepts: Sample Space and Event Unfamiliar concepts: • Ideas of chance and uncertainty. • determining experimental and theoretical probabilities JHS (Core): Examples of Familiar Concepts: • Multiplication and Division of fractions Unfamiliar concepts: • Multiplying whole numbers with fractions or Fractions with whole numbers • Connecting common and decimal fractions and percent JHS (Elective)	**Concept Development** 2.1 Identify familiar and unfamiliar concepts in their lessons and discuss with the larger group. <u>Familiar and Unfamiliar Concepts</u> Upper Primary Examples of Familiar Concepts: Sample Space and Event Unfamiliar concepts: • Ideas of chance and uncertainty. • determining experimental and theoretical probabilities JHS (Core): Examples of Familiar Concepts: • Multiplication and Division of fractions Unfamiliar concepts: • Multiplying whole numbers with fractions or Fractions with whole numbers • Connecting common and decimal fractions and percent JHS (Elective)	**15 mins**

	Examples of Familiar Concepts: • Concept of vectors • Components of vectors Unfamiliar concepts: • Magnitude and directions of vectors • Concept of bearing and back bearings 2.2 Lead tutors to draw connections among concepts in the various lessons in line with the Basic School Curriculum. *E.g.* *The connection between possibility of an event and certainty of an event (B5.4.2.1)-Upper Primary* 2.3 Ask tutors to use Think-Pair-Share to outline possible challenging areas in: Upper Primary: Handling Data 2 (PD Themes 1 &3) JHS(Core): Fractions 2 (PD Themes 1 &3) JHS (Elective): Teaching of Vectors *NB:* *In groups let both genders take leading role by using the internet to explore the possible challenging areas in the lessons Handling Data 2, Fractions 2 and Teaching of Vectors* (PD Themes 1 &3) 2.4 Lead tutors to discuss misconceptions and	Examples of Familiar Concepts: • Concept of vectors • Components of vectors Unfamiliar concepts: • Magnitude and directions of vectors • Concept of bearing and back bearings 2.2 Lead tutors to draw connections among concepts in the various lessons in line with the Basic School Curriculum. *E.g.* *The connection between possibility of an event and certainty of an event (B5.4.2.1)-Upper Primary* 2.3 Individually, outline the challenging areas in your lesson, share with a member of the same phase group and then with the whole group. *NB:* *In groups let both genders take leading role by using the internet to explore the possible challenging areas in the lessons Handling Data 2, Fractions 2 and Teaching of Vectors* (PD Themes 1 &3) 2.4 Participate actively in the discussion on	

	barriers in teaching and learning of the lesson. <u>Misconceptions</u> Example: a. Upper Primary: Learners believe that all events are possible b. JHS (core): Learners believe that the principles for multiplying two (2) fractions is the same as dividing two (2) fractions c. Learners believe that there is no difference between vectors and coordinate geometry. <u>Barriers</u> Upper Primary/JHS Core/JHS (Elective) Some possible barriers: • Different entry behaviours, • different learning needs, • misconceptions about mathematics • Socio-cultural issues 2.5 Support tutors to identify GESI responsive resources such as supporting staff with experts in sign language as well as resources such teacher and learner resource packs, textbooks, course manual, Posters illustrating people using mathematics in the jobs; video clips downloaded from the	misconceptions and barriers in teaching and learning of the lesson. <u>Misconceptions</u> Example: a. Upper Primary: Learners believe that all events are possible b. JHS (core): Learners believe that the principles for multiplying two (2) fractions is the same as dividing two (2) fractions c. Learners believe that there is no difference between vectors and coordinate geometry. <u>Barriers</u> Upper Primary/JHS Core/JHS (Elective) Some possible barriers: • Different entry behaviours, • different learning needs, • misconceptions about mathematics • Socio-cultural issues 2.5 Identify as many GESI responsive resources such as supporting staff with experts in sign language as well as resources such teacher and learner resource packs, textbooks, course manual, Posters illustrating people using mathematics in the jobs; video clips downloaded from the	

