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

HANDBOOK FOR TUTORS





and Prudence





The Government of Ghana







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# 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 '21<sup>st</sup> 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):	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 1 in the Course Manual**

- 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

pro wh the she gu for tut du Ea ad ref ma ma	cus: the bullet points ovide the frame for nat is to be done in e session. The SWL ould use the bullets to ide what they write r the SL/HoD and tors to do and say ring each session. ch bullet needs to be dressed and specific ference should be ade to the course anual/s.	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
-	: Introduction to the mester – in session	1a: Introduction	20 mins
on		1.1 Ice breaker: Estimate the number of	
•	e Introduction to the	handspans that can make the height of Subject	
•	purpose of the	Lead and prove by measuring.	
	specialisms: EG, UP		
	and JHS	1.2 Discuss the overview of the phases to be	
•	Overview of subject/s	covered in the course this PD session.	
	age level/s to be		
	covered in the PD	Upper Primary: Place value (Teaching and	
	sessions and	Assessing)	
	guidance on grouping	JHS (Core) - Measurement, Shape and Space:	
	tutors according to	(Teaching and Assessing)	
	the subject/s, age	JHS (Elective) – Teaching investigations with shapes	
	levels/s.	and space	
•	Introduction to the		
	course manual/s	NB:	
•	Overview of course	Please work in your phase group and contribute in	
	learning outcomes	the whole group.	
•	Introduction to the	1.3. Individually, scan through the course manual	
	two continuous	and identify the purpose of the specialisms	

<b></b>		
assessment	(Upper Primary, JHS Core and JHS Elective)	
components to be	and share with the whole group.	
undertaken in each		
subject during the	NB:	
semester (See Course	Pay attention to all NTS references and salient	
Assessment	points necessary for the development of their	
Components at a	teaching plan.	
Glance Appendix 2)		
NB: in subjects where	1.4. Read the introduction of your course manual	
there are no	and discuss the Course learning Outcomes	
assessment	(CLOs) in groups as appropriate.	
components in the	1 E With reference to Annordiy 2 of this DD	
course manuals	1.5. With reference to Appendix 2 of this PD	
examples will need to	manual, discuss the two continuous	
be provided for	assessment components to be undertaken	
SL/HoD.	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:	
	$\alpha$ . Samples of problem -solving tasks with written	
	explanations of how the problems were solved and	
	how this can be taught.	
	<i>β. Charts and graphs with written explanations of how and why they were created and how this can</i>	
	be taught.	
	y. Use of computer analyses conducted as well as	
	use of software to teach mathematics and evaluate	
	how effective they are.	
	$\delta$ . 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	1b Introduction to the Lesson	
session		
Review prior learning	1.6 Tell how useful the previous semester's PD	
<ul> <li>Reading and</li> </ul>	session was and how it influenced your teaching	
discussion of the	in year 3 semester 1. Provide examples of how	
introductory sections	students employed the various strategies and	
of the lesson up to	skills during the basic school classroom work	
and including	including STS Field Experience in year 3	
learning outcomes	semester 1 and how student teachers will be	
and indicators	prepared to employ the various strategies and	

<ul> <li>Overview of content and identification of any distinctive accords of the</li> </ul>	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	
aspects of the		
lesson/s,	lesson 1 in the course manual including the	
NB: The guidance for	Learning Outcomes (LOs) in your phase groups.	
SL/HoD should identify		
and address any areas	1.8 In your phase group, discuss the important or	
where tutors might	distinctive aspects of lesson 1 including	
require clarification on	vocabulary and fundamental concepts.	
any aspect of the lesson.	Distinctive aspects	
NB: SL/HoD should ask	Example:	
tutors to plan for their	a. Upper Primary:	
teaching as they go	Place value in numeration systems; counting and	
through the PD session	representing numbers in multiple of ways and indifferent bases.	
	NB:	
	Consider leaners as knowledge constructors but not	
	as passive listeners in the learning environment.	
2. Concept	Concept Development	15 mins
Development (New		
learning likely to	2.1 Identify familiar and unfamiliar concepts in your	
arise in lesson/s):	lesson and discuss with the larger group	
Identification and		
discussion of new	2.2 In your phase groups, draw connections among	
learning, potential	concepts in the lesson and in line with the basic	
barriers to learning	school curriculum.	
for student teachers		
or students, concepts	2.3 Individually, outline the challenging areas in	
or pedagogy being	teaching your lesson, share with a member of	
introduced in the	the same phase group and then with the whole	
lesson, which need to	group.	
be explored with the	2.4 In whole group discuss missensentions and	
SL/HoD	2.4 In whole group, discuss misconceptions and	
<i>NB:</i> The guidance for	barriers to learning in the lesson.	
SL/HoD should set out	Example:	
what they need to do to	a. UPPER PRIMARY: – In place-value, students do	
introduce and explain	not consider the place of a number as showing the	
the issues/s with tutors	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 of internet bundle for students, inadequate contact time due to staff meetings.	
3.	Planning for teaching, learning and assessment activities for the lesson/s	<ul> <li>Planning for Teaching and learning activities</li> <li>3.1 Suggest teaching and learning activities for the lesson by ensuring;</li> <li>i. Provision is made for SEN</li> </ul>	40 mins
•	Reading and discussion of the teaching and learning activities	ii. Both genders take leading roles in group task, etc making reference to NTS 1a, b, c, d, 2b, e, f, 3b, c.	
•	Noting and addressing areas where tutors may require clarification	<ul> <li>3.2 Read the activities outlined in your course manual and identify areas that require clarification.</li> <li>NB: Refer to the Basic School Curriculum (BSC</li> </ul>	
•	Noting opportunities for making links to the Basic School Curriculum	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".	
•	Noting opportunities for integrating: GESI responsiveness and ICT and 21 <sup>st</sup> Century skills	3.3 Brainstorm to come up with some pedagogical approaches that can be employed during the lesson and their impact on learning of the concepts under consideration. Example:	
•	Reading, discussion, and identification of continuous assessment opportunities in the lesson. Each lesson should include at least two	<ul> <li>i) The use of inquiry to explore successfully how Geometry relate to all members of the society.</li> <li>(ii) The use of differentiation and scaffolding to ensure that no learner is left behind (BSC pp. xv)</li> <li>iii) Being patient with stutterers</li> <li>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.</li> </ul>	
•	opportunities to use continuous assessment to support student teacher learning Resources: o links to the existing PD Themes, for	<ul> <li>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).</li> <li>Example: Using Group Work to discuss how Geometry relate to the society: Social and Leadership Skills, Collaborative Learning, etc.</li> </ul>	
	example, action research, questioning and to other external reference material:	<ul> <li>3.5 Mention some GESI responsive and culturally relevant resources that can be used with the suggested approaches and strategies to achieve the LOs.</li> <li>Example: Resources may include supporting staff with experts in sign language as well as resources</li> </ul>	

4. Evaluation and	1a, b, 2b, e, 3b, c, J; BSC pp. iii). Evaluation and review of session:	15 mins
	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	
	their folders. ii) Encouraging students to take notes in class and filing them.	
	i) Encouraging student teachers to file all their assignments, presentation, quizzes, reports, pictures of activities/events, etc with feedback in their folders	
	Example:	
	3.8 Discuss the various ways you can support student teachers to build their subject portfolio.	
	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	
	3.7 Develop a sample of assessment items based on the LOs and share with the whole group.	
expected to have a plan for the next lesson for student teachers	A project on investigating measurement in leaner's community using non-standard unit (JHS). Make reference to assessment in the course manual and NTEAP	
developed to support learning • Tutors should be	A project on investigation of space and shape between prism and pyramid (JHS).	
power point presentations, TLM or other resources which need to be	Example: A project on how to develop and use a known place value material in teaching place value - UPPER PRIMARY	
Consideration needs to be given to local availability o guidance on any	NB: Continuous assessment activities (assignments, quizzes, group presentations, etc. should be used to create subject projects and build subject portfolios).	
resources, power point; how they should be used.	3.6 Discuss assessment strategies ('as' and 'for') to be used during teaching of the lesson.	
literature, on web, Utube, physical	such teacher and learner resource packs, textbooks, etc	

<ul> <li>Tutors need to identify critical friends to observe lessons and report at next session</li> <li>Identifying and addressing any outstanding issues relating to the lesson/s for clarification</li> <li>Identifying and addressing any outstanding issues relating to the lesson/s for clarification</li> <li>Identify a critical friend from the department's WhatsApp/ Telegram platform and research into the issues raised.</li> <li>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).</li> <li>Advance Preparation</li> <li>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 2) JHS (Elective) – Operations and Properties of Integers (number sense): Learning, teaching and applying</li> </ul>			
NB: <i>i. Read the course manual the PD session guide, the</i> <i>NTEAP, and the NTS ahead of time to identify any</i> <i>outstanding issues relating to the lesson for</i>	<ul> <li>identify critical friends to observe lessons and report at next session</li> <li>Identifying and addressing any outstanding issues relating to the lesson/s for</li> </ul>	<ul> <li>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</li> <li>4.2 Identify unresolved issues relating to this lesson for clarification.</li> <li>NB: <i>Put your unresolved issues unto</i> the department's <i>WhatsApp/ Telegram platform and research into the issues raised</i>.</li> <li>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).</li> <li>Advance Preparation</li> <li>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)</li> <li>JHS (Core) - Construction, Angles and Polygons: (Teaching and Assessing 2)</li> <li>JHS (Elective) – Operations and Properties of Integers (number sense): Learning, teaching and applying</li> <li>NB:</li> <li><i>i. Read the course manual the PD session guide, the NTEAP, and the NTS ahead of time to identify any</i></li> </ul>	

Age Lev

Name of Subject/s:

- a. Upper Primary b. JHS (Core)
- a. Mathematics: Teaching and Assessing
  - b. Teaching and Assessing JHS Mathematic
- c. JHS (Elective)
- c. Mathematics

