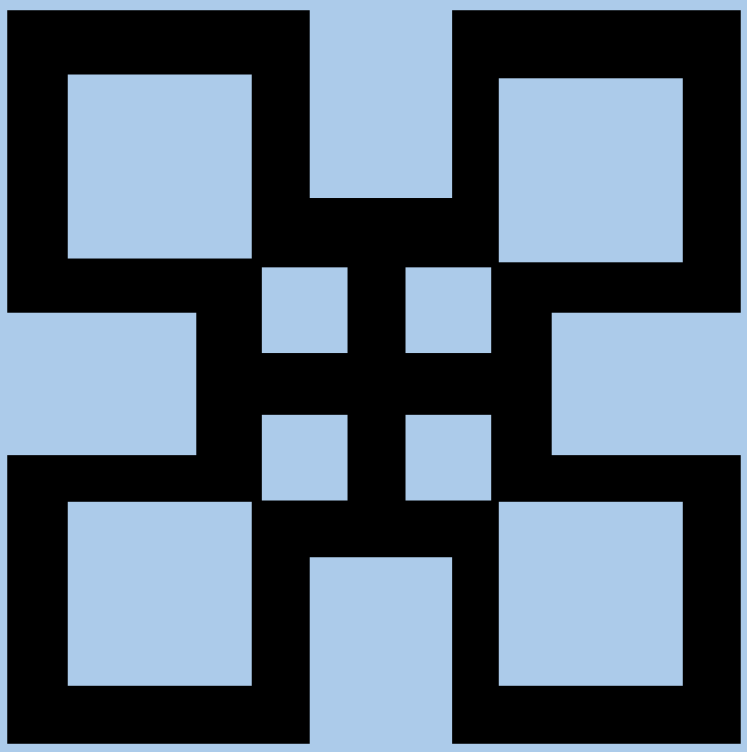
Secondary Education Professional Development Programme

Professional Learning Community Handbook

Intervention Mathematics

Level One & Two



Ghana Education Service (GES)

NaCCA
NATIONAL COUNCIL FOR CURRICULUM AND ASSESSMENT

NTC

Professional Learning Community Handbook

Intervention Mathematics

Level One & Two

REPUBLIC OF GHANA

Contents

LEVEL ONE

Module 1

PLC Session 0: Guidelines for Intervention Mathematics

1. Introduction

Learners enter Senior High Schools (SHSs) from a wide range of backgrounds. Many of these learners may have experienced deficiencies in Mathematics and English Language teaching at primary and Junior High School levels.

For the first time the Government of Ghana has introduced Intervention English and Intervention Mathematics in SHSs to address these deficiencies and ensure that all learners have the best chance to succeed in their studies during their 3 years in SHS.

Intervention English and Intervention Mathematics Teacher Manuals, PLC Handbooks and Learner Materials have been written to support teachers to deliver these classes, which will be timetabled for three hours per week for those learners who require intervention. These intervention subjects will have to be taken in addition to Core Mathematics and Core English Language.

2. Developing items, Conducting, Marking and Interpreting the Initial Assessment

Purpose

The purpose is to prepare English and Mathematics teachers to run intervention classes, starting with identifying learners who require intervention upon entry to Senior High School Year One.

Learning Outcome

To support teachers to understand the need for intervention, develop initial assessment items and conduct initial assessments that will inform the placement of learners who require intervention at the appropriate level (i.e. Level One or Level Two) of Intervention English and Intervention Mathematics.

Learning Indicators

1. Discuss the structure for identifying SHS Year One learners for placement at the appropriate level of Intervention English and Intervention Mathematics.
2. Outline and elaborate on the do's and don'ts that teachers are required to follow in the running of intervention classes.
3. Examine when and how teachers of Intervention English and Intervention Mathematics will assess the progress of learners studying the intervention subjects.

2.1 Discuss as English and Mathematics subject groups the process you will follow to

a) develop initial assessment items for assessing individual learning needs.

b) conduct the initial assessment.

E.g.

a) *Develop a table of specification, etc.*

b) *Arrange desks in a way that will help learners to do independent work, etc.*

2.2 Discuss, as a subject group, how you will

a) mark learners' work.

b) record learners' scores.

c) analyse the results of the initial assessment.

d) interpret learners' performance.

E.g.

a) *Develop rubrics for marking, etc.*

b) *Create a spreadsheet containing learners' names and scores, etc.*

c) *Calculate item difficulty index for each item, etc.*

d) *Use cut-off points to determine the learners who need intervention, etc.*

2.3 Discuss the do's and don'ts of identifying and grouping learners who have been identified as needing intervention in English only, Mathematics only or both.