	internet (NTS 3j, PD Manual pp.38)	internet. (NTS 3j, PD Manual pp.38)	
3. Planning for teaching, learning and assessment activities for the lesson/s • Reading and discussion of the teaching and learning activities • Noting and addressing areas where tutors may require clarification • Noting opportunities for making links to the Basic School Curriculum • Noting opportunities for integrating: GESI responsiveness and ICT and 21st C skills • Reading, discussion, and identification of continuous assessment opportunities in the lesson. Each lesson should include at least two opportunities to use continuous assessment to support student teacher learning • Resources: ○ links to the existing PD Themes, for example, action research, questioning and to other external reference	**Teaching and learning activities** 3.1 Ask tutors to suggest teaching and learning activities for the lesson taking into account GESI issues. Upper Primary: *Example of suggested learning Activities:* *Discussing the use of manipulative materials and ICT tools in modelling situations by constructing a sample space to determine probabilities (PD Themes 1 &3* JHS (Core): *Discussing the use of manipulative materials and other resources (including ICT tools) in modelling multiplication of fractions (PD Themes 1 &3)* *HS(Elective):* *Example of suggested learning Activities:* *Discussion on the concept of vectors and related concepts* *NB:* *i. Make provision for physically challenged* *ii. Both genders take leading roles in group task* *iii. Even distribution of questions to different categories of learners based on gender, ability, previous experience, etc* *NTS 1a, b, c, d, 2b, e, f, 3b, c*	**Teaching and learning activities** 3.1 Suggest teaching and learning activities for the lesson taking into consideration GESI Upper Primary: *Example of suggested learning Activities:* *Discussing the use of manipulative materials and ICT tools in modelling situations by constructing a sample space to determine probabilities (PD Themes 1 &3* JHS (Core): *Discussing the use of manipulative materials and other resources (including ICT tools) in modelling multiplication of fractions (PD Themes 1 &3)* *HS(Elective):* *Example of suggested learning Activities:* *Discussion on the concept of vectors and related concepts* *NB:* *i. Make provision for physically challenged* *ii. Both genders take leading roles in group task* *iii. Even distribution of questions to different categories of learners based on gender, ability, previous experience, etc* *NTS 1a, b, c, d, 2b, e, f, 3b, c*	**40 mins**

material: literature, on web, Utube, physical resources, power point; how they should be used. Consideration needs to be given to local availability ○ guidance on any power point presentations, TLM or other resources which need to be developed to support learning • Tutors should be expected to have a plan for the next lesson for student teachers	3.2 Let tutors read the activities outlined in their course manuals and identify areas that require clarification. *NB:* *Identify challenging areas that require clarification, using Internet Search to clarify the otherwise dark spots in Handling Data 2 (B5.4.2.1, 4.4.1.1, 5.4.1.1) Fractions 2, and Teaching vectors.* 3.3 Lead tutors to brainstorm to come up with some pedagogical approaches and their related core competencies likely to be inculcated in students and for that matter Basic School learners. Examples: Strategies: Expository, Think pair Share, Discussion Brainstorming, interactive and Collaborative group work. Core Competencies: Problem solving, critical and creative thinking and communication. *NB:* *Both the strategies and the competencies are applicable to all the lesson:* • *Handling Data 2* • *Fractions 2* • *Teaching vectors*	3.2 Read the activities outlined in your course manual and identify areas that require clarification. *NB:* *Identify challenging areas that require clarification, using Internet Search to clarify the otherwise dark spots in Handling Data 2 (B5.4.2.1, 4.4.1.1, 5.4.1.1) Fractions 2, and Teaching vectors.* 3.3 Brainstorm to come up with some pedagogical approaches and their related core competencies likely to be inculcated in students and for that matter Basic School learners. Examples: Strategies: Expository, Think pair Share, Discussion Brainstorming, interactive and Collaborative group work. Core Competencies: Problem solving, critical and creative thinking and communication. *NB:* *Both the strategies and the competencies are applicable to all the lesson:* • *Handling Data 2* • *Fractions 2* • *Teaching vectors*	

	3.4 Ask tutors to explain some suggested teaching strategies that can help inculcate core competencies in the student teachers and for that matter basic school learners. e.g., Expository, Think pair Share, Discussion Brainstorming, interactive and Collaborative group work. *NB:* *Lead tutors to explain how the suggested strategies will inculcate core competencies in the student teacher* 3.5 Ask tutors to mention some GESI responsive resources that can be used with suggested approaches and strategies in achieving the Los. E.g. *Resources may include supporting staff with experts in sign language as well as resources such teacher and learner resource packs, textbooks, course manual, projectors, flip charts, sticky notes, braille, tactile materials, audio and audio-visuals that can be used in the teaching and learning of the concepts mentioned above (NTS 3j)*	3.4 Suggested teaching strategies that can help inculcate core competencies in the student teachers and for that matter basic school learners. e.g., Expository, Think pair Share, Discussion Brainstorming, interactive and Collaborative group work. *NB:* *Lead tutors to explain how the suggested strategies will inculcate core competencies in the student teacher* 3.5 Mention some GESI responsive resources that can be used with suggested approaches and strategies in achieving the Los. E.g. *Resources may include supporting staff with experts in sign language as well as resources such teacher and learner resource packs, textbooks, course manual, projectors, flip charts, sticky notes, braille, tactile materials, audio and audio-visuals that can be used in the teaching and learning of the concepts mentioned above (NTS 3j)*	