#### Tutor PD Session for Lesson 2 in the Course Manual

- 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 Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each stage of the session.	Time in session
<ol> <li>Introduction to the session</li> <li>Review prior learning</li> <li>A critical friend to share findings for a short discussion and lessons learned</li> </ol>	<ul> <li>Introduction</li> <li>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?</li> </ul>	20 mins
<ul> <li>Reading and discussion of the introductory sections of the lesson up to and including learning outcomes and indicators</li> </ul>	<ul> <li>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 various strategies and skills during the basic school classroom work in STS Field Experience in year 4 semester 1.</li> <li>1.3 As a critical friend, share your observation on</li> </ul>	
<ul> <li>Overview of content and identification of any distinctive aspects of the lesson/s,</li> <li>NB The guidance for SL/HoD should identify</li> </ul>	the previous lesson. <i>NB:</i> <i>Things tutor might have observed; tutor's choice of</i> <i>words, pedagogical content knowledge, content</i> <i>knowledge subject matter, use of ICT tools,</i> <i>consideration of GESI issues and the use of NTEAP</i>	

and address any areas where tutors might require clarification on any aspect of the lesson. NB SL/HoD should ask	<ul><li>1.4 Read and discuss the introductory section of the lesson up to Learning Outcomes (Los).</li><li>NB:</li></ul>	
tutors to plan for their teaching as they go through the PD session	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 aspects of the s lesson including vocabulary and fundamental concepts.	
	Distinct Fundamental Concepts 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 Vocabulary	
	Upper Primary - Basic operations JHS (core) – Construct, perpendicular, parallel,	
	bisect JHS (Elective): surface area, volume	
2. Concept	Concept Development	15 mins
Development (New	2.1 Identify families and unfamilies concepts in	
learning likely to arise in lesson/s):	2.1 Identify familiar and unfamiliar concepts in their lessons and discuss with the larger group.	
<ul> <li>Identification and</li> </ul>	Familiar and Unfamiliar Concepts	
discussion of new	Upper Primary	
learning, potential barriers to learning	Familiar Concepts: operations on numbers up to 9,999	
for student teachers or students, concepts	Unfamiliar concepts: operations on numbers up to 10,000,000	
or pedagogy being	JHS (core)	
introduced in the lesson, which need to	Familiar Concepts: Constructing lines and angles	
be explored with the	Unfamiliar concepts: Copying and bisecting lines	
SL/HoD	and angles	
NB The guidance for	JHS (Elective):	
SL/HoD should set out	Familiar Concepts:	
what they need to do to	Teaching lengths and surface area of 3-D shapes	
introduce and explain the issues/s with tutors	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 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	
		Barriers	
		Some possible barriers	
		Inadequate relevant previous knowledge of	
		students	
		<ul> <li>Unavailability learning Resources</li> </ul>	
		<ul> <li>Lack of content knowledge of the teacher</li> </ul>	
		NB:	
		Guide tutors to discuss how learning resource, time	
		and teacher competence could be barrier to	
		teaching and learning Fraction and Rigid motion.	
		2 Eldontify on mony CESI recoveration	
		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	
~	Diamata a fact	Manual pp.38)	40
3.	Planning for	Teaching and learning activities	40 mins
	teaching, learning		
	and assessment	3.1 Suggest teaching and learning activities for the	
		lesson taking into consideration slow learners,	

			1
	activities for the	learners who are dyscalculia, students who	
	lesson/s	suppress the opposite sex during lessons.	
•	Reading and	Suggested Learning Activities	
	discussion of the	<u>Upper Primary</u> : Engage student teachers series of	
	teaching and learning	number game in building an understanding of basic	
	activities	operations.	
•	Noting and	JHS core: Employ the principle of multiple	
	addressing areas	embodiment in_building an understanding bisection	
	where tutors may	of angles	
	require clarification	JHS(Elective):	
•	Noting opportunities	Engage student teachers in a discussion towards	
	for making links to	building an understanding of volumes of 3-Ds using	
	the Basic School	variety of TLRs	
	Curriculum		
		NB: Be conscious of:	
•	Noting opportunities	i. Provision made for physically challenged	
	for integrating: GESI	ii. Both genders taking leading roles in group task	
	responsiveness and	<i>iii. Even distribution of questions to different</i>	
	ICT and 21 <sup>st</sup> C skills	categories of learners based on gender, ability,	
•	Reading, discussion,	previous experience, etc	
	and identification of	• •	
	continuous	NTS 1a, b, c, d, 2b, e, f, 3b, c	
	assessment	2.2 Dead the activities outlined in your course	
	opportunities in the	3.2 Read the activities outlined in your course	
	lesson. Each lesson	manual and identify areas that require	
	should include at	clarification.	
	least two	NB:	
	opportunities to use	Refer to the Basic School Curriculum (BSC pp. xv –	
	continuous	xvii) Identify challenging areas that require	
	assessment to	clarification, using GeoGebra to clarify the	
	support student	otherwise dark spots in "Rid motion".	
	teacher learning		
•	Resources:	3.3 Brainstorm some pedagogical approaches and	
	$\circ$ links to the	their related core competencies likely to be	
	existing PD	inculcated in students and for that matter Basic	
	Themes, for	School learners.	
	example, action	Example	
	research,	<u>(a) Upper Primary:</u>	
	questioning and to	Strategy: Expository, Think pair Share, Discussion	
	other external	and Brainstorming	
	reference	Core Competencies: Problem solving, critical and	
	material:	creative thinking and communication.	
	literature, on web,	<u>(b)HS (core)</u>	
	Utube, physical	Strategy: Expository, Think pair Share, group	
	resources, power	project, internet search	
	point; how they	Core Competencies: Problem solving, critical and	
	should be used.	creative thinking and communication.	
	Consideration	<u>(b) JHS (Elective)</u>	
	needs to be given	Strategy: interactive and Collaborative group	
	to local availability	work, Discussion	
	<ul> <li>guidance on any</li> </ul>	Core Competencies: Critical thinking skills,	
	power point	Collaborative learning and Problem-Solving Skills.	
	presentations,		
L	p. cocincaciono,		I

TLM or other	3.4 Mention some GESI responsive resources that	
resources which	can be used with the suggested approaches	
need to be	and strategies in achieving the LOs.	
developed to	Example:	
support learning	Resources may include supporting staff with	
Tutors should be	experts in sign language as well as resources such	
	teacher and learner resource packs, textbooks,	
expected to have a	• • • •	
plan for the next	course manual, projectors, flip charts, sticky notes,	
lesson for student	braille, tactile materials, audio and audio-visuals	
teachers	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	
	JHS (Core)	
	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.	
	JHS (Elective)	
	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 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.	
L		

	<ul> <li>E.g. encouraging student teachers to file all their assignmeOnts with feedback in their folders.</li> <li>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)</li> </ul>	
<ul> <li>4. Evaluation and review of session:</li> <li>Tutors should Identifying critical friends to observe lessons and report a next session.</li> <li>Identifying and addressing any outstanding issues relating to the lesson/s for clarification</li> </ul>	<ul> <li>Reflective Activity</li> <li>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.</li> <li>4.2 Reflect on the activities in the session and outline unresolved issues relating to the lesson</li> <li>NB:</li> <li>Take note of all unresolved issues and use any of following strategies to address them: <ul> <li>put on SL/SWL WhatsApp platform for discussion</li> <li>research and submit it in the next PD session for discussion</li> </ul> </li> <li>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)</li> <li>Advance Preparation NB:</li> <li>Read Lesson 4 of the Course Manual on:</li> <li>Upper Primary - Fraction Concepts 2: (Teaching and Assessment)</li> <li>JHS(Core) - Operations on fractions: (Teaching and Assessment)</li> <li>JHS(Elective) – Teaching Indices and logarithms1</li> </ul> <li>NB:</li> <li>Read the course manual, the PD session guide ahead of time to identify any outstanding issues relating to the lesson for clarification.</li> <li>Collect all-inclusive resources (such as projector, flip chart and sticky notes) you need ahead of time, prepare samples of TLMs you may need.</li>	15 mins

Age Lev

- d. Upper Primary
- e. JHS (Core)
- f. JHS (Elective)
- Name of Subject/s:
  - d. Mathematics: Teaching and Assessing
  - e. Teaching and Assessing JHS Mathematic
  - f. Mathematics

#### **Tutor PD Session for Lesson 3 in the Course Manual**

- 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 Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each stage of the session.	Time in session
<ol> <li>Introduction to the session         <ul> <li>Review prior learning</li> <li>A critical friend to share findings for a short discussion and lessons learned</li> <li>Reading and discussion of the introductory sections of the lesson up to and including learning outcomes and indicators</li> <li>Overview of content and identification of any distinctive aspects of the lesson/s,</li> <li>NB The guidance for SL/HoD should identify and address any areas where tutors might require clarification on any aspect of the lesson.</li> <li>NB SL/HoD should ask tutors to plan for their</li> </ul> </li> </ol>	<ul> <li>Introduction</li> <li>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.</li> <li>1.2 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 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)).</li></ul>	20 mins

teaching as they go	Suggest relevant previous knowledge of students	
through the PD session	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 anable them develop awareness of	
	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     superior set on polygons and their properties	
	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 In phase groups, discuss the distinctive aspects	
	of the s lesson including vocabulary and	
	fundamental concepts.	
	Distinct Aspects	
	a. Upper Primary/JHS (core): Building an	
	understanding of common fractions,	
	b. JHS (Elective) - Teaching Number plane, scale	
	drawing	
	Vocabulary	
	Upper Primary/HS (core)	
	Examples: Fraction, Equivalent, decimals,	
	comparing and ordering	
	JHS (Elective): Number, plane, rotation, scale factor	
	and symmetry.	
	Fundamental Concepts	
	Upper Primary/JHS (core)	
	Meaning of Common Fraction	
	Finding Equivalent Fraction	
	Comparing and ordering of fractions	
	JHS (Elective)	
	Teaching:	
	Number plane	

		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 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 and learning activities	40 mins
	teaching, learning		
	and assessment	3.1 Suggest teaching and learning activities for the	
	activities for the	lesson taking into consideration GESI	
	lesson/s		
	Reading and	Suggested Learning Activities	
	discussion of the	Upper Primary/JHS core:	
	teaching and learning	Engage student teachers in a discussion towards	
	activities	building an understanding of common fractions	
•	Noting and	using variety of TLRs.	
	addressing areas	JHS(Elective):	
	where tutors may	Engage student teachers in a number game as a	
	require clarification	starter.	
	Noting opportunities		
•	for making links to	NB: Be conscious of:	
	the Basic School	<i>i.</i> Provision made for physically challenged	
	Curriculum	ii. Both genders take leading roles in group task	
	Noting opportunities	iii. Even distribution of questions to different	
•	for integrating: GESI	categories of learners based on gender, ability,	
	responsiveness and	previous experience, etc	
	ICT and 21 <sup>st</sup> C skills	NTS 1a, b, c, d, 2b, e, f, 3b, c	
	Reading, discussion,		
•	and identification of	3.2 Read the activities outlined in your course	
	continuous	manual and identify areas that require	
	assessment	clarification.	
	opportunities in the	NB:	
	lesson. Each lesson	Refer to the Basic School Curriculum (BSC pp. xv –	
	should include at	xvii) Identify challenging areas that require	
	least two	clarification, using GeoGebra to clarify the	
	opportunities to use	otherwise dark spots in "Rid motion".	
	continuous		
	assessment to	3.3 Brainstorm to come up with some pedagogical	
		approaches and their related core	
	support student teacher learning	competencies likely to be inculcated in students	
	Resources:	and for that matter Basic School learners.	
	NESUULES.		