E.g.

a) *Do's: Learners are to be encouraged to see the need for accepting to be placed in the appropriate level of the intervention, etc.*

b) *Don'ts: Learners should not be tagged for belonging to any level or subject of an intervention class, etc.*

2.4 Discuss how and when you will assess the progress of intervention learners.

E.g.

Use of task sheets, etc.

3. Review and Reflection

3.1 Reflect and share your views on the session.

3.2 Remember to:

a) read PLC Session 1 and related Teacher Manuals and Learner Materials.

b) bring along your Teacher Manual and PLC Handbook in preparation for the next session on *Modelling and Comparing of Number Quantities* (NTS 1c, 1f).

PLC Session 1: Modelling and Comparing of Number Quantities

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Materials and assessment strategies that can support teaching and learning of *Modelling and Comparing of Number Quantities.*

Learning Outcomes

1 Review your Teacher Manual and Learner Material for concepts on *Modelling and Comparing of Number Quantities* (NTS 1a, 2b, 2c and 3o).

2 Teach and reflect on a lesson on *Modelling and Comparing of Number Quantities* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content on *Modelling and Comparing of Number Quantities* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Modelling and Comparing of Number Quantities*.

2.2 Give constructive feedback on a lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning (NTS 1a, 2e).

1.2 As a critical friend, share the feedback you gave/received during the lesson observed (what went well and what could have been done differently) (NTS 1a, 2e).

2. Plan and Practice together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lessons(s) on *Modelling and Comparing of Number Quantities* (NTS 1a, 2b and 3o).

b) note the pedagogical and assessment strategies that have been recommended for teaching *Modelling and Comparing of Number Quantities* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s) based on your review on 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help to differentiate activities to meet the diverse needs of learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in the lesson? etc.*

E.g.

a) ***Pedagogy: Collaborative/ Experiential learning:*** *In mixed-gender/ability groups, learners read, write and compare numbers up to 1 000 000 using graph sheets, multi-base blocks and other improvised materials to explore and enhance their understanding of place value of large numbers.*

b) ***Assessment: Presentations:*** *Learners in groups model quantities of large values and present, orally to the whole class, how they did, etc.*

2.3 Review the activities in the Learner Material for *Modelling and Comparing of Number Quantities* and select activity(ies) best suited for the pedagogical strategy(ies) you will use in your lesson(s) (NTS 2e and 3a).

E.g.

Activity 1.1: *"Modelling with Graphs", etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e and 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

a) ***Task sheets:*** *Task sheet will be given to learners to practice the concept(s) for the lesson and to serve as extended learning.*

b) ***Graph sheets:*** *Graph sheet will be used to support learners to model quantities taking into consideration their place value, etc.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed in 2.2 above

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 1 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 2 on *Approximations*, *Odd and Even Numbers* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Material and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 2: Approximations, Odd and Even Numbers

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Materials and assessment strategies that can support teaching and learning of *Approximations, Odd and Even Numbers.*

Learning Outcomes

1 Review your Teacher Manual and Learner Materials for concept(s) on *Approximations, Odd and Even Numbers.* (NTS 1a, 2b, 2c and 3o)

2 Teach and reflect on a lesson on *Approximations, Odd and Even Numbers* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content of *Approximations, Odd and Even Numbers* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Approximations, Odd and Even Numbers.*

2.2 Give constructive feedback on a lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning (NTS 1a, 2e).

1.2 1.2 As a critical friend, share the feedback you gave/received during the lesson observed (what went well and what could have been done differently) (NTS 1a, 2e).

2. Plan and Practice together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lesson(s) on *approximations, odd and even numbers* (NTS 1a, 2b and 3o).

b) note the pedagogical and assessment strategies that have been recommended for teaching *Approximations, Odd and Even Numbers* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s), based on your review in 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) ***Pedagogy: Think Pair-Share:*** *In pairs, or mixed ability groupings, use base ten blocks or other manipulatives to represent numbers and visually understand rounding to the nearest tens, hundreds, thousands and tens of thousands.*

b) ***Assessment: Demonstration:*** *Learners in groups demonstrate how to round given amounts/quantities with real-life scenarios and explain how they did it, etc.*

2.3 Review the activities in the Learner Material for *Approximations, Odd and Even Numbers* and select activity(ies) best suited for the pedagogical strategy(ies) you will use in your lesson(s) (NTS 2e, 3a).