	3.6 Lead tutors to discuss assessment strategies ("as and "for") to be used during the lesson. *NB:* *Assessment must involve; the subject project and Subject Portfolio.* *(i)Example each for the two forms of project* *Upper Primary:* *Subject project (class exercise):* *In a bag containing 10 red, 4 green and 1 pink bottle tops, let a learner pick one bottle top from the bag. What is the probability of picking black?* *Subject Portfolio: A project on investigating probabilities for the possible outcomes of a simple experiment.* *JHS (Core):* *Subject project (class exercise):* *Show step by step how you will use Cuisenaire rods to solve the following:* $\frac{1}{2} \times \frac{3}{4}$, $\frac{4}{6} \times \frac{1}{2}$, *and* $\frac{1}{2} \times \frac{4}{7}$ *Subject Portfolio:* *A project on using Cuisenaire rods to teach multiplication of two fractions.* *JHS (Elective):* *Subject project (class exercise):* *List any five examples of vectors.*	3.6 Discuss to come up with assessment strategies ("as and "for") to be used during the lesson. *NB:* *Assessment must involve; the subject project and Subject Portfolio.* *(i)Example each for the two forms of project* *Upper Primary:* *Subject project (class exercise):* *In a bag containing 10 red, 4 green and 1 pink bottle tops, let a learner pick one bottle top from the bag. What is the probability of picking black?* *Subject Portfolio: A project on investigating probabilities for the possible outcomes of a simple experiment.* *JHS (Core):* *Subject project (class exercise):* *Show step by step how you will use Cuisenaire rods to solve the following:* $\frac{1}{2} \times \frac{3}{4}$, $\frac{4}{6} \times \frac{1}{2}$, *and* $\frac{1}{2} \times \frac{4}{7}$ *Subject Portfolio:* *A project on using Cuisenaire rods to teach multiplication of two fractions.* *JHS (Elective):* *Subject project (class exercise):* *List any five examples of vectors.*	

	Subject Portfolio: *A project on aapplications of vectors and bearings to real life situations.* *NB:* *Assessment must be aligned to the NTEAP. Continuous assessment activities (assignments, quizzes, group presentations, etc, should be used to create subject projects and build subject portfolios (See, Appendix II)* 3.7 Ask each tutor to develop a sample of assessment item based on the LOs and share with the whole group. *Example:* *Upper Primary* *Interview 6 basic school teachers during the STS activity to tell the manipulative materials and other resources (including ICT tools) in modelling situations by constructing a sample space to determine probabilities* *JHS (core) – In groups of three, basic school teachers should tell models and manipulatives to develop the concepts involving division of fractions.* *JHS (Elective)- As teachers to tell strategies for teaching operations of vectors.*	*Subject Portfolio:* *A project on aapplications of vectors and bearings to real life situations.* *NB:* *Assessment must be aligned to the NTEAP. Continuous assessment activities (assignments, quizzes, group presentations, etc, should be used to create subject projects and build subject portfolios (See, Appendix II)* 3.7 Develop a sample of assessment items based on the LOs and share with the whole group. *Example:* *Upper Primary* *Interview 6 basic school teachers during the STS activity to tell the manipulative materials and other resources (including ICT tools) in modelling situations by constructing a sample space to determine probabilities* *JHS (core) – In groups of three, basic school teachers should tell models and manipulatives to develop the concepts involving division of fractions.* *JHS (Elective)- As teachers to tell strategies for teaching operations of vectors.*	

	3.8 Lead tutors to discuss the various ways they can support student teachers to build their subject portfolio. *E.g. encouraging student teachers to file all their assignments with feedback in their folders.* 3.9 Ask a tutor to model a presentation of an activity using projector, internet search and taking into consideration GESI issues (eg. Both gender taking the leading roles in their groups) NTS 1a, b, 2b, e, 3b, c, J; BSC pp. iii)	3.8 Discuss the various ways you can support student teachers to build their subject portfolio. *E.g. encouraging student teachers to file all their assignments with feedback in their folders.* 3.9 Prepare and model a presentation of an activity using projector, internet search and taking into consideration GESI issues. (eg. Both gender taking the leading roles in their groups) NTS 1a, b, 2b, e, 3b, c, J; BSC pp. iii)	
4. Evaluation and review of session: • Tutors should Identifying critical friends to observe lessons and report at next session. • Identifying and addressing any outstanding issues relating to the lesson/s for clarification	**Reflective Activity** 4.1 Engage tutors in self-evaluation as well as encourage tutors to provide feedback of the PD session taking into consideration inclusivity – how to be patient with Stutterers, using tactile and audio devices for visually challenged, paying attention to all courses, etc. 4.1.1 Ask tutors to show by fingers/nods their level of satisfaction with the session. (NTS 1a, 3i). 4.2 Engage tutors to identify unresolved	**Reflective Activity** 4.1 Show by fingers/nods of 5 or 3 or 1 as to those who “really got it”, “got some of it” or “didn’t get it” respectively. Explain if you really got the lesson 4.2 Reflect on the activities in the session	**15 mins**