•links to the existing PDExample (a) Upper Primary/INS (core)Themes, for research, questioning and to other external reference material: literature, on web, Utube, physical resources, power point; how they should be used.Strategy: 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.•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.•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.•Building (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•Tutors should be expected to have a plan for the next lesson for student teachers•S.5 Mention some GESI responsive resources that can be used with the suggested approaches and strategies in achieving the LOS. Example: Resources manual, projectors, flip charts, sticky notes, braille, tactle materials, audia and adia-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.•>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>>					
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 availabilityStrategy: 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. Olaborative learning and Problem-Solving Skills.•Strategy: interactive and for the lesson and explain how they can help inculate core competencies in student teachers and for that matter Basic School learners.•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 teachers•Tutors should be expected to have a plan for the next teachers•S.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, brailig, 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 subje		0			
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<ul> <li>research, questioning and to other external reference material:</li> <li>(b) JHS (Elective)</li> <li>Strategy: interactive and Collaborative group work, Discussion</li> <li>Core Competencies: Critical thinking skills, Collaborative learning and Problem-Solving Skills.</li> <li>J4 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.</li> <li>J 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.</li> <li><i>Example:</i></li> <li>Using (a) Group Work Assign student teachers in groups to explore equivalent fractions- Social and Leadership Skills</li> <li>(b) collaborative group discussion on scale drawing-Communication Skills and Critical Thinking</li> <li>S Mention some GESI responsive resources that can be used with the suggested approaches and strategies in achieving the LOS.</li> <li>Example:</li> <li>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 31)</li> <li>3.6 Discuss to come up with assessment strategies ("as and "for") to be used during the lesson.</li> <li>NB: Assessment must involve; the subject project and Subject Portfolio.</li> <li>Examples of subject project and subject portfolio UP/IHS: subject project (class exercise): Arrange the following fractions in an ascending order</li> </ul>					
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UP/JHS: subject project (class exercise): Arrange the following fractions in an ascending order				Subject Portfolio.	
UP/JHS: subject project (class exercise): Arrange the following fractions in an ascending order				Examples of subject project and subject portfolio	
subject project (class exercise): Arrange the following fractions in an ascending order					
following fractions in an ascending order					
$\left[\frac{1}{5}, \frac{1}{3}, \frac{1}{5}\right]$ and $\frac{1}{7}$ (5 marks).					
				5, -7, -4, -4, -7, -7, -7, -7, -7, -7, -7, -7, -7, -7	

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° (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.	
Furnerales Hanner Driver and HUG (Court) Courts	
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.	
<i>E.g. encouraging student teachers to file all their</i>	
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:	
$\frac{3}{7} \times 2 = \frac{6}{7}$	
7 ~ ~ 7	
1 1 1 6	
$\frac{1}{2} \div \frac{1}{6} = \frac{1}{2} \times \frac{6}{1} = 3$	
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)	

review of session:		
Tutors should Identifying critical friends to observe	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	
next session.		
addressing any	4.2 Reflect on the activities in the session and outline unresolved issues relating to the lesson	
relating to the lesson/s for clarification	<ul> <li>NB: Take note of all unresolved issues and use any of following strategies</li> <li>put on SL/SWL WhatsApp platform for discussion</li> <li>tutors to research for the next PD session for</li> </ul>	
	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: Identify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a)	
	Advance Preparation 4.1 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	
	Identifying and addressing any outstanding issues relating to the lesson/s for	<ul> <li>next session.</li> <li>Identifying and addressing any outstanding issues relating to the lesson/s for clarification</li> <li>4.2 Reflect on the activities in the session and outline unresolved issues relating to the lesson /s for clarification</li> <li><i>NB:</i> Take note of all unresolved issues and use any of following strategies</li> <li>put on SL/SWL WhatsApp platform for discussion</li> <li>tutors to research for the next PD session for discussion</li> <li>4.3 Identify critical friend observes teaching and record his/her findings to be presented after delivery or in the Next PD session.</li> <li>NB:</li> <li>Identify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a)</li> <li>Advance Preparation</li> <li>4.1 Read Lesson 4 of the Course Manual on:</li> <li>Upper Primary - Fraction Concepts 2: (Teaching and Assessment)</li> <li>JHS(Core) - Operations on fractions: (Teaching and Assessment)</li> <li>JHS(Elective) – Teaching Indices and logarithms1</li> <li>NB:</li> <li>Read the course manual, the PD session guide ahead of time to identify any outstanding issues relating to the lesson for clarification.</li> </ul>

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

- d. Mathematics: Teaching and Assessing
- e. Teaching and Assessing JHS Mathematics
- f. Mathematics

#### **Tutor PD Session for Lesson 4 in the Course Manual**

- a. Upper Grade: Fraction Concepts 2: (Teaching and Assessment)
- Operations on fractions: (Teaching and Assessment) b. JHS (Core):
- 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 Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each stage of the session.	Time in session
<ol> <li>Introduction to the session</li> <li>Review prior learning</li> <li>Reading and discussion of the introductory sections of the lesson up to and including learning outcomes and indicators</li> <li>Overview of content and identification of any distinctive aspects of the lesson/s,</li> <li>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</li> </ol>	<ul> <li>Introduction</li> <li>1.1 Ice breaker: Express the fraction representing the unshaded in the exponent form).</li> <li>▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲ ▲</li></ul>	20 mins

	<ul> <li>Pay attention to all NTS references and salient points necessary for the development of your teaching plan.</li> <li>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.</li> <li>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).</li> <li>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         <ul> <li>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.</li> <li>JHS (core) – Mental strategies for adding, subtracting, multiplying and dividing by fractions; Basic applications of fractions to real life.</li> <li>JHS (Elective) – Teaching powers of numbers; Teaching prime power factorization</li> </ul> </li> </ul>	
2. Concept	Concept Development	15 mins
Development (New learning likely to	2.1 Identify familiar and unfamiliar concepts in your lesson and discuss with the larger group.	
<ul><li>arise in lesson/s):</li><li>Identification and</li></ul>	Examples:	
discussion of new	Familiar Concepts Unfamiliar concepts	
learning, potential barriers to learning for student teachers or students, concepts	The concept of fractions and percentApplication of ratio and proportion to real life	
or pedagogy being introduced in the lesson, which need to be explored with the SL/HoD	Mental strategiesMental strategies forfor adding andmultiplying and dividingsubtractingfractions	
NB: The guidance for SL/HoD should set out what they need to do to	Prime power Powers of numbers, factorization	
introduce and explain the issues/s with tutors	2.2 In your phase group, draw connections among concepts in the lesson and in line with the basic school curriculum.	

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 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.	
<i>b. JHS – Mental strategies do not support learning of the concept of multiplying and dividing by fractions</i>	
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.	
Planning for Teaching and learning activities	40 mins
<ul> <li>Planning for Teaching and learning activities</li> <li>3.1 In your phase group, suggest teaching and learning activities for teaching the lesson ensuring;</li> <li>i. Provision is made for SEN</li> <li>ii. Both genders take leading roles in group task, etc referring to NTS 1a, b, c, d, 2b, e, f, 3b, c</li> <li>3.2 Read the activities outlined in your course manual and identify areas that require clarification.</li> <li>NB: <i>Refer to the Basic School Curriculum (BSC pp. xv</i> - <i>xvii) and http://uk.sagepub.com for</i> <i>explanations on "The concept and operations on</i> <i>fraction" and search through "IXL Math"</i>.</li> <li>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</li> </ul>	40 mins
	<ul> <li>your lesson, share with a member of the same phase group and then with the whole group.</li> <li>2.4 In whole group, discuss misconceptions and barriers in teaching and learning of the lesson.</li> <li><i>Example:</i> <ul> <li>Upper Primary: – Ratio shows 2 distinct whole numbers; Ratio is not a fraction.</li> <li>b. JHS – Mental strategies do not support learning of the concept of multiplying and dividing by fractions</li> <li>JHS (Electives): Repeated addition can be written in the exponent form.</li> <li>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.</li> </ul> </li> <li>Planning for Teaching and learning activities <ul> <li>3.1 In your phase group, suggest teaching and learning activities for teaching the lesson ensuring;</li> <li>i. Provision is made for SEN</li> <li>ii. Both genders take leading roles in group task, etc referring to NTS 1a, b, c, d, 2b, e, f, 3b, c</li> </ul> </li> <li>3.2 Read the activities outlined in your course manual and identify areas that require clarification.</li> <li>NB: <i>Refer to the Basic School Curriculum (BSC pp. xv - xvii) and http://uk.sagepub.com for explanations on "The concept and operations on fraction" and search through "IXL Math".</i></li> </ul>

	lesson. Each lesson	3.4 Suggest teaching strategies to be used in	
	should include at	achieving the Los of the lesson and explain how	
	least two	they can help inculcate core competencies in	
	opportunities to use	student teachers and for that matter Basic	
	continuous	School learners.	
	assessment to	Example	
	support student	a) <u>Pedagogical approaches:</u> Group Work to explore	
	teacher learning	the relationship among fractions, percentages,	
•	Resources:	percentages, ratio and proportions –	
	<ul> <li>links to the</li> </ul>	Associated 21 <sup>st</sup> century skills: Social and Leadership	
	existing PD	Skills	
	Themes, for	b) Pedagogical approaches: Using investigation to	
	example, action	identify generalizations on laws of indices	
	research,	Associated 21 <sup>st</sup> century skills: Critical Thinking	
	questioning and to	NB: Suggest more examples beyond those	
	other external	suggested above.	
	reference		
	material:	3.5 Mention some GESI responsive resources that	
	literature, on web,	can be used with the suggested approaches	
	Utube, physical	and strategies in achieving the LOs.	
	resources, power	Example	
	point; how they	Resources may include supporting staff with	
	should be used.	experts in sign language as well as resources such	
	Consideration	as teacher and learner resource packs, textbooks,	
	needs to be given	etc	
	to local availability		
	<ul> <li>guidance on any</li> </ul>	3.6 Using discussion, lead tutors to come out with	
	power point	assessment strategies ('as' and 'for') to be used	
	presentations,	during teaching of the lesson.	
	TLM or other	NB: Continuous assessment activities (assignments,	
	resources which	quizzes, group presentations, etc. should be used to	
	need to be	create subject projects and build subject portfolios).	
	developed to		
	support learning	Example: A project on how to teach to depict the	
•	Tutors should be	relationship among fraction, decimal, ratio and	
	expected to have a	percentages (UP).	
	plan for the next		
	lesson for student	A project on investigation of the operations and	
	teachers	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	
L		J	

			[]
1		JHS (Core) – Write a report on the steps you will use	
1		to teach operations on fractions	
		JHS (Elective) – Interview 10 JHS teachers on how	
		they introduce powers of numbers to learners.	
		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.	
		2.0 Dropping and model a presentation of an activity	
		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	Evaluation and review of session:	15 mins
	review of session:		
•	Tutors need to	4.1 Reflect and provide feedback on this PD session	
	identify critical	taking into consideration – Clarity of content,	
	, friends to observe	pedagogical approaches employed, ICT	
	lessons and report at	integration, GESI, Twenty First Century Skills	
	next session	(NTS 1a, 3i, BSC pp. x-xvi)? and make notes that	
		will help you to teach Lesson 1	
•	Identifying and		
	addressing any	4.2 Identify unresolved issues relating to this lesson for clarification.	
	outstanding issues		
	relating to the	NB: Put your unresolved issues unto the	
	lesson/s for	department's WhatsApp/ Telegram platform and	
	clarification	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:	
1		(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>i.</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. <i>ii.</i> 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**