E.g.

Activity 1.7: *"Identifying Odd and Even Numbers Using a Number Line and Grouping", etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

Number Chart: *Learners have access to a number chart numbering from 1-100 and circle out both odd and even numbers.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c, 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed in 2.2 above.

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 2 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 3 on *Factors and Multiples* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Material and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 3: Factors and Multiples

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Materials and assessment strategies that can support teaching and learning of *Factors and Multiples.*

Learning Outcome

1 Review your Teacher Manual and Learner Materials for concepts on *Factors and Multiples* (NTS 1a, 2b, 2c and 3o).

2 Teach and reflect on a lesson on *Factors and Multiples* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content for *Factors and Multiples* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Factors and Multiples.*

2.2 Give constructive feedback on a lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning (NTS 1a, 2e).

1.2 As a critical friend share the feedback you gave/received during the lesson observed (what went well and what could have been done differently) (NTS 1a, 2e).

2. Plan and Practice together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lesson(s) on *factors and multiples* (NTS 1a, 2b and 3o).

b) note the pedagogical strategies and assessment strategies that have been recommended for teaching *Factors and Multiples* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s), based on your review on 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) ***Pedagogy: Think-Pair-Share:*** *Learners individually think about the multiples of 6 and 8. They then pair up to discuss their lists and identify the common multiples, followed by sharing their results with the class.*

b) ***Assessment: Group work:*** *Learners in pairs complete a task on prime factorisation of two numbers using factor tree for given numbers and identify the common factors.*

2.3 Review the activities in the Learner Material for factors and multiples and select activity(ies) best suited for the pedagogical strategy(ies) you will use in your lesson(s) (NTS 2e, 3a).

E.g.

Activity 1.9: *Test learners' knowledge on factors, multiples, HCF and LCM using index cards/ small pieces of paper/chalk board illustrations, etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

Bingo card: *Learners in pairs randomly select bingo cards containing numbers to find their multiples and factors.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed in 2.2 above.

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 3 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 4 on *Mental Mathematics Strategies* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Manual and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 4: Mental Mathematics Strategies

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Materials and assessment strategies that can support teaching and learning of *Mental Mathematics Strategies*.

Learning Outcomes

1 Review your Teacher Manual and Learner Material for *Mental Mathematics Strategies* (NTS 1a, 2b, 2c and 3o)

2 Teach and reflect on a lesson on *Mental Mathematics Strategies* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content for *Mental Mathematics Strategies.*

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Mental Mathematics Strategies.*

2.2 Give constructive feedback on the lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning (NTS 1a, 2e).

1.2 As a critical friend, share the feedback you gave/received during the lesson observed (what went well and what could have been done differently) (NTS 1a, 2e).

2. Plan and Practice together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lesson(s) on *Mental Mathematics Strategies* (NTS 1a, 2b and 3o).

b) note the pedagogical and assessment strategies that have been recommended for teaching *Mental Mathematics Strategies* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s), based on your review in 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson (s)? etc.*

E.g.

a) ***Pedagogy: Problem-based learning:*** *Learners are given a hypothetical budget of GHS1000 and a list of expenses. They use mental strategy*(ies) *to calculate the total expenses and determine how much money is left.*

b) ***Assessment: Project:*** *Give a detailed account of the expenditure made on the last market day when you went for shopping.*

2.3 Review the activities in the Learner Material for *Mental Mathematics Strategies* and select activity(ies) best suited for the pedagogical strategy(ies) you will use in your lesson(s) (NTS 2e, 3a).

E.g.

Activity 2.1: *Students in groups explore different strategies to solve addition and subtraction problems, etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

Number line/track: *Learners hop to model addition and subtraction of numbers on a number line/track drawn on the floor.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed in 2.2 above.

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 4 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 5 on *Positive and Negative Whole Numbers* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Manual and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 5: Positive and Negative Whole Numbers

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Materials and assessment strategies that can support teaching and learning of *Positive and Negative Whole Numbers.*

Learning Outcome

1 Review your Teacher Manual and Learner Material for *Positive and Negative Whole Numbers* (NTS 1a, 2b, 2c and 3o).

2 Teach and reflect on a lesson on *Positive and Negative Whole Numbers*. (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content of *Positive and Negative Whole Numbers* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *positive and negative whole numbers*.

2.2 Give constructive feedback on a lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning (NTS 1a, 2e).

1.2 As a critical friend share the feedback you gave/received during the lesson observed (what went well and what could have been done differently) (NTS 1a, 2e).