	issues relating to this lesson for clarification *NB:* *Take note of all unresolved issues and use any of following strategies* – *put on SL/SWL WhatsApp platform for discussion* – *tutors to research for the next PD session for discussion* 4.3 Ask a critical friend to observe your teaching and record his/her findings to be presented after delivery or in the Next PD session. NB: *Remind tutors to identify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a)* Advance Preparation 4.4 Ask tutors to read Lesson of the Course Manual on: Upper Primary - End of Semester Review (Lessons 1-11Measurement: (Teaching and Assessing) JHS(Core) - End of Semester Review (Lessons 1-11 JHS(Elective) – Revision of Lessons in the Course Manual	and outline unresolved issues relating to the lesson *NB:* *Take note of all unresolved issues and use any of following strategies* – *put on SL/SWL WhatsApp platform for discussion* – *tutors to research for the next PD session for discussion* 4.3 Identify critical friend observes teaching and record his/her findings to be presented after delivery or in the Next PD session. NB: I*dentify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a)* Advance Preparation 4.4 Ask tutors to read Lesson of the Course Manual on: Upper Primary - End of Semester Review (Lessons 1-11Measurement: (Teaching and Assessing) JHS(Core) - End of Semester Review (Lessons 1-11 JHS(Elective) – Revision of Lessons in the Course Manual	

	NB: *Read the course manual, the PD session guide ahead of time to identify any outstanding issues relating to the lesson for clarification.* *Collect all-inclusive resources (such as projector, flip chart and sticky notes) you need ahead of time, prepare samples of TLMs you may need.*	*NB:* *Read the course manual, the PD session guide ahead of time to identify any outstanding issues relating to the lesson for clarification.* *Collect all-inclusive resources (such as projector, flip chart and sticky notes) you need ahead of time, prepare samples of TLMs you may need.*	

Age Levels/s:

a. Upper Grade
b. JHS (Core)
c. JHS (Elective)

Name of Subject/s:

a. Mathematics: Teaching and Assessing
b. Teaching and Assessing JHS Mathematics
c. Mathematics

Tutor PD Session for Lesson 12 in the Course Manual

Lesson Title:

a. Upper Grade: End of Semester Review (Lessons 1-11)
b. JHS (Core): End of Semester Review (Lessons 1-11)
c. JHS (Electives): Revision of the lessons in the course

Focus: the bullet points provide the frame for what is to be done in the session. The SWL should use the bullets to guide what they write for the SL/HoD and tutors to do and say during each session. Each bullet needs to be addressed and specific reference should be made to the course manual/s.	**Guidance notes on Leading the session. *What the SL/HoDs will have to say during each stage of the session***	**Guidance Notes on Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each stage of the session.**	**Time in session**
1. Introduction to the session • Review prior learning • Reading and discussion of the introductory sections of the lesson up to and including learning outcomes and indicators • Overview of content and identification of any distinctive aspects of the lesson/s, NB: The guidance for SL/HoD should identify and address any areas	**Introduction** 1.1 Ice breaker activity: Engage tutors in an investigational activity by asking a member from each of the phases to lead a starter of their choices. 1.2 Ask tutors to tell how useful the week 11 PD session influenced their teaching over the week and how students will employ the various concepts during the STS Field Experience.	**Introduction** 1.1 Ice breaker: Participate in the investigational activity by leading a starter of your choices. 1.2 Tell how useful the week 11 PD session influenced their teaching and how students will employ the various concepts during the STS Field Experience.	**20 mins**

where tutors might require clarification on any aspect of the lesson. NB: SL/HoD should ask tutors to plan for their teaching as they go through the PD session	1.3 Ask a critical friend to share with members, feedback on the observation made during the enactment of lesson 11. That is: Upper Primary Handling Data 2: (Teaching and Assessment) JHS (Core) Fractions 2: (Teaching and Assessment) JHS (Elective) Teaching vectors 1.4 Lead tutors to discuss any challenges that arose during the enactment. Eg In what ways did the students appreciate the need to consider equality and equity during the lesson and during STS activities? *NB:* ➢ *Remember to put members into groups according to the phases to be taught in the semester and contribute to the whole group discussion.* ➢ *Pay attention to all NTS references and salient points necessary for the development of their teaching plan.* 1.5 Ask tutors to silently read the introductory sections of lesson 12 in the course manual (including the learning outcomes-LOs). Let tutors suggest relevant previous knowledge of	1.3 As a critical friend, share with members, feedback on the observation you made during the enactment of lesson 11. That is: Upper Primary Handling Data 2: (Teaching and Assessment) JHS (Core) Fractions 2: (Teaching and Assessment) JHS (Elective) Teaching vectors 1.4 Discuss any challenges that arose during the enactment. Eg In what ways did the students appreciate the need to consider equality and equity during the lesson and during STS activities? *NB:* ➢ *Work in your phase group and contribute to the whole group discussion.* ➢ *Pay attention to all NTS references and salient points necessary for the development of your teaching plan.* 1.5 Silently read the introductory sections of lesson 12 in the course manual (including the LOs. Suggest relevant previous knowledge of students that will support effective	