- 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	Guidance Notes on Tutor Activity during the PD	Time in
provide the frame for	Session. What PD Session participants (Tutors)	session
what is to be done in	will do during each stage of the session.	
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.		
<ol> <li>Introduction to the session         <ul> <li>Review prior learning</li> <li>A critical friend to share findings for a short discussion and lessons learned</li> <li>Reading and discussion of the introductory sections of the lesson up to and including learning outcomes and indicators</li> <li>Overview of content and identification of any distinctive aspects of the lesson/s,</li> <li>NB: The guidance for SL/HoD should identify and address any areas where tutors might require clarification on any aspect of the lesson.</li> <li>NB: SL/HoD should ask tutors to plan for their teaching as they go through the PD session</li> </ul> </li> </ol>	<ul> <li>Introduction</li> <li>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.</li> <li>1.2 Tell how useful the previous PD session was and how it influenced your 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</li> <li>NB: Pay attention to NTS references and salient points necessary for the development of your proforma.</li> <li>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.</li> <li>1.4 Discuss any challenges encountered during enactment.</li> <li>1.5 Read one-on-one and discuss the introductory sections of the lesson up to the learning outcomes.</li> <li>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.</li> <li>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.</li> <li>J.HS (Core) – eg. Plan and design micro lessons.</li> <li>C. JHS (Elective) – eg. Logarithms and its properties.</li> </ul>	20 mins

2.	Concept	Concept Development	15 mins
	Development (New		
	learning likely to	2.1 In your phase group identify familiar and	
	arise in lesson/s):	unfamiliar concepts in your lessons and discuss	
•	Identification and	with the larger group.	
	discussion of new		
	learning, potential	2.2 In your phase groups, make connections	
	barriers to learning	between the lesson concepts and in accordance	
	for student teachers	with the Basic School Curriculum.	
	or students, concepts		
	or pedagogy being	2.3 Individually, describe the difficult points of your	
	introduced in the	lesson, share them with one member of the	
	lesson, which need to	same phase group and then with the entire	
	be explored with the	group.	
	SL/HoD	Example:	
NE	The guidance for	Giving examples of application of logarithm to real	
	/HoD should set out	life.	
	hat they need to do to		
	roduce and explain	2.4 Discuss the misconceptions and barriers to	
	e issues/s with tutors	teaching and learning this lesson.	
	-		
3.	Planning for	Planning for teaching, learning and assessment	40 mins
	teaching, learning	activities	
	and assessment		
	activities for the	3.1 Suggest teaching and learning activities in your	
	lesson/s	phase groups to teach the lesson	
•	Reading and	ensuring;	
	discussion of the	i. equal opportunity is given to persons with SEN to	
	teaching and learning	ask and answer questions in Class.	
	activities	ii. both genders take leading roles in group task.	
•	Noting and	iii. even distribution of questions to different	
	addressing areas	categories of learners based on gender, ability,	
	where tutors may	previous experience, etc.	
	require clarification	iv. constructing verbal feedback is to both females	
•	Noting opportunities	and males in class, referring to NTS 1a, b, c, d, 2b,	
	for making links to	e, f, 3b, c.	
	the Basic School	2.2 Road the activities outlined in your course	
	Curriculum	3.2 Read the activities outlined in your course	
•	Noting opportunities	manuals and identify areas that require clarification.	
	for integrating: GESI		
	responsiveness and	NP: Pafar to https://www.21cafara.9	
	ICT and 21 <sup>st</sup> C skills	NB: Refer to <u>https://www.21caf.org</u> &	
٠	Reading, discussion,	https://www.researchgate.net for explanations on	
	and identification of	"Connections between the theoretical perspectives	
	continuous	and learning of mathematics" and search through	
		https://www.mathsisfun.com to clarify the	
	assessment		
	assessment opportunities in the lesson. Each lesson	otherwise dark spots in "Quadratic Equations". dark spots in "Logarithms".	

		1
	<ul> <li>Make reference to assessment in the course manual and NTEAP</li> <li>3.7 Develop a sample of assessment items based on the LOs and share with the whole group.</li> <li><i>Example:</i> <ul> <li>Upper Primary and JHS (Core): Interview at least 5</li> <li>basic school teachers during the STS activity on which theory support their philosophy of teaching.</li> <li>JHS Elective: In groups of four, draw three different logarithms graphs and write a report on the difference and similarities in the graphs.</li> </ul> </li> <li>3.8 Discuss the various ways you can support student teachers to build their subject portfolio.</li> <li><i>Example: Encouraging student teachers to i) file all their assignments with feedback in their folders.</i> <ul> <li><i>ii. file all reports and presentation.</i></li> <li>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)</li> </ul></li></ul>	
<ul> <li>4. Evaluation and review of session:</li> <li>Tutors should Identifying critical friends to observe lessons and report at next session</li> <li>Identifying and addressing any outstanding issues relating to the lesson/s for clarification</li> </ul>	<ul> <li>Evaluation and review of session</li> <li>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</li> <li>4.2 Identify unresolved issues relating to this lesson for clarification.</li> <li><i>NB: Put your unresolved issues unto</i> the <i>department's WhatsApp/ Telegram platform and research into the issues raised.</i></li> <li>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).</li> <li>Advance Preparation</li> </ul>	15 mins

4.4 Remember to prepare teaching plan for the lesson 5 taking note of important or distinctive	
0	
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	

Age Levels/s:

Name of Subject/s:

a. Upper Grade

ade a.

- a. Mathematics: Teaching and Assessing
   b. Teaching and Assessing JHS Mathematics
- b. JHS (Core) c. JHS (Elective)
- c. Mathematics

## Tutor PD Session for Lesson 6 in the Course Manual

- 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	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
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.		
<ol> <li>Introduction to the session</li> <li>Review prior learning</li> <li>Reading and discussion of the introductory sections of the lesson up to and including learning outcomes and indicators</li> <li>Overview of content and identification of any distinctive aspects of the lesson/s,</li> <li>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</li> </ol>	<ul> <li>Introduction to the session</li> <li>1.1 Ice breaker activity: Begin with an investigational activity according to the subjects and age phases</li> <li>Eg. Mention: <ol> <li>the food you like best</li> <li>your ages</li> <li>your ages</li> </ol> </li> <li>1.2 Discuss how useful the previous PD session influenced your 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</li> <li>1.3 Discuss the overview of the subject age phases to be covered in this PD session and how it will be organised.</li> <li>1.4 Participate in the critiquing of the feedback on observation during the enactment of lesson 6.</li> <li>1.5 Engage tutors to suggest the purpose of the lesson and state your expectations of the PD Session.</li> <li>1.6 Participate in the linkage of the CLOs and the LOs of the lesson for each of the phases.</li> <li>1.7 In pairs discuss the distinctive aspects of the lesson including vocabulary and fundamental concepts related to the components of the front matters.</li> </ul>	20 mins
<ul> <li>2. Concept Development (New learning likely to arise in lesson/s):</li> <li>Identification and discussion of new learning, potential</li> </ul>	<ul><li>Concept Development (New learning likely to arise in lesson/s)</li><li>2.1 Participate in the identification of familiar and unfamiliar concepts in the lesson and discuss with the larger group.</li></ul>	15 mins
barriers to learning for student teachers or students, concepts or pedagogy being introduced in the	Familiar ConceptUnfamiliar Conceptcoding	

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	<ul> <li>2.2 Draw connections among concepts in the various lessons in line with the basic school curriculum.</li> <li>Example:</li> <li>Upper Prim &amp; 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.</li> <li>(PD Theme 3)</li> <li>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.</li> <li>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.</li> <li>a. Upper Prim &amp; JHS (Core) Grade: theoretical principles that explains children's learning of mathematics.</li> <li>b. JHS (Elective) application of central tendency in real life.</li> <li>2.4 Discuss the misconceptions and barriers in teaching and learning of the lesson.</li> <li>Example:</li> <li>Misconceptions <ul> <li>a. Upper Prim &amp; JHS (Core) Grade: Some mathematics topics are not related to real life.</li> </ul> </li> </ul>	
	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	Planning for teaching, learning and assessment	
teaching, learning	activities for the lesson/s	
and assessment		
activities for the	3.1 Suggest teaching and learning activities for the	
lesson/s	lesson.	

<ul> <li>Reading and discussion of the teaching and learning activities</li> <li>Noting and addressing areas where tutors may require clarification</li> <li>Noting opportunities for making links to the Basic School</li> </ul>	<ul> <li>3.2 Read the activities outlined in your course manual and identify areas that require clarification.</li> <li>3.3 Brainstorm and explain how <ul> <li>a. theoretical perspectives and principles of learning that are relevant to children's learning.</li> <li>b. relates handling data to real life problem for improvement learners understanding of the central tendency. Refer to Basic School Curriculum (BSC</li> </ul></li></ul>	
<ul> <li>Noting opportunities for integrating: GESI responsiveness and ICT and 21<sup>st</sup> C skills</li> <li>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</li> </ul>	<ul> <li>pp. 93 – 97; 171-173).</li> <li>3.4 Suggest some pedagogical approaches and their related core competencies likely to be inculcated in students and for that matter Basic School learners.</li> <li>3.5 Mention some GESI responsive resources that can be used with the suggested approaches and strategies in achieving the LOs. <i>E.g Resources may include supporting staff with experts in sign language as well as resources such teacher and learner resource packs, textbooks, etc</i></li> <li>3.6 Identify and discuss continues assessment strategies for the lesson to support student teacher learning (NTS 3k).</li> <li>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 &amp; b) during play.</li> <li>JHS (Elective): In groups of four, develop any game for teaching any concept within your course outline.</li> <li>3.7 Discuss the various ways you can support student teachers to build their subject portfolio. <i>E.g. encouraging student teachers to file all their assignments with feedback, presentation, reports, in their folders.</i></li> <li>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</li> </ul>	

4.	Evaluation and	Evaluation and review of session:	15 mins
	review of session:		
•	Tutors need to identify critical friends to observe lessons and report at next session Identifying and	<ul> <li>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</li> </ul>	
	addressing any outstanding issues relating to the lesson/s for	4.2 Identify unresolved issues relating to this lesson for clarification.	
	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	
		<ul> <li>4.4 Remember to prepare proforma for the Lesson</li> <li>7 taking note of important or distinctive aspects of the lesson and crosscutting issues and read Lesson 7 of the Course Manual on:</li> <li>Upper Primary:</li> </ul>	
		Shape and Space: (Teaching and Assessment) JHS(Core):	
		Shape, Space and Measurement: (Teaching and Assessment)	
		JHS(Elective): Teaching Probability	
		NB: Take note of the PD session quide ahead of time to	
		identify any outstanding issues relating to the	
		lesson for clarification.	