2. Plan and Practice together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lesson(s) on *Positive and Negative Whole Numbers* (NTS 1a, 2b and 3o)

b) note the pedagogical and assessment strategies that have been recommended for teaching *Positive and Negative Whole Numbers* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s), based on your review in 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson (s)? etc.*

E.g.

a) ***Pedagogy: Experiential learning****: Provide concrete manipulatives like number lines, counters or coloured chips and ask learners to physically manipulate these objects to represent positive and negative whole numbers.*

b) ***Assessment: Project:*** *Give a detailed account of the expenditure made on the last market day when you went for shopping.*

2.3 Review the activities in the Learner Material for *Positive and Negative Whole Numbers* and select activity(ies) best suited for the pedagogical strategy(ies) you will use in your lesson(s) for the week (NTS 2e, 3a).

E.g.

Activity 2.3: *Exploring positive and negative whole numbers using banking and temperature, etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

Colour-coded counters: learners use colour-coded counters to model combining positive and negative whole numbers.

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed in 2.2 above

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 5 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 6 on *Extending Patterns Visually* and related Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Manual and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 6: Extending Patterns Visually

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Materials and assessment strategies that can support teaching and learning of *Extending Patterns Visually*.

Learning Outcomes

1 Review your Teacher Manual and Learner Material for *Extending Patterns Visually* (NTS 1a, 2b, 2c and 3o).

2 Teach and reflect on a lesson on *Extending Patterns Visually* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content of *Extending Patterns Visually* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Extending Patterns Visually*.

2.2 Give constructive feedback on a lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning (NTS 1a, 2e).

1.2 As a critical friend, share the feedback you gave/received during the lesson observed (what went well and what could have been done differently) (NTS 1a, 2e).

2. Plan and Practice together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lesson(s) on *Extending Patterns Visually*.

b) note the pedagogical and assessment strategies that have been recommended for teaching *Extending Patterns Visually* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s), based on your review on 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson(s)? etc.*

E.g.

a) ***Pedagogy: Collaborative learning**: Engage learners to discuss and agree on how to extend a given pattern based on the relationship they identify.*

b) ***Assessment: Project**–Learners design a wrist and waist bead using repetitive pattern and generate a growing pattern from their work.*

2.3 Review the activities in the Learner Material for *Extending Patterns Visually* and select activity(ies) best suited for the pedagogical strategy(ies) you will use in your lesson(s) (NTS 2e, 3a).

E.g.

***Activity 3.1**: Create and extend both repeating and growing patterns using different materials, etc.*

2.4 Discuss the activities you will use to deliver your lesson(s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j)

E.g.

***Coloured beads:** Learners practice creating patterns taking into consideration the type of pattern to be used.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed in 2.2 above.

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 6 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) Read PLC Session 7 on *Using Pattern Rules to Solve Problems* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) Bring along your Teacher Manual, Learner Manual and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 7: Using Pattern Rules to Solve Problems

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Materials and assessment strategies that can support teaching and learning of *Using Pattern Rules to Solve Problems.*

Learning Outcomes

1 Review your Teacher Manual and Learner Material for concept (s) on *Using Pattern Rules to Solve Problems*. (NTS 1a, 2b, 2c and 3o).

2 Teach and reflect on a lesson on *Using Pattern Rules to Solve Problems*. (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content of *Using Pattern Rules to Solve Problems* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Using Pattern Rules to Solve Problems*.

2.2 Give constructive feedback on the lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning (NTS 1a, 2e).

1.2 As a critical friend share the feedback you gave/received during the lesson you observed (what went well and what could have been done differently) (NTS 1a, 2e).

2. Plan and Practice together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lesson(s) on *Using Pattern Rules to Solve Problems.*

b) note the pedagogical and assessment strategies that have been recommended for teaching *Using Pattern Rules to Solve Problems* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s), based on your review in 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson(s)? etc.*

E.g.

a) ***Pedagogy: Inquiry-Based Learning:*** *In collaborative and mixed-gender/ability groupings, engage learners to investigate and write the rule for a given pattern.*

b) ***Assessment: Peer assessment :*** *Learners individually to find the rule of a given pattern and predict an unknown term in the pattern. They exchange it with their colleagues for feedback.*

2.3 Review the activities in the Learner Material for *Using Pattern Rules to Solve Problems* and select activity(ies) best suited for the pedagogical strategy(ies) you will use in your lesson(s) (NTS 2e and 3a).