	students that will support effective teaching and learning of the lesson. 1.6 Guide tutors to read the course manual silently and identify the purpose and state their expectations of the lesson 12 PD session on post-in cards and share with the whole group. NTS 2b 1.7 Ask tutors in phase groups to discuss the important or distinctive aspects of lesson 12 including vocabulary and fundamental concepts. *Distinctive aspects* *a. Upper Primary*- A reflection on lessons 1-11 *b. JHS (core)* – A reflection on lessons 1-11 c. *JHS (Elective)* – A reflection on lessons 1-11	teaching and learning of the lesson. 1.6 Read the course manual silently and identify the purpose of lesson 12and state your expectations on post-in cards and share with the whole group. NTS 2b (NTS 2b). 1.7 In your phase group, identify the important features of lesson 12 in the course manual taking note of cross cutting themes (including developing awareness of equity and diversity issues and issues on ICT). *Distinctive aspects* *a. Upper Primary*- A reflection on lessons 1-11 *b. JHS (core)* – A reflection on lessons 1-11 c. *JHS (Elective)* – A reflection on lessons 1-11	
2. Concept Development (New learning likely to arise in lesson/s): • Identification and discussion of new learning, potential barriers to learning for student teachers or students, concepts or pedagogy being introduced in the	**Concept Development** 2.1 Ask tutors to mention the concepts handled in lessons 1 – 11. Upper Primary <u>Concepts:</u> Place value; The four basic operations on Number and Number facts; Fractions; Diagnosis and remediation, assessment resources/ records, and monitoring	**Concept Development** 2.1 Mention the concepts handled in lessons 1 – 11. Upper Primary <u>Concepts:</u> Place value; The four basic operations on Number and Number facts; Fractions; Diagnosis and remediation, assessment resources/ records, and monitoring	**15 mins**

lesson, which need to be explored with the SL/HoD NB: The guidance for SL/HoD should set out what they need to do to introduce and explain the issues/s with tutors	progress; Micro lessons and use of technology across upper primary numeracy; Shape and space; measurement; Handling Data JHS (Core) <u>Concepts:</u> Shape and Space Measurement; Angles, Polygons and Construction; Fraction; Micro Lessons and use of technology across JHS numeracy; Diagnosis and remediation, assessment resources, and monitoring progress; Handling Data and Chance; Rational and Irrational numbers JHS (Elective) <u>concepts:</u> Teaching shapes and space; Mensuration; Rigid Motion; Indices and logarithms; Handling Data; Probability; Percentages and its applications; Vectors 2.2 Lead tutors to draw connections among concepts within the various phases and outline how these ideas can be used in teaching Upper Primary School students. *NB: Encourage tutors to give examples beyond the suggested ones.* *Example* *Upper Primary: The four basic operations on Number are effectively done when there is*	progress; Micro lessons and use of technology across upper primary numeracy; Shape and space; measurement; Handling Data JHS (Core) <u>Concepts:</u> Shape and Space, Measurement; Construction, Angles and Polygons; Fraction; Micro Lessons and use of technology across JHS numeracy; Diagnosis and remediation, assessment resources, and monitoring progress; Handling Data and Chance; Rational and Irrational numbers JHS (Elective) <u>concepts:</u> Teaching shapes and space; Mensuration; Rigid Motion; Indices and logarithms; Handling Data; Probability; Percentages and its applications; Vectors 2.2 Discuss the possible connections among concepts within the various phases and outline how these ideas can be used in teaching Upper Primary School students. *NB: Encourage tutors to give examples beyond the suggested ones.* *Example* *Upper Primary: The four basic operations on Number are effectively done when there is*	

	adequate Place value knowledge. *BSC; B4.1.1.1, B5.1.1.1* *JHS (Core): Construction of polygons begins with the construction of angle; Portions of Data can be expressed as percentages (fractions). BSC;, B5.3.1.1* *JHS (ELECTIVE): Probability can be expressed in percentages BSC; B4.1.5.1, B5.1.5.1, B5.4.2.1* 2.3 Ask tutors through Think-Pair-Share to outline possible challenging areas in reviewing all the 11 lesson of the semester. *Example:* *a. Teaching all the lessons in a sequential order.* *b. Students ability to recollect all concepts* 2.4 Lead tutors to discuss misconceptions and barriers in learning of the lesson. *Misconceptions: Revision is not necessary to matured students* *Barriers may include weak prior knowledge in the concepts in the lessons, inadequate time to manage all 11 lessons, lack of opportunity to use ICT due to failure of electric power (lights-out), interrupted network, unavailability of internet bundle for students,*	*adequate Place value knowledge.* *BSC; B4.1.1.1, B5.1.1.1* *JHS (Core): Construction of polygons begins with the construction of angle; Portions of Data can be expressed as percentages (fractions). BSC;, B5.3.1.1* *JHS (ELECTIVE): Probability can be expressed in percentages BSC; B4.1.5.1, B5.1.5.1, B5.4.2.1* 2.3 Individually, write possible challenging areas in reviewing all the 11 lesson of the semester, share with an elbow partner and then with the whole group *Example:* *a. Teaching all the lessons in a sequential order.* *b. Students ability to recollect all concepts* 2.4 Discuss in the whole group, misconceptions and barriers in learning of the lesson. *Misconceptions: Revision is not necessary to matured students* *Barriers may include weak prior knowledge in the concepts in the lessons, inadequate time to manage all 11 lessons, lack of opportunity to use ICT due to failure of electric power (lights-out), interrupted network, unavailability of internet bundle for students,*	