Age Level(s)

Name of Subject(s):

a. Upper Primary

a. Mathematics: Teaching and Assessing

- oper Primary a
- b. JHS (Core)c. JHS (Elective)
- b. Teaching and Assessing JHS Mathematicc. 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 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	Introduction	20 mins

Review prior learning	1.1 Ice breaker activity: participate in mental drills
A critical friend to	using related games:
share findings for a	Example: When a ludo dice is tossed how many
short discussion and	faces is/are likely to show.
lessons learned	
<ul> <li>Reading and</li> </ul>	1.2 Tell to tell how useful the previous PD session
discussion of the	was and how it influenced their teaching in the
introductory sections	previous lesson. Provide examples of how
of the lesson up to	students were prepared to employ the various
and including	strategies and skills during the basic school
learning outcomes	classroom work in STS Field Experience in year 4
and indicators	semester 1
Overview of content	1.2. As a suitiant friend share your shear with a se
and identification of	1.3 As a critical friend share your observation on
any distinctive	the previous lesson.
aspects of the	Upper Primary/JHS (Core)
lesson/s,	a.Diagnosis and remediation; assessment resources/records, and monitoring progress:
NB The guidance for	(Teaching and Assessing)
SL/HoD should identify	JHS (Elective)
and address any areas	b. Teaching Handling Data:
where tutors might	NB:
require clarification on	Things tutor might have observed; tutor's choice of
any aspect of the lesson.	words, pedagogical content knowledge, content
NB SL/HoD should ask tutors to plan for their	knowledge subject matter, the use of ICT tools,
teaching as they go	GESI and the use of NTEAP
through the PD session	
	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 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)

		<ul> <li>expose student teachers to the development of conceptual understanding for teaching probability and related concepts</li> <li>develop appropriate learning strategies where percentages (taxation, discount, commissions, VAT, etc.) can be applied.</li> <li>In phase groups, discuss the distinctive aspects of the s lesson including vocabulary and fundamental concepts related to the components of the front matters.</li> <li><u>Distinct Aspects</u></li> <li>Upper Primary/JHS (core):</li> <li>Informal geometry and spatial sense</li> <li>Spatial visualization (PD Themes 1 &amp; 3) JHS (Elective):</li> <li>Outcomes of an Experiment</li> <li>Probability of an outcome</li> <li><u>Vocabulary</u></li> <li>Upper Primary/JHS (core)</li> <li>Examples: Spatial, Sense, Geometry, Visualization, Segment (PD Themes 1 &amp; 3) JHS (Elective): Probability, Experiment, Outcome, <u>Fundamental Concepts</u></li> <li>UP/JHS (core)</li> <li>Introduce the lesson on integers as shape and space.</li> <li>Shapes and their properties</li> <li>Hand sketching of common solids (PD Themes 1 &amp; 3)</li> <li>JHS (Elective)</li> <li>Teaching:</li> <li>Outcomes of an experiment</li> <li>Probability of an outcome</li> <li>Equally likely outcomes</li> </ul>	
2.	Concept Development (New	Concept Development	15 mins
•	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	<ul> <li>1.1 Identify familiar and unfamiliar concepts in their lessons and discuss with the larger group.</li> <li>Familiar and <u>Unfamiliar Concepts</u></li> <li>Upper Primary/JHS (core)</li> <li>Examples of Familiar Concepts: Shapes and their properties and Hand sketching of common solids</li> <li>Unfamiliar concepts: Spatial visualization and Relationship among faces, edges and vertices.</li> <li>JHS (Elective):</li> </ul>	

lesson, which need to	Examples of Familiar Concepts: Outcomes of an	
be explored with the	experiment and Probability of an outcome	
SL/HoD	Unfamiliar concepts: Probability of a given event in	
NB The guidance for	table, equally likely outcomes	
SL/HoD should set out		
what they need to do to	1.2 Draw connections among concepts in the	
introduce and explain	various lessons in line with the basic school	
the issues/s with tutors	curriculum.	
	NB:	
	Anticipated question	
	What is the relationship between 2D-shapes and	
	3D shapes? (Bsc:B5.1.5.1)	
	1.3 Individually, outline the challenging areas in	
	your lesson, share with a member of the same	
	phase group and then with the whole group.	
	pride group and then with the whole group.	
	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.	
	Shapes.	
	1.4 Participate actively in the discussion on	
	misconceptions and barriers in teaching and	
	learning of the lesson.	
	Misconceptions	
	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.	
	Possible Barriers	
	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.	
	1.5 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 and learning activities	40 mins
	teaching, learning		
	and assessment	3.1 Suggest teaching and learning activities for the	
	activities for the	lesson taking into consideration GESI	
	lesson/s		
•	Reading and	Suggested learning Activities Upper Primary/JHS	
	discussion of the	core:	
	teaching and learning	Provide student-teachers with e-learning	
	activities	opportunities to explore the concept of shape and	
	Noting and	space.	
	addressing areas	JHS(Elective):	
	where tutors may	Example of suggested learning Activities	
	require clarification	Use interactive and collaborative group work to	
•	Noting opportunities	develop conceptual understanding of the concepts	
	for making links to	of sample space, events, and the idea of probability	
	the Basic School	of an outcome.	
	Curriculum		
•	Noting opportunities	NB:	
	for integrating: GESI	i. Make provision for physically challenged	
	responsiveness and	<i>ii.</i> Both genders take leading roles in group task	
	ICT and 21 <sup>st</sup> C skills	<i>iii. Even distribution of questions to different</i>	
		categories of learners based on gender, ability,	
•	Reading, discussion,	previous experience, etc	
	and identification of	NTS 1a, b, c, d, 2b, e, f, 3b, c	
	continuous	3.2 Read the activities outlined in your course	
	assessment	manual and identify areas that require	
	opportunities in the	clarification.	
	lesson. Each lesson		
	should include at	NB:	
	least two	Refer to the Basic School Curriculum (BSC pp. xv –	
	opportunities to use	xvii) Identify challenging areas that require	
	continuous	clarification, using GeoGebra to clarify the	
	assessment to		
	support student	otherwise dark spots in "Teaching probability	
	teacher learning	2.2 Projectory to come up with come podegogical	
•	Resources:	3.3 Brainstorm to come up with some pedagogical	
	<ul> <li>links to the</li> </ul>	approaches and their related core competencies	
	existing PD	likely to be inculcated in students and for that	
	Themes, for	matter Basic School learners.	
	example, action	Furnerale	
	research,	Example	
	questioning and to	(a) Upper Primary/JHS (core)	
	other external	Strategy: Expository, Think pair Share, Discussion	
	reference	and Brainstorming	
	material:	Core Competencies: Problem solving, critical and	
	literature, on web,	creative thinking and communication.	
		(b) JHS (Elective)	

Utube, physical resources, power point; how they should be used. Consideration needs to be given to local availability o 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	<ul> <li>Strategy: interactive and Collaborative group work, Discussion</li> <li>Core Competencies: Critical thinking skills,</li> <li>Collaborative learning and Problem-Solving Skills.</li> <li>3.4 Suggested teaching strategies that can help inculcate core competencies in the student teachers and for that matter basic school learners.</li> <li>3.5 Mention some GESI responsive resources that can be used with suggested approaches and strategies in achieving the Los.</li> <li>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)</li> <li>3.6 Discuss to come up with assessment strategies ("as and "for") to be used during the lesson.</li> <li>NB: Assessment must involve; the subject project and Subject Portfolio.</li> <li>Examples</li> <li>Upper Primary/JHS (Core): Subject project (class exercise): Hand sketch a rectangle and a square (5 marks).</li> <li>Subject Portfolio: Project on investigating the properties of 2D and 3D shapes using manipulatives and Google search.</li> <li>JHS (Elective): Subject Protfolio: A project on using the google search to Find both experimental and theoretical probabilities.</li> <li>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)</li> </ul>	

4. Evaluation and	<ul> <li>3.7 Develop a sample of assessment items based on the LOs and share with the whole group.</li> <li><i>Example: Early, Upper Primary and JHS (Core)</i> <i>Grades – Interview 8 basic school teachers during</i> <i>the STS activity to tell the relationship among the</i> <i>number of faces, edges, and vertices of given</i> <i>shapes.</i> <i>JHS Grade – In groups of three, use different</i> <i>activities to differentiate between sample spaces</i> <i>and event.</i></li> <li>3.8 Discuss the various ways you can support student teachers to build their subject portfolio.</li> <li><i>Example: Encouraging student teachers to file all</i> <i>their assignments with feedback in their folders.</i></li> <li>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)</li> <li>Reflective Activity</li> </ul>	15 mins
<ul> <li>Provide the session of the session of the session.</li> <li>Tutors should identifying critical friends to observe lessons and report at next session.</li> <li>Identifying and addressing any outstanding issues relating to the lesson/s for clarification</li> </ul>	<ul> <li>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</li> <li>4.2 Reflect on the activities in the session and outline unresolved issues relating to the lesson</li> <li>4.3 Identify critical friend observes teaching and record his/her findings to be presented after delivery or in the Next PD session.</li> <li>NB:</li> </ul>	
	<ul> <li>NB:</li> <li>Identify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a)</li> <li>Advance Preparation</li> <li>4.4 Ask tutors to read Lesson of the Course Manual on:</li> <li>Upper Primary - Measurement: (Teaching and Assessing)</li> <li>JHS(Core) - Handling Data and Chance: (Teaching and Assessing)</li> <li>JHS(Elective) – Teaching Percentages and its applications</li> </ul>	

	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.	
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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 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 Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each stage of the session.	Time in session
<ol> <li>Introduction to the session</li> <li>Review prior learning</li> <li>Reading and discussion of the introductory sections of the lesson up to and including learning outcomes and indicators</li> <li>Overview of content and identification of any distinctive aspects of the lesson/s,</li> <li>NB: The guidance for SL/HoD should identify and address any areas where tutors might</li> </ol>	<ul> <li>Introduction</li> <li>1.1 Ice breaker: Participate in the investigational activity by responding to the mental task. (eg. Which nonstandard unit of measurement is used by <ul> <li>a. Gari sellers</li> <li>b. Cloth sellers</li> <li>c. Children during play?</li> </ul> </li> <li>1.2 Ask tutors to tell how useful the week 7 PD session influenced your teaching and how students will employ the various concepts during the STS Field Experience.</li> <li>1.3 As a critical friend, share with members, feedback on the observation you made during the enactment of lesson 7. That is:</li> </ul>	20 mins

require clarification		
any aspect of the le		
NB: SL/HoD should tutors to plan for the		
teaching as they go		
through the PD ses		
unough the PD ses	<ul> <li>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?</li> <li>NB:</li> <li>Work in your phase group and contribute to the whole group discussion.</li> <li>Pay attention to all NTS references and salient points necessary for the development of your teaching plan.</li> </ul>	
	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	
2. Concept	Concept Development	15 mins
Development (		
learning likely t		
arise in lesson/	· · · · · · · · · · · · · · · · · · ·	
<ul> <li>Identification ar discussion of ne</li> </ul>	0 0	
learning, potent		