E.g.

Activity 3.3: *Identify and write down the rules that describes patterns and use these to predict the next elements, etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed in 2.2 above

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 7 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) Read PLC Session 8 on *Operations on Algebraic Expressions* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) Bring along your Teacher Manual, Learner Manual and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 8: Operations on Algebraic Expressions

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Materials and assessment strategies that can support teaching and learning of *Operations on Algebraic Expressions.*

Learning Outcomes

1 Review your Teacher Manual and Learner Material for concept on *Operations on Algebraic Expressions* (NTS 1a, 2b, 2c and 3o).

2 Teach and reflect on a lesson on *Operations on Algebraic Expressions* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content of *Operations on Algebraic Expressions* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Operations on Algebraic Expressions*.

2.2 Give constructive feedback on a lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning (NTS 1a, 2e).

1.2 As a critical friend share the feedback you gave/received during the lesson observed (what went well and what could have been done differently) (NTS 1a, 2e).

2. Plan and Practice together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lessons(s) on *Operations on Algebraic Expressions* (NTS 1a, 2b and 3o).

b) note the pedagogical and assessment strategies that have been recommended for teaching *Operations on Algebraic Expressions* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s) based on your review on 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) ***Pedagogy: Problem-based learning**: In groups/pairs learners translate real-life problems into algebraic expressions and perform operations on them.*

b) ***Assessment: Role play**: Learners model real-life problems, brainstorm to interpret and solve problems on algebraic expressions, etc.*

2.3 Review the activities in the Learner Material for *Operations on Algebraic Expressions* and select activity(ies) best suited for the pedagogical strategy(ies) you will use in your lesson(s) (NTS 2e, 3a).

E.g.

***Activity 3.4:** Identifying quantities, relationships and operations in real-life and translating those relationships into mathematical expressions, etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

***Task sheets:** Task sheet will be given to learners to consolidate understanding by practicing the concepts for the week and to serve as extended learning.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners ((NTS 1b, 1f, 2c 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed in 2.2 above.

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 8 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 9 on *2D and 3D Shapes* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Material and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 9: 2D and 3D Shapes

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Materials and assessment strategies that can support teaching and learning of *2D and 3D Shapes.*

Learning Outcomes

1 Review your Teacher Manual and Learner Material for concept on *2D and 3D shapes* (NTS 1a, 2b, 2c and 3o).

2 Teach and reflect on a lesson on *2D and 3D Shapes.* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content of *2D and 3D Shapes* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *2D and 3D Shapes*.

2.2 Give constructive feedback on a lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning (NTS 1a, 2e).

1.2 As a critical friend share the feedback you gave/received during the lesson observed (what went well and what could have been done differently) (NTS 1a, 2e).

2. Plan and Practice together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lessons(s) on *2D and 3D shapes.*

b) note the pedagogical and assessment strategies that have been recommended for teaching *2D and 3D shapes* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s) based on your review on 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) ***Pedagogy**: The use of visual aid and realia: Audio visuals are used to allow learners identify and sort the 2D and 3D shapes according to their attributes.*

b) ***Assessment: Creative task**: Learners cut out the net of 3D shapes to identify the different 2D shapes and discuss their properties as edges, face and vertices.*

2.3 Review the activities in the Learner Material for *2D and 3D Shapes* and select activity(ies) best suited for the pedagogical strategy(ies) you will use in your lesson(s) (NTS 2e, 3a).

E.g.

***Activity 4.1:** "3D Shape Scavenger Hunt", etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

***Solids of varied shapes:** Learners identify the 2D shapes from a pool of solids and describe their attributes, etc.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed in 2.2 above.

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 9 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 10 on *Perimeter of Regular and Irregular Shapes* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Material and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 10: Measurement of Perimeter I

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Materials and assessment strategies that can support teaching and learning of *Measurement of Perimeter I.*

Learning Outcomes

1 Review your Teacher Manual and Learner Material for concept on *Perimeter of regular and irregular* 2D shapes (NTS 1a, 2b, 2c and 3o).

2 Teach and reflect on a lesson on *Measurement of Perimeter I* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content of *Measurement of Perimeter I* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Measurement of Perimeter I*.

2.2 Give constructive feedback on a lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning (NTS 1a, 2e).

1.2 As a critical friend share the feedback you gave/received from the lesson observed (what went well and what could have been done differently) (NTS 1a, 2e).