	inadequate contact time due to staff meetings.	*inadequate contact time due to staff meetings.*	
3. Planning for teaching, learning and assessment activities for the lesson/s • Reading and discussion of the teaching and learning activities • Noting and addressing areas where tutors may require clarification • Noting opportunities for making links to the Basic School Curriculum • Noting opportunities for integrating: GESI responsiveness and ICT and 21st C skills • Reading, discussion, and identification of continuous assessment opportunities in the lesson. Each lesson should include at least two opportunities to use continuous assessment to support student teacher learning • Resources: ○ links to the existing PD Themes, for example, action research, questioning and to other external	**Planning for Teaching and learning Activities for the Lesson** 3.1 Ask tutors in their phase groups to suggest reflective activities for reviewing the past lessons ensuring; i. Provision is made for SEN ii. Both genders take leading roles in group task iii. Even distribution of questions to different categories of learners based on gender, ability, previous experience, etc. referring to NTS 1a, b, c, d, 2b, e, f, 3b, c 3.2 Ask tutors to read the activities outlined in lesson 12 of their course manuals and identify areas that require clarification. NB: *Refer to the Basic School Curriculum (BSC. Upper primary) and through "IXL Math" for explanations on the concepts under this lesson.* 3.3 Lead tutors to brainstorm some pedagogical approaches and their impact on reflecting on the concepts taking into consideration inclusivity.	**Planning for Teaching and learning activities** 3.1 In your phase group, suggest reflective activities for reviewing the past lessons ensuring; i. Provision is made for SEN ii. Both genders take leading roles in group task, etc. referring to NTS 1a, b, c, d, 2b, e, f, 3b, c 3.2 Read the activities outlined in lesson 12 in your course manual and identify areas that require clarification. NB: *Refer to the Basic School Curriculum (BSC. Upper primary) and through "IXL Math" for explanations on the concepts under this lesson.* 3.3 Brainstorm some pedagogical approaches that can be employed during the lesson and their effectiveness towards reflecting on the concepts. Mention any	**40 mins**

reference material: literature, on web, Utube, physical resources, power point; how they should be used. Consideration needs to be given to local availability ○ guidance on any power point presentations, TLM or other resources which need to be developed to support learning • Tutors should be expected to have a plan for the next lesson for student teachers	*Example:* *i) The use of inquiry to explore the relationship that exist between the topics handled in the semester* *(ii) The use of differentiation and scaffolding to ensure that no learner is left behind (BSC pp. xv)* *iii) Being patient with stutterers, using tactile or braille for visually challenged, providing peer support for those who might need, while you pay attention to all Phases.* 3.4 Ask tutors to explain some suggested teaching strategies that can help inculcate core competencies in student teachers and for that matter Basic School learners. *Example:* *a)* <u>Pedagogical approaches:</u> *Group Work to explore the relationship among <u>Associated 21st century skills</u>:* *Social and Leadership Skills* *b)* <u>Pedagogical approaches:</u> *Using investigation to identify generalizations on laws of indices <u>Associated 21st century skills</u>:* *Critical Thinking*	GESI issues that need consideration while using those approaches 3.4 Suggest teaching strategies to be used in achieving the LOs of the lesson and explain how they can help inculcate core competencies in student teachers and for that matter Basic School learners. *Example:* *a)* <u>Pedagogical approaches:</u> *Group Work to explore the relationship among <u>Associated 21st century skills</u>:* *Social and Leadership Skills* *b)* <u>Pedagogical approaches:</u> *Using investigation to identify generalizations on laws of indices <u>Associated 21st century skills</u>:* *Critical Thinking*	