barriers to learning	JHS (Core) Familiar Concepts:	
for student teachers	Collecting data; Measures of central tendencies	
or students, concepts	Unfamiliar concepts: Interpreting and presenting	
or pedagogy being	data in multiple ways; Chance	
introduced in the	JHS (Elective)	
lesson, which need to	Familiar concepts: Concept of Percentage	
be explored with the	Unfamiliar concepts: Taxation, discount,	
SL/HoD	commissions and VAT	
NB: The guidance for		
SL/HoD should set out	2.2 In your phase group, draw connections among	
what they need to do to	concepts in the lesson and in line with the basic	
introduce and explain	school curriculum.	
the issues/s with tutors	Example	
	Upper Primary: The use of standard units helps	
	eliminate 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,	
	<i>B</i> 4.4.1.2, <i>B</i> 5.4.1.1, <i>B</i> 5.4.1.2	
	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) – 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	
	network, anavanability of internet bullate joi	

		students, inadequate contact time due to staff meetings.	
3.	Planning for teaching,	Planning for Teaching and learning activities	40 mins
	learning and		
	assessment activities	3.1 In your phase group, suggest teaching and	
	for the lesson/s	learning activities for teaching the lesson	
•	Reading and	ensuring;	
	discussion of the	i. Provision is made for SEN	
	teaching and learning	ii. Both genders take leading roles in group task,	
	activities	etc. referring to NTS 1a, b, c, d, 2b, e, f, 3b, c	
•	Noting and		
	addressing areas	3.2 Read the activities outlined in lesson 8 in your	
	where tutors may	course manual and identify areas that require	
	require clarification	clarification.	
•	Noting opportunities	NB: Refer to the Basic School Curriculum (BSC pp. xv	
	for making links to	– xvii) and	
	the Basic School	https://statisticsbyjim.com	
	Curriculum	for explanations on "The concept of statistics and	
•	Noting opportunities	operations on fraction" and search through "IXL	
	for integrating: GESI	Math".	
	responsiveness and		
	ICT and 21 <sup>st</sup> C skills	3.3 Brainstorm some pedagogical approaches that	
•	Reading, discussion,	can be employed during the lesson and their	
	and identification of	effectiveness towards learning of the concepts.	
	continuous	Mention any GESI issues that need	
	assessment	consideration while using those approaches	
	opportunities in the		
	lesson. Each lesson	3.4 Suggest teaching strategies to be used in	
	should include at	achieving the LOs of the lesson and explain how	
	least two	they can help inculcate core competencies in	
	opportunities to use	student teachers and for that matter Basic	
	continuous	School learners.	
	assessment to	Example:	
	support student	a) <u>Pedagogical approaches:</u>	
	teacher learning	Group Work to explore the relationship among	
•	Resources:	Associated 21 <sup>st</sup> century skills:	
	<ul> <li>links to the</li> </ul>	Social and Leadership Skills	
	existing PD	() Dedenosiant engras chase their structure the	
	Themes, for	b) Pedagogical approaches: Using investigation to	
	example, action	identify generalizations on laws of indices	
	research,	Associated 21 <sup>st</sup> century skills:	
	questioning and	Critical Thinking	
	to other external	NB: Let tutors suggest more examples beyond	
	reference	those suggested above.	
	material:	2 E Montion come CECI reconcision reconstruction	
	literature, on	3.5 Mention some GESI responsive resources that	
	web, Utube,	can be used with the suggested approaches	
	physical	and strategies in achieving the LOs.	
	resources, power	E.g. Resources may include supporting staff with	
	point; how they	experts in sign language as well as resources such	
	should be used.	as teacher and learner resource packs, textbooks,	
		etc	

•	Consideration needs to be given to local availability o 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	<ul> <li>3.6 Using discussion, lead tutors to come out with assessment strategies ('as' and 'for') to be used during teaching of the lesson.</li> <li>NB: Continuous assessment activities (assignments, quizzes, report writing, group presentations, etc. should be used to create subject projects and build subject portfolios).</li> <li>Example: A project on how to teach measurement of area from non-standard unit up to and including standard unit. (Upper Primary)</li> <li>A project on investigation of experiments that will generate P(E)=0; O<p(e)<1, (jhs="" -="" core)<="" li="" p(e)="1"> <li>A project on developing an understanding of taxation. (JHS – Elective)</li> <li>NB: Make reference to assessment in the course manual and NTEAP</li> <li>3.7 Develop a sample of assessment items based on the LOs and share with the whole group.</li> <li>Example:</li> <li>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</li> <li>3.8 Discuss the various ways you can support student teachers to build their subject portfolio.</li> <li>E.g. Encouraging student teachers to file all feedback on micro teaching in their folders.</li> <li>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, c, 1: BSC pn. jii)</li> </p(e)<1,></li></ul>	
4.	Evaluation and	1a, b, 2b, e, 3b, c, J; BSC pp. iii) Evaluation and review of session:	15 mins
	review of session:		10 11113
•	Tutors need to identify critical friends to observe lessons and report at next session Identifying and addressing any	<ul> <li>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</li> </ul>	

outstanding issues	4.2 Identify unresolved issues relating to this lesson
relating to the	for clarification.
lesson/s for	NB: Put your unresolved issues unto the
clarification	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:
	LESSON 9
	Upper Primary – Measurement 2 (Teaching and
	Assessing)
	JHS (Core) - Rational and Irrational numbers 1
	(Teaching and Assessing)
	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.
	clarificación

Age Levels/s:

Name of Subject/s:

- a. Upper Primary
- a. Mathematics: Teaching and Assessingb. Teaching and Assessing JHS Mathematics
- b. JHS Core)
- c. JHS (Elective)
- **c.** Mathematics

## **Tutor PD Session for Lesson 9 in the Course Manual**

Lesson Tittle:

- a. Upper Primary: Measurement 2
- a. JHS (Core): Rational and Irrational numbers 1
- b. 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 Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each stage of the session.	Time in session
<ol> <li>Introduction to the session</li> <li>Review prior learning</li> <li>A critical friend to share findings for a short discussion and lessons learned</li> <li>Reading and discussion of the introductory sections of the lesson up to and including learning outcomes and indicators</li> <li>Overview of content and identification of any distinctive aspects of the lesson/s,</li> </ol>	<ul> <li>Introduction</li> <li>1.1 Demonstrate with any relevant learning resources to determine the number of fives in 16.</li> <li>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 various strategies and skills during the basic school classroom work in STS Field Experience in year 4 semester 1</li> <li>1.3 As a critical friend share his/her observation on the eighth lesson.</li> <li>1.4 Read and discuss the introductory section of the lesson (up to learning outcomes). Suggest</li> </ul>	20 mins

	•	
NB The guidance for	relevant previous knowledge of students that	
SL/HoD should identify	will support effective teaching and learning of	
and address any areas	the lesson.	
where tutors might		
require clarification on	1.5 Identify the purpose of the lesson from the	
any aspect of the lesson.	course manual and state your expectations of	
NB SL/HoD should ask	the PD Session.	
tutors to plan for their	Upper Primary	
teaching as they go	i. Prepare and model interactive, develop and	
through the PD session	innovative ways of teaching student teachers'	
	understanding of Perimeter and areas of	
	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 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	
	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.	
	Vocabulary	
	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.	
<ul> <li>2. Concept Development (New learning likely to arise in lesson/s):</li> <li>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</li> <li>NB The guidance for SL/HoD should set out what they need to do to introduce and explain the issues/s with tutors</li> </ul>	<ul> <li>Concept Development</li> <li>2.1 Identify familiar and unfamiliar concepts in your lesson and discuss with the larger group.</li> <li>2.2 In your phase groups, draw connections among concepts in the lesson and in line with the basic school curriculum.</li> <li>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.</li> <li>2.4 In whole group, discuss misconceptions and barriers to learning in the lesson.</li> <li><i>Example:</i> <ul> <li><i>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.</i></li> <li><i>JHS (Core/Elective) – Misconception of irrational number is that pi is the same as <sup>22</sup>/<sub>7</sub> and measurement and estimation of quantity and money are not the same.</i></li> <li>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.</li> </ul></li></ul>	15 mins
3. Planning for teaching, learning and assessment activities for the lesson/s	Teaching and learning activities 3.1 Suggest teaching and learning activities for the lesson taking into consideration GESI.	40 mins

•	Reading and discussion of the	Example: i. equal opportunity is given to persons with SEN to	
	teaching and learning	ask and answer questions in class.	
	activities	ii. ensures equal participation of female and males	
	Noting and	during role play. iii. positive feedback is given to	
•	-	both males and females,	
	addressing areas	iv. body language does not exclude girls or shows	
	where tutors may	preferential treatment to boys, etc	
	require clarification	NTS 1a, b, c, d, 2b, e, f, 3b, c.	
•	Noting opportunities	NTS 1a, b, c, u, 2b, c, 1, 5b, c.	
	for making links to	3.2 Read the activities outlined in your course	
	the Basic School	manual and identify areas that require	
	Curriculum	clarification.	
•	Noting opportunities	clarification.	
	for integrating: GESI	3.3 Brainstorm to come up with some pedagogical	
	responsiveness and	approaches and their related core	
	ICT and 21 <sup>st</sup> C skills	competencies likely to be inculcated in students	
•	Reading, discussion,	and for that matter Basic School learners.	
	and identification of		
	continuous	3.4 Discuss the assessment strategies to be used	
	assessment	during teaching of the lesson- Subject Project	
	opportunities in the	and Subject Portfolio). Assessment must be	
	lesson. Each lesson	aligned with the NTEAP.	
	should include at		
	least two	3.5 Discuss the various ways they can support	
	opportunities to use continuous	student teachers to build their project and	
		subject portfolios.	
	assessment to		
	support student teacher learning	3.6 Model a presentation of an activity using ICT	
-	Resources:	tools and taking into consideration GESI issues	
	1. 11	in the lessons (NTS 1a, b, 2b, e, 3b, c, J; BSC pp.	
	<ul> <li>links to the existing PD</li> </ul>	23).	
	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		
	-		

Δ	Evaluation and	Reflective Activity	15 mins
	review of session:	Reflective Activity	13 111113
•	Tutors should Identifying critical friends to observe lessons and report at next session.	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.	
•	Identifying and addressing any outstanding issues	4.2 Reflect on the activities in the session and outline unresolved issues relating to the lesson.	
	relating to the lesson/s for clarification	<ul> <li>4.3 Identify critical friend observes teaching and record his/her findings to be presented after delivery or in the Next PD session.</li> <li>NB: Identify a critical friend from the same or related discipline to observe during teaching and provide feedback (NTS 1a)</li> </ul>	
		<ul> <li>Advance Preparation</li> <li>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:</li> <li>Upper Primary - Handling Data 1 (Teaching and Assessing)</li> <li>JHS(Core) - Fractions 1 (Teaching and assessing).</li> <li>JHS(Elective) – Percentages and its applications.</li> </ul>	

Age Levels/s:

Name of Subject/s:

- a. Upper Grade
- b. JHS (Core)
- a. Mathematics: Teaching and Assessingb. Teaching and Assessing JHS Mathematics
- c. JHS (Elective)
- 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 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	Introduction	20 mins
<ul> <li>Review prior learning</li> <li>Reading and discussion of the introductory sections of the lesson up to</li> </ul>	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?)	
and including learning outcomes and indicators	1.2 Tell how useful the week 9 PD session influenced your teaching and how students will employ the various concepts during the STS	
<ul> <li>Overview of content and identification of any distinctive aspects of the</li> </ul>	Field Experience. 1.3 As a critical friend, share with members, feedback on the observation you made during	
lesson/s,	the enactment of lesson 9.	
NB: The guidance for SL/HoD should identify	Upper Primary: Measurement 2 (Teaching and Assessing)	
and address any areas where tutors might	JHS (Core): Rational and Irrational numbers 1 (Teaching and Assessing)	

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	<ul> <li>and bank transactions</li> <li>1.4 Discuss any challenge enactment. Eg In whappreciate the neede equity during the less activities?</li> <li>NB:</li> <li>Work in your phase gewhole group discussis</li> <li>Pay attention to all N points necessary for a teaching plan.</li> <li>1.5 Silently read the interference lesson 4 in the coure LOS. Suggest releva students that will su and learning of the</li> <li>1.6 Read the course mathematication and share NTS 2b (NTS 2b).</li> </ul>	aroup and contribute to the on. ITS references and salient the development of your croductory sections of se manual (including the nt previous knowledge of upport effective teaching	
<ul> <li>2. Concept Development (New learning likely to arise in lesson/s):</li> <li>Identification and discussion of new learning, potential barriers to learning for student teachers</li> </ul>	and diversity issues Distinctive aspects a. Upper Primary- Deve Collecting, interpreting Exploring various source b. JHS (core) – fraction and interpreting fractio c. JHS (Elective) – Insurce income tax, value added Concept Development 2.1 Ask tutors to identif	loping the concepts of and presenting data es of data al parts, naming fractions ns. ance (types and benefits),	15 mins
or students, concepts or pedagogy being	Upper primary	presenting data	

introduced in the lesson, which ne be explored with SL/HoD NB: The guidance for SL/HoD should set of what they need to of introduce and explat the issues/s with tu	ned to in the       Interpreting fractions.         JHS(Core)       Income tax, value added tax and custom duties         or but       JHS(Elective)         Insurance (types and benefits)       Income tax, value added tax and custom duties         2.2 In your phase group, draw connections among concepts in the lesson and in line with the basic school curriculum.         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 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.	
<ul> <li>3. Planning for teacher learning and assessment activities</li> <li>Beading and discussion of the teaching and lead activities</li> </ul>	<ul> <li>vities 3.1 In your phase group, suggest teaching and learning activities for teaching the lesson ensuring;</li> <li>i. Provision is made for SEN</li> </ul>	10 mins
<ul> <li>Noting and addressing areas where tutors marequire clarificat</li> <li>Noting opportune for making links the Basic School Curriculum</li> </ul>	aymanual and identify areas that requireionclarification.nities.toNB: Refer to the Basic School Curriculum (BSC pp. xv	

•	Noting opportunities	explanations on pedagogical approaches" and	
	for integrating: GESI	search through "IXL Math".	
	responsiveness and	5	
	ICT and 21 <sup>st</sup> C skills	3.3 Brainstorm some pedagogical approaches that	
•	Reading, discussion,	can be employed during the lesson and their	
	and identification of	effectiveness towards learning of the concepts.	
	continuous	Mention any GESI issues that need	
	assessment	consideration while using those approaches	
	opportunities in the	0 11	
	lesson. Each lesson	3.4 Suggest teaching strategies to be used in	
	should include at	achieving the Los of the lesson and explain how	
	least two	they can help inculcate core competencies in	
	opportunities to use	student teachers and for that matter Basic	
	continuous	School learners.	
	assessment to	Example.	
	support student	<i>a</i> ) Pedagogical approaches: <i>Group Work to collect</i>	
	teacher learning	data and present them on graphs –	
•	Resources:	Associated 21 <sup>st</sup> century skills: Social and Leadership	
	<ul> <li>links to the</li> </ul>	Skills	
	existing PD		
	Themes, for	b) Pedagogical approaches: Using investigation to	
	example, action	identify various interpretation of fractions.	
	research,	Associated 21 <sup>st</sup> century skills: Critical Thinking	
	questioning and	NB: Suggest more examples beyond those	
	to other external	suggested above.	
	reference		
	material:	3.5 Mention some GESI responsive resources that	
	literature, on	can be used with the suggested approaches and	
	web, Utube,	strategies in achieving the LOs.	
	physical	Example	
	resources, power	Resources may include supporting staff with	
	point; how they	experts in sign language as well as resources such	
	should be used.	as teacher and learner resource packs, textbooks,	
	Consideration	etc	
	needs to be given		
	to local	3.6 Discuss to come out with assessment strategies	
	availability	('as' and 'for') to be used during teaching of the	
	<ul> <li>guidance on any</li> </ul>	lesson.	
	power point	NB: Continuous assessment activities (assignments,	
	presentations,	quizzes, group presentations, etc. should be used to	
	TLM or other	create subject projects and build subject portfolios).	
	resources which	Example: A project on how collecting discrete data	
	need to be	Example: A project on how collecting discrete data and representing it on a graph	
	developed to		
_	support learning	(Upper Primary).	
•	Tutors should be	A project on investigation of causes of 20 level 100	
	expected to have a	students' fear for fractions. (JHS - Core)	
	plan for the next		
	lesson for student	A project on investigating the type of insurance 10	
	teachers	basic school teachers invest in and why.	
		(JHS – Elective)	
L		USING LICCUVCJ	

(Teaching and Assessing) JHS (Elective) – Teaching vectors: Learning, teaching and applying
NB: <i>i.</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. <i>ii.</i> 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)

Name of Subject(s):

c. Upper Primary

d. Mathematics: Teaching and Assessing

- e. Teaching and Assessing JHS Mathematic
- d. JHS (Core) e. JJHS (Elective)
- f. 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 Tutor Activity during the PD Session. What PD Session participants (Tutors) will do during each stage of the session.	Time in session
<ol> <li>Introduction to the session         <ul> <li>Review prior learning</li> <li>A critical friend to share findings for a short discussion and lessons learned</li> <li>Reading and discussion of the introductory sections of the lesson up to and including learning outcomes and indicators</li> <li>Overview of content and identification of any distinctive aspects of the lesson/s,</li> </ul> </li> </ol>	<ul> <li>Introduction</li> <li>1.1 Ice breaker activity: Begin with an investigational activity:</li> <li><i>Example: A man was travelling and got to the middle of the journey. What numerical value will use to represent the distance covered.</i></li> <li>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.</li> <li><i>NB:</i></li> <li><i>Lead tutors to use their preferred learning styles in reporting how useful the previous PD Session (Lesson 10) was.</i></li> <li>1.3 Ask a critical friend to give feedback on observation during enactment of the previous lesson.</li> </ul>	20 mins

NR The guidance for	Linner Primary	
NB The guidance for SL/HoD should identify	Upper Primary Handling Data 1 (Teaching and Assessing)	
and address any areas	JHS (core)	
where tutors might	Fractions 1 (Teaching and Assessing)	
require clarification on	JHS (Elective)	
any aspect of the lesson.	Percentages and its applications	
NB SL/HoD should ask	NB:	
tutors to plan for their	Let a critical friend provide feedback during	
teaching as they go	enactment of the previous lesson by using power	
through the PD session	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	
	<ul> <li>Introduce the student teachers to prepare and model interneting and importing upper of</li> </ul>	
	model interactive, and innovative ways of	
	teaching mathematics, e	
	JHS (Elective)	
	<ul> <li>Introduce student teachers to vectors and related concents and to model adequately how</li> </ul>	
	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.	

		,
	Distinct Aspects	
	Upper Primary:	
	Sample Spaces to Determine Probability	
	Experimental and theoretical probabilities	
	JHS (core):	
	<ul> <li>Use of manipulative materials and other</li> </ul>	
	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	
	Vocabulary	
	Upper Primary:	
	Chance, Uncertainty, theoretical, Probability and	
	Data	
	JHS (core): Multiplication, Division, Fraction and	
	Percentages.	
	JHS (Elective): Vector, Operation, Magnitude,	
	Direction and Bearings	
	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	Concept Development	15 mins
Development (New		
learning likely to	2.1 Identify familiar and unfamiliar concepts in	
arise in lesson/s):	their lessons and discuss with the larger group.	
<ul> <li>Identification and</li> </ul>	Familiar and Unfamiliar Concepts	
discussion of new	Upper Primary	
learning, potential	Examples of Familiar Concepts: Sample Space and	
barriers to learning	Event	
for student teachers	Unfamiliar concepts:	
or students, concepts	Ideas of chance and uncertainty.	
or pedagogy being	determining experimental and	
introduced in the	theoretical probabilities	
lesson, which need to	JHS (Core):	
	Examples of Familiar Concepts:	

		[
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	<ul> <li>Multiplication and Division of fractions Unfamiliar concepts:         <ul> <li>Multiplying whole numbers with fractions or Fractions with whole numbers</li> <li>Connecting common and decimal fractions and percent</li> </ul> </li> <li>JHS (Elective)         <ul> <li>Examples of Familiar Concepts:</li> <li>Concept of vectors</li> <li>Concept of vectors</li> <li>Concept of vectors</li> <li>Concept of bearing and back bearings</li> </ul> </li> <li>2.2 Lead tutors to draw connections among concepts in the various lessons in line with the Basic School Curriculum.</li> <li>E.g. The connection between possibility of an event and certainty of an event (B5.4.2.1)-Upper Primary</li> </ul> <li>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.</li> <li>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 &amp;3)</li> <li>2.4 Participate actively in the discussion on misconceptions and barriers in teaching and learning of the lesson.</li> <li>Misconceptions</li>	
	Basic School Curriculum.	
	your lesson, share with a member of the same	
	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	
	misconceptions and barriers in teaching and	
	<ul> <li><u>Misconceptions</u> Example:</li> <li>a. Upper Primary: Learners believe that all events are possible</li> <li>b. JHS (core): Learners believe that the principles for multiplying two (2) fractions is the same as dividing two (2) fractions</li> <li>c. Learners believe that there is no difference between vectors and coordinate geometry.</li> </ul>	
	Barriers Upper Primary/JHS Core/JHS (Elective) Some possible barriers:	
	Different entry behaviours,	