2. Plan and Practice together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lessons(s) on *Measurement of Perimeter I.*

b) note the pedagogical and assessment strategies that have been recommended for teaching *Measurement of Perimeter I* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s) based on your review on 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) ***Pedagogy: Experiential learning:*** *Using mixed ability/gender grouping, learners measure and record the side lengths of objects and calculate the perimeter of squares, rectangles and triangles.*

b) ***Assessment: Group work****: Learners in groups support each other to find perimeter of squares, rectangles and triangles using grid/geoboard*

2.3 Review the activities in the Learner Material for *Measurement of Perimeter I* and select activity(ies) best suited for the pedagogical strategy(ies) you will use in your lesson(s) (NTS 2e, 3a).

E.g.

Activity 4.6: *Learners Individually /in groups develop(s) the squares, rectangles, triangles and irregular shades using grid/geoboard and calculate their perimeter, etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

Grid paper/Geo board: *Learners also use paper grid to investigate the perimeter of regular and irregular shapes.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed in 2.2 above

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 10 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 11 *Measurement of Perimeter II* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Material and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 11: Measurement of Perimeter II

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Materials and assessment strategies that can support teaching and learning of *Measurement of Perimeter II.*

Learning Outcomes

1 Review your Teacher Manual and Learner Material for concept on *Calculating Perimeter of 2D Shapes using Formula* (NTS 1a, 2b, 2c and 3o).

2 Teach and reflect on a lesson on *Measurement of Perimeter II* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content of *Measurement of Perimeter II* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Measurement of Perimeter II*.

2.2 Give constructive feedback on a lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning (NTS 1a, 2e).

1.2 As a critical friend share the feedback you gave/received during the lesson observed (what went well and what could have been done differently) (NTS 1a, 2e).

2. Plan and Practice Together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lessons(s) on *Measurement of Perimeter II.*

b) note the pedagogical and assessment strategies that have been recommended for teaching *Measurement of Perimeter II* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s) based on your review on 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) ***Pedagogy: Collaborative/experiential learning and problem-based learning:*** *using mixed ability/gender grouping, learners measure and record the side length of objects and calculate the perimeter of squares, rectangles and triangles.*

b) ***Assessment: Class Exercise :*** *Learners individually solve word problems on perimeter of 2D shapes*

2.3 *Review the activities in the Learner Material for Measurement of Perimeter II and select activity(ies) best suited for the pedagogical strategy(ies) you will use in your lesson(s)* (NTS 2e, 3a).

E.g.

Activity 4.8: *Learners Individually/in pairs/groups develop(s) the squares, rectangles and triangles using grid/geoboard and calculate their perimeter, etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

Empty packaging cases: *Learners investigate the nets of solids and determine the perimeter of their faces using standard formulae.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed in 2.2 above

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 11 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 12 *Organising and Presenting Quantitative and Qualitative Data* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Material and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 12: Organising and Presenting Quantitative and Qualitative Data

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Materials and assessment strategies that can support teaching and learning of *Organising and Presenting Quantitative and Qualitative Data.*

Learning Outcomes

1 Review your Teacher Manual and Learner Material for concept on *Organising and Presenting Quantitative and Qualitative data* (NTS 1a, 2b, 2c and 3o).

2 Teach and reflect on a lesson on *Organising and Presenting Quantitative and Qualitative Data* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content of *Organising and Presenting Quantitative and Qualitative Data* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Organising and Presenting Quantitative and Qualitative Data*.

2.2 Give constructive feedback on a lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning (NTS 1a, 2e).

1.2 As a critical friend share the feedback you gave/received during the lesson observed (what went well and what could have been done differently) (NTS 1a, 2e).

2. Plan and Practice together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lessons(s) on *Organising and Presenting Quantitative and Qualitative Data*

b) note the pedagogical and assessment strategies that have been recommended for teaching *Organising and Presenting Quantitative and Qualitative Data.* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s) based on your review on 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*
ii. *help me differentiate activities to meet the diverse needs of my learners?*
iii. *support GESI responsiveness throughout lessons?*
iv. *help me assess learners' understanding throughout the lesson?*
v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) ***Pedagogy: Collaborative/experiential learning:*** *In small group discussions, learners collect and organize data on a variable (e.g. day of birth, favourite food, height etc.).*

b) ***Assessment: Group work:*** *Learners organise, record and graph a given data and present findings.*

2.3 *Review the activities in the Learner Material for Organising and Presenting Quantitative and Qualitative Data and select activity(ies) best suited for the pedagogical strategy(ies) you will use in your lesson(s)* (NTS 2e, 3a).