	NB: Let tutors suggest more examples beyond those suggested above. 3.5 Ask tutors to mention some GESI responsive resources that can be used with the suggested approaches and strategies in achieving the LOs. E.g. *Resources may include supporting staff with experts in sign language as well as resources such as teacher and learner resource packs, grid boards, graph sheets, textbooks, course manual, projectors, flip charts, sticky notes, braille, tactile materials, audio and audio-visuals that can be used in the teaching and learning of the concepts mentioned above (NTS 3j)* 3.6 Lead tutors to discuss assessment strategies ('as' and 'for') to be used during the reflective activities. *NB: Continuous assessment activities (assignments, quizzes, report writing, group presentations, etc. should be used to create subject projects and build subject portfolios)*. *Example:* *A Report on the connections among measurement, Fraction*	*NB: Let tutors suggest more examples beyond those suggested above.* 3.5 Mention some GESI responsive resources that can be used with the suggested approaches and strategies in achieving the LOs. E.g. *Resources may include supporting staff with experts in sign language as well as resources such as teacher and learner resource packs, textbooks, etc* 3.6 Using discussion, lead tutors to come out with assessment strategies ('as' and 'for') to be used during teaching of the lesson. *NB: Continuous assessment activities (assignments, quizzes, report writing, group presentations, etc. should be used to create subject projects and build subject portfolios)*. *Example:* *A Report on the connections among measurement, Fraction*	

	and handling data (Upper Primary) *A project on investigating different games that can be used in teaching challenging topics fraction (JHS - Core)* *A project on developing TLMs for teaching percentages and vectors. (JHS – Elective)* *NB: Make reference to assessment in the course manual and NTEAP* 3.7 Ask each tutor to develop a sample of assessment item based on the LOs and share with the whole group. *Example:* *Interview 5 students in your class on any 2 concepts that are related and state the connections* 3.8 Lead tutors to discuss the various ways they can support student teachers to build their subject portfolio. *E.g. Encouraging student teachers to file all feedback on micro teaching in their folders.* 3.9 Ask a tutor to model a presentation of an activity using projector, internet search and taking into consideration equality and equity in assigning roles and in choosing material for teaching)	*and handling data (Upper Primary)* *A project on investigating different games that can be used in teaching challenging topics fraction (JHS - Core)* *A project on developing TLMs for teaching percentages and vectors. (JHS – Elective)* *NB: Make reference to assessment in the course manual and NTEAP* 3.7 Develop a sample of assessment items based on the LOs and share with the whole group. *Example:* *Interview 5 students in your class on any 2 concepts that are related and state the connections* 3.8 Discuss the various ways you can support student teachers to build their subject portfolio. *E.g. Encouraging student teachers to file all feedback on micro teaching in their folders.* 3.9 Prepare and model a presentation of an activity using projector, internet search and taking into consideration equality and equity in assigning roles and in choosing material for teaching)	

	NTS 1a, b, 2b, e, 3b, c, J; BSC pp. iii)	NTS 1a, b, 2b, e, 3b, c, J; BSC pp. iii)	
4. Evaluation and review of session: • Tutors need to identify critical friends to observe lessons and report at next session • Identifying and addressing any outstanding issues relating to the lesson/s for clarification	**Evaluation and review of session:** 4.1 Engage tutors in providing feedback of the PD session taking into consideration – Clarity of content, ICT integration, GESI, Twenty First Century Skills (NTS 1a, 3i, BSC pp. x-xvi) and make notes that will help them to teach Lesson 1. 4.2 Engage tutors to identify unresolved issues relating to this lesson for clarification. *NB: Take note of all unresolved issues that may need further research or consultation and use any of following strategies to address them.* *i. put on SL/SWL WhatsApp/ Telegram platform for discussion* *ii. tutors to research for the next PD session for discussion* 4.3 Ask tutors to evaluate the PD sessions by indicating how the PD sessions have influenced their teaching	**Evaluation and review of session:** 4.1 Reflect and provide feedback on this PD session taking into consideration – Clarity of content, pedagogical approaches employed, ICT integration, GESI, Twenty First Century Skills (NTS 1a, 3i, BSC pp. x-xvi)? and make notes that will help you to teach Lesson 1 4.2 Identify unresolved issues relating to this lesson for clarification. NB: *Put your unresolved issues unto* the department's *WhatsApp/ Telegram platform and research into the issues raised.* *i. put on SL/SWL WhatsApp/ Telegram platform for discussion* *ii. tutors to research for the next PD session for discussion* 4.3 Ask tutors to evaluate the PD sessions by indicating how the PD sessions have influenced their teaching	**15 mins**

	Advance Preparation NB: ➢ *Inform tutors to remember to prepare their teaching plan for Lesson 12 taking note of important or distinctive aspects of the lesson and crosscutting issues.* ➢ *Read over lesson 12 in the course manual, the PD session guide, the NTEAP and the NTS to identify any outstanding issues relating to the lesson for clarification.* ➢ *Collect all-inclusive 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 lesson.*	Advance Preparation NB: ➢ *Remember to prepare their teaching plan for Lesson 12 taking note of important or distinctive aspects of the lesson and crosscutting issues.* ➢ *Read over lesson 12 in the course manual, the PD session guide, the NTEAP and the NTS to identify any outstanding issues relating to the lesson for clarification.* ➢ *Collect all-inclusive 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 lesson.*	

Appendix 1

The PD session check list: supporting B.Ed. implementation.