<ul> <li>misconceptions about mathematics</li> <li>Socio-cultural issues</li> <li>Planning for teaching and learning activities for the lesson taking into consideration GESI</li> <li>Upper Primary:</li> <li>Reading and discussion of the teaching and learning activities</li> <li>Noting and addressing areas where tutors may require clarification</li> <li>Noting opportunities for making links to the Basic School Curriculum</li> <li>Noting opportunities for integrating: GESI responsiveness and ICT and 21<sup>st</sup> C skills</li> <li>Reading, discussion, and identification of continuous assessment opportunities in the lesson. Each lesson should include at least two</li> <li>3.2 Read the activities outlined in your course</li> </ul>			different leaves a set le	
<ul> <li>Socio-cultural issues</li> <li>Panning for traction social formation in the internet. (NTS 3), PD Manual pp.38</li> <li>Teaching and learning activities</li> <li>Socio-cultural issues</li> <li>Soci</li></ul>			different learning needs,	
<ul> <li>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)</li> <li>3. Planning for teaching, learning and assessment activities for the lesson taking into consideration GESI Upper Primary:</li> <li>Reading and discussion of the teaching and learning activities</li> <li>Reading and discussion of the teaching and learning activities</li> <li>Noting and adressing areas where tutors may require clarification</li> <li>Noting opportunities for making links to the Basic School Curriculum</li> <li>Noting opportunities for integrating: GESI Discussion of the other probabilities (PD Themes 1 &amp; 3)</li> <li>Net ing opportunities for integrating: GESI Discussion of the concept of vectors and related concepts</li> <li>Noting and identification of factions (PD Themes 1 &amp; 3)</li> <li>ME: 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</li> <li>A Read the activities outlined in your course</li> </ul>			•	
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		should include at		
manual and identify areas that require		least two		
		opportunities to use	manual and identify areas that require	
continuous clarification.		••		
assessment to NB:		assessment to		
support student Identify challenging areas that require clarification,		support student		
teacher learning using Internet Search to clarify the otherwise dark		teacher learning		
• Resources: spots in Handling Data 2 (B5.4.2.1, 4.4.1.1, 5.4.1.1)	•	Resources:		
<ul> <li>links to the</li> <li><i>Fractions 2, and Teaching vectors.</i></li> </ul>		<ul> <li>links to the</li> </ul>	Fractions 2, and Teaching vectors.	
existing PD		existing PD		
Themes, for 3.3 Brainstorm to come up with some pedagogical		Themes, for		
approaches and their related core			approaches and their related core	

<ul> <li>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</li> <li>guidance on any power point presentations, TLM or other resources which need to be developed to support learning</li> <li>Tutors should be expected to have a plan for the next lesson for student teachers</li> </ul>	<ul> <li>competencies likely to be inculcated in students and for that matter Basic School learners.</li> <li>Examples:</li> <li>Strategies: Expository, Think pair Share, Discussion Brainstorming, interactive and Collaborative group work.</li> <li>Core Competencies: Problem solving, critical and creative thinking and communication.</li> <li>NB:</li> <li>Both the strategies and the competencies are applicable to all the lesson:</li> <li>Handling Data 2</li> <li>Fractions 2</li> <li>Teaching vectors</li> <li>3.4 suggested teaching strategies that can help inculcate core competencies in the student teachers and for that matter basic school learners.</li> <li>e.g.,</li> <li>Expository, Think pair Share, Discussion Brainstorming, interactive and Collaborative group work.</li> <li>NB:</li> <li>Lead tutors to explain how the suggested strategies will inculcate core competencies in the student teacher</li> <li>3.5 mention some GESI responsive resources that can be used with suggested approaches and strategies in achieving the Los.</li> <li>E.g.</li> <li>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)</li> <li>3.6 Discuss to come up with assessment strategies ("as and "for") to be used during the lesson.</li> </ul>	

(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: $\frac{1}{2} \times \frac{3}{4} + \frac{6}{4} \times \frac{1}{2}$ 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 applications 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 (Elective)- As teachers to tell strategies for 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 Discuss the various ways you can support student teachers to build their subject portfolio.	

		<i>E.g. encouraging student teachers to file all their assignments with feedback in their folders.</i>	
		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:	Reflective Activity	15 mins
•	Tutors should Identifying critical friends to observe lessons and report at next session.	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	
•	Identifying and addressing any outstanding issues	4.2 Reflect on the activities in the session and outline unresolved issues relating to the lesson <i>NB</i> :	
	relating to the lesson/s for clarification	<ul> <li>Take note of all unresolved issues and use any of following strategies</li> <li>put on SL/SWL WhatsApp platform for discussion</li> </ul>	
		<ul> <li>tutors to research for the next PD session for discussion</li> </ul>	
		4.3 Identify critical friend observes teaching and record his/her findings to be presented after delivery or in the Next PD session.	
		NB: 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	
		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	d. Mathematics: Teaching and Assessing	
b. JHS (Core)	e. Teaching and Assessing JHS Mathematics	
c. JHS (Elective)	f. 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 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	Introduction	20 mins
<ul><li> Review prior learning</li><li> Reading and</li></ul>	<ol> <li>1.1 Ice breaker: Participate in the investigational activity by leading a starter of your choices.</li> </ol>	
discussion of the introductory sections of the lesson up to and including learning outcomes and indicators	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.	
<ul> <li>Overview of content and identification of any distinctive aspects of the lesson/s,</li> <li>NB: The guidance for SL/HoD should identify</li> </ul>	<ul> <li>1.3 As a critical friend, share with members, feedback on the observation you made during the enactment of lesson 11. That is:</li> <li>Upper Primary Handling Data 2:</li> <li>(Teaching and Assessment)</li> <li>JHS (Core) Fractions 2: (Teaching and Assessment)</li> </ul>	
and address any areas	JHS (Elective) Teaching vectors	

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	<ul> <li>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?</li> <li><i>NB:</i></li> <li><i>Work in your phase group and contribute to the whole group discussion.</i></li> <li><i>Pay attention to all NTS references and salient points necessary for the development of your teaching plan.</i></li> <li>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 teaching and learning of the lesson.</li> <li>1.6 Read the course manual silently and identify the purpose of lesson 12 and state your expectations on post-in cards and share with the whole group. NTS 2b (NTS 2b).</li> <li>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).</li> <li><i>Distinctive aspects</i></li> <li><i>Upper Primary-</i> A reflection on lessons 1-11</li> <li><i>JHS (core) –</i> A reflection on lessons 1-11</li> <li><i>C. JHS (Elective) –</i> A reflection on lessons 1-11</li> </ul>	
<ul> <li>2. Concept Development (New learning likely to arise in lesson/s):</li> <li>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</li> <li>NB: The guidance for SL/HoD should set out what they need to do to</li> </ul>	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 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	15 mins

introduce and explain		
the issues/s with tutors	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 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.	

3.	Planning for teaching, learning	Planning for Teaching and learning activities	40 mins
	and assessment	2.1 In your phase group, suggest reflective	
	activities for the	3.1 In your phase group, suggest reflective activities for reviewing the past lessons	
	lesson/s	ensuring;	
•	Reading and	i. Provision is made for SEN	
•	discussion of the	ii. Both genders take leading roles in group task,	
	teaching and learning	etc. referring to NTS 1a, b, c, d, 2b, e, f, 3b, c	
	activities		
•	Noting and	3.2 Read the activities outlined in lesson 12 in your	
•	addressing areas	course manual and identify areas that require	
	where tutors may	clarification.	
	require clarification		
•	Noting opportunities	NB: Refer to the Basic School Curriculum (BSC.	
-	for making links to	Upper primary) and through "IXL Math" for	
	the Basic School	explanations on the concepts under this lesson.	
	Curriculum	,	
•	Noting opportunities	3.3 Brainstorm some pedagogical approaches that	
	for integrating: GESI	can be employed during the lesson and their	
	responsiveness and	effectiveness towards reflecting on the	
	ICT and 21 <sup>st</sup> C skills	concepts. Mention any GESI issues that need	
•	Reading, discussion,	consideration while using those approaches	
	and identification of		
	continuous	3.4 Suggest teaching strategies to be used in	
	assessment	achieving the LOs of the lesson and explain how	
	opportunities in the	they can help inculcate core competencies in	
	lesson. Each lesson	student teachers and for that matter Basic	
	should include at	School learners.	
	least two	Example:	
	opportunities to use	a) Pedagogical approaches:	
	continuous	Group Work to explore the relationship among	
	assessment to	Associated 21 <sup>st</sup> century skills:	
	support student	Social and Leadership Skills	
	teacher learning	(b) Dedegenical engrande and University of the start of the	
•	Resources:	b) <u>Pedagogical approaches</u> : Using investigation to	
	<ul> <li>links to the</li> </ul>	identify generalizations on laws of indices	
	existing PD	Associated 21 <sup>st</sup> century skills:	
	Themes, for	Critical Thinking	
	example, action	NB: Let tutors suggest more examples beyond	
	research,	those suggested above.	
	questioning and		
	to other external	3.5 Mention some GESI responsive resources that	
	reference	can be used with the suggested approaches	
	material:	and strategies in achieving the LOs.	
	literature, on	E.g. Resources may include supporting staff with	
	web, Utube,	experts in sign language as well as resources such	
	physical	as teacher and learner resource packs, textbooks,	
	resources, power	etc	
	point; how they should be used.		
	consideration		
	needs to be given		

•	to local availability o 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	<ul> <li>3.6 Using discussion, lead tutors to come out with assessment strategies ('as' and 'for') to be used during teaching of the lesson.</li> <li>NB: Continuous assessment activities (assignments, quizzes, report writing, group presentations, etc. should be used to create subject projects and build subject portfolios).</li> <li>Example:</li> <li>A Report on the connections among measurement, Fraction and handling data (Upper Primary)</li> <li>A project on investigating different games that can be used in teaching challenging topics fraction (JHS - Core)</li> <li>A project on developing TLMs for teaching percentages and vectors. (JHS – Elective)</li> <li>NB: Make reference to assessment in the course manual and NTEAP</li> <li>3.7 Develop a sample of assessment items based on the LOs and share with the whole group.</li> <li>Example:</li> <li>Interview 5 students in your class on any 2 concepts that are related and state the connections</li> <li>3.8 Discuss the various ways you can support student teachers to build their subject portfolio.</li> <li>E.g. Encouraging student teachers to file all feedback on micro teaching in their folders.</li> <li>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)</li> </ul>	
4.	Evaluation and review of session:	Evaluation and review of session:	15 mins
•	Tutors need to identify critical friends to observe lessons and report at next session Identifying and addressing any	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	
	outstanding issues relating to the lesson/s for clarification	<ul> <li>4.2 Identify unresolved issues relating to this lesson for clarification.</li> <li>NB: Put your unresolved issues unto the department's WhatsApp/ Telegram platform and research into the issues raised.</li> </ul>	

i. put on SL/SWL WhatsApp/ Telegram platform for discussion
ii. tutors to research for the next PD session for discussion
<ul> <li>4.3 Ask tutors to evaluate the PD sessions by indicating how the PD sessions have influenced their teaching</li> <li>Advance Preparation</li> </ul>
<ul> <li>NB:</li> <li>Remember to prepare their teaching plan for Lesson 12 taking note of important or distinctive aspects of the lesson and crosscutting issues.</li> </ul>
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	
<ul> <li>The final PD session provides the opportunity to review student teachers' learning from the course</li> </ul>	
<b>Prior knowledge:</b> 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	
<b>Interactive teaching</b> PD sessions 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	
<b>Integration of subject specific content and subject specific pedagogy</b> 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.	
<b>Resources /TLM</b> . 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	SUBJECT PORTFOLIO 1 per course per semester, individual or collaborative student teacher work.
	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	<b>The Subject Portfolio</b> 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	<b>End of semester Exam, weight 40%. To assess:</b> 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 21 <sup>st</sup> C skills in teaching and learning	

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