E. g.

Activity 5.3: Recording and graph responses*: Learners practice recording and graphing of data collected from quantitative questionnaire*, interviews or observation guide, etc.

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*
b) *connect to real-world situations that learners can relate to?*
c) *make the lesson more engaging or fun for the learners?*
d) *require adjustment in complexity to match learners' abilities?*
e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

Graph board/sheet: *Learners represent their findings on graphs and interpret them.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed in 2.2 above

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 12 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Intervention Module 2 Session 1 on *Real Number and Numeration System* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Material and PLC Handbook for the next session (NTS 1c, 1f).

LEVEL TWO

Module 2

PLC Session 0: Guidelines for Intervention English and Intervention Mathematics

1. Introduction

Learners enter Senior High Schools (SHSs) from a wide range of backgrounds. Many of these learners may have experienced deficiencies in Mathematics and English Language teaching at primary and Junior High School levels.

For the first time the Government of Ghana has introduced Intervention English and Intervention Mathematics in SHSs to address these deficiencies and ensure that all learners have the best chance to succeed in their studies during their 3 years in SHS.

Intervention English and Intervention Mathematics Teacher Manuals, PLC Handbooks and Learner Materials have been written to support teachers to deliver these classes, which will be timetabled for three hours per week for those learners who require intervention. These intervention subjects will have to be taken in addition to Core Mathematics and Core English Language.

2. Developing items, Conducting, Marking and Interpreting the Initial Assessment

Purpose

To prepare English and Mathematics teachers to run intervention classes, starting with identifying learners who require intervention upon entry to Senior High School Year One.

Learning Outcome

To support teachers to understand the need for intervention, develop initial assessment items and conduct initial assessments that will inform the placement of learners who require intervention at the appropriate level (i.e. Level One or Level Two) of Intervention English and Intervention Mathematics.

Learning Indicators

1. Discuss the structure for identifying SHS Year One learners for placement at the appropriate level of Intervention English and Intervention Mathematics.
2. Outline and elaborate on the do's and don'ts that teachers are required to follow in the running of intervention classes.
3. Examine when and how teachers of Intervention English and Intervention Mathematics will assess the progress of learners studying the intervention subjects.

2.1 Discuss as English and Mathematics subject groups the process you will follow to

a) develop initial assessment items for assessing individual learning needs.

b) conduct the initial assessment.

E.g.

a) *Develop a table of specification, etc.*

b) *Arrange desks in a way that will help learners to do independent work, etc*

2.2 Discuss, as a subject group, how you will

a) mark learners' work.

b) record learners' scores.

c) analyse the results of the initial assessment.

d) interpret learners' performance.

E.g.

a) Develop rubrics for marking, etc.

b) Create a spreadsheet containing learners' names and scores, etc.

c) Calculate item difficulty index for each item, etc.

d) Use cut-off points to determine the learners who need intervention, etc.

2.3 Discuss the do's and don'ts of identifying and grouping learners who have been identified as needing intervention in English only, Mathematics only or both.

E.g.

a) *Do's: Learners are to be encouraged to see the need for accepting to be placed in the appropriate level of the intervention, etc.*

b) *Don'ts: Learners should not be tagged for belonging to any level or subject of an intervention class, etc.*

2.4 Discuss how and when you will assess the progress of intervention learners.

E.g.

Use of task sheets, etc.

3. Review and Reflection

3.1 Reflect and share your views on the session.

3.2 Remember to:

a) read PLC Session 1 and related Teacher Manuals and Learner Materials.

b) bring along your Teacher Manual and PLC Handbook in preparation for the next session on *Real Number and Numeration System* (NTS 1c, 1f).

PLC Session 1: Real Number and Numeration System

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Material and assessment strategies that can support teaching and learning of *Real Number and Numeration System*.

Learning Outcomes

1. Review your Teacher Manual and Learner Material for concepts on *real number and numeration system* and how they can be taught and assessed (NTS 1a, 2b, 2c, 3a, and 3o).
2. Teach and reflect on a lesson on *real number and numeration system* (NTS 1a, 2e, 2c, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content of *real number and numeration system* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *real number and numeration system.*

2.2 Give constructive feedback on the lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning (NTS 1a, 2e).

1.2 As a critical friend, share the feedback you gave/received during the lesson observed (what went well and what could have been done differently) (NTS 1a, 2e).

2. Plan and Practice together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lesson(s) on *real number and numeration system*

b) note the pedagogical and assessment strategies that have been recommended for teaching *real number and numeration system* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s), based on your review on 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) ***Pedagogy: Experiential learning*** *: Engage learners in counting objects available in and around the classroom to build the concepts of natural numbers, etc.*

b) ***Assessment: Project:*** *Learners in groups collect data on their ages or heights and group them into the various subsets in the real number system, etc.*

2.3 Review the activities in the Learner Material for *real number system* and select activity(ies) best suited for the pedagogical and assessment strategy(ies) you will use in your lesson(s) (NTS 2e, 3a).

E.g.

Activity 1.1: *"Creating Models of the Real Number and Numeration System", etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

Number chart or grid (1 to 50)*: Number chart or grid will be used to support learners to identify prime and composite numbers, etc.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed under 2.2 above

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 1 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 2 on *integers and operations on integers* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Material and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 2: Integers and Operations on Integers

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Material and assessment strategies that can support teaching and learning of *Integers and Operations on Integers*.

Learning Outcomes

1. Review your Teacher Manual and Learner Materials for concepts on *Integers and Operations on Integers and how they can be taught and assessed* (NTS 1a, 2b, 2c, 3a, and 3o).
2. Teach and reflect on a lesson on *Integers and Operations on Integers* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content for *Integers and Operations on Integers* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Integers and Operations on Integers.*

2.2 Give constructive feedback on a lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning (NTS 1a, 2e).

1.2 As a critical friend, share the feedback you gave/received during the lesson observed (what went well and what could have been done differently) (NTS 1a, 2e).

2. Plan and Practice Together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lesson(s) *Integers and Operations on Integers.*

b) note the pedagogical and assessment strategies that have been recommended for teaching *Integers and Operations on Integers* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s), based on your review on 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) ***Pedagogy: Think-pair-share**: Pose a question related to real number operations, such as "How would you explain adding a positive and a negative number?" Allow learners time to think individually, discuss their thoughts with a partner, and then share their ideas with the class.*

b) ***Assessment: Peer Assessment**: Learners model real world application of both negative and positive numbers. Learners then exchange their modelled scenarios and assess and give feedback to the partner*

2.3 Review the activities in the Learner Material for the lesson on *Integers and Operations on Integers* and select activity(ies) best suited for the pedagogical strategy(ies) you will use in your lesson(s) (NTS 2e, 3a).

E.g.

***Activity 1.1:** "Creating Models of the Real Number System", etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

***Two colour counters:** support learners to use two colour counters to model and solve operations of integers, etc.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed under 2.2 above.

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 2 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 3 on *fractions and Its applications* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Material and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 3: Fractions and Its Applications

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Material and assessment strategies that can support teaching and learning of *Fractions and Its Applications*.

Learning Outcomes

1. Review your Teacher Manual and Learner Materials for concepts on *Fractions and Its Applications* (NTS 1a, 2b, 2c, 3a, and 3o).
2. Teach and reflect on a lesson on *Fractions and Its Applications* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content for *Fractions and Its Applications* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Fractions and Its Applications.*

2.2 Give constructive feedback on a lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning (NTS 1a, 2e).

1.2 As a critical friend, share the feedback you gave/received during the lesson observed (what went well and what could have been done differently) (NTS 1a, 2e).

2. Plan and Practice Together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lesson(s) on *Fractions and Its Applications*

b) note the pedagogical and assessment strategies that have been recommended for teaching *Fractions and Its Applications* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s), based on your review on 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) ***Pedagogy: Collaborative learning**: In mixed ability/gender small groups, ask learners to fold a piece of paper into two equal pieces. Learners discuss and agree on the number of parts, and folds, what each part is called, and the number of halves in a whole.*

b) ***Assessment: Problem-based learning:** Learners in pairs create real-world scenarios from their homes that involve fractions, etc.*

2.3 Review the activities in the Learner Material for the lesson on *Fractions and Its Applications* and select activity(ies) best suited for the pedagogical and assessment strategy(ies) you will use in your lesson(s) (NTS 3a).

E.g.

***Activity 2.4:** "Comparing Fractions Using Equivalent Fractions", etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

***Fraction strips or fraction circles**: Using Fraction strips or fraction circles to compare unlike fractions, etc.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed under 2.2 above.

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 3 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 4 on *Operations on Fractions* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Material and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 4: Operations on Fractions

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Material and assessment strategies that can support teaching and learning of *Operations on Fractions*.

Learning Outcomes

1. Review your Teacher Manual and Learner Materials for