In some cases, to support implementation and address recent developments the PD session writers may need to add detail to what is covered in the course manuals

What to Include in PD sessions	Checked and In Place.
Course introductions and conclusions • The first PD session of each semester introduces the course manual/s, course expectations and course assessment components • The final PD session provides the opportunity to review student teachers' learning from the course	
Prior knowledge: Points for tutors on activating student teachers' prior knowledge.	
Basic School Curriculum: when topics for student teachers are from the Basic School Curriculum the PD session makes explicit links.	
LO: relevance to each session is introduced	
Interactive teaching PD **s**essions provide opportunities for SL/HOD to model interactive approaches to teaching and learning that tutors will use to support student teachers	
Lesson Learning outcomes and indicators are introduced	
Integration of subject specific content and subject specific pedagogy is modelled in PD sessions through activities for tutors. Any potentially new concepts introduced in the lesson are explored with tutors	
Subject Specific Training: where subjects have been grouped together for the PD sessions, tutors are guided to engage with activities in the subject course manuals to ensure the PD is subject specific. Where appropriate there is direct page or point references to activities in each of the relevant subject course manuals.	
Integrating GESI: each PD session explicitly includes at least two (2) teaching and learning activities from the course manual/s which should be used to promote student teachers' understanding of GESI responsiveness and support the inclusion of all pupils.	
Assessment, integrating and embedding NTEAP practices: PD sessions include at least two (2) continuous assessment opportunities which will support tutors in developing student teacher's understanding of, and ability to apply, assessment for or as learning.	
Age Specific Training: where relevant tutors are guided to specific activities in the course manuals for EG, UP and JHS. Tutors are advised to group student teachers according to the age they are training for.	
Building in STS: STS tasks are integrated into the PD sessions. Preparing for work in school and opportunities for tutors to draw on what student teachers are learning in school by, for example, targeting observations linked directly to the themes in the course manuals.	

Building in activities which support the development of 21c skills in particular the use of ICT. The development of these is integrated into the PD sessions including the use of ICT to support learning. Each PD session should include at least two (2) examples of students being required to use ICT to extend their learning.	
Resources /TLM. Where specific resources are required, it is clear where tutors can access them e.g., videos, online resources or readings.	

Appendix 2.
Course Assessment Components briefly

COMPONENT	SUBJECT PROJECT **1 per course per semester, individual or collaborative student teacher work.**	SUBJECT PORTFOLIO **1 per course per semester, individual or collaborative student teacher work.**
WHAT IS IT?	**The Subject project** is an assignment designed to enable student teachers to demonstrate achieving one or more of the CLOs, progress towards achieving identified NTS, development of knowledge and understanding of: the Basic School Curriculum, GESI responsiveness, using ICT mand 21stC skills	**The Subject Portfolio** is the deliberate collection of student teachers' work that has been selected and organized for a particular subject to show student teacher's learning and progress to achieving the CLOs through examples of his or her best work.
CONSTITUENTS	**Introduction:** a clear statement of aim and purpose **Methodology**: what the student teacher has done and why to achieve the aim and purpose of the project **Substantive or main section**: Presentation of any artifacts, experiments, TLMs created for the project; presentation, analysis, and interpretation of what has been done, learned, or found out in relation to focus of the project. **Conclusion:** Statement of the key outcomes of the project; reflection on what the student teacher has learnt	**3 items of work produced during the semester selected by student teachers with tutor support** during the semester as best examples of their progress and 200-word reflection on the items* **Or 2 items of work and** **A mid semester assessment**: case study, reflective note, quiz. * For each item they select, Student teacher's need to reflect on progress against identified NTS; achieving CLOs; increased knowledge and understanding of the Basic School Curriculum, GESI responsiveness, integration of ICT and how they could have approached developing the item differently to achieve a better outcome
WEIGHT	**Overall weighting of project = 30%** **Weighting of individual parts of project out of 100** • **Introduction – 10** • **Methodology – 20** • **Substantive section – 40** • **Conclusion – 30**	**Overall weighting of project = 30%** **Weighting of individual parts of portfolio out of 100** **i(a). Each of the three (3) items selected by the student teacher is 30 % (90%).** **i(b) Presentation and organisation of portfolio 10%.** **OR** **ii(a). Each of the two (2) items selected by the student teacher is 30 % (60%).** **ii(b)Mid semester assessment 30%** **ii(c)Presentation and organisation of portfolio 10%**
EXAM	**End of semester Exam, weight 40%. To assess:** achievement of one or more of the CLOs, progress towards achieving identified NTS, development of knowledge and understanding of the Basic School Curriculum, ability to use GESI responsive approaches and to integrate ICT and 21st C skills in teaching and learning	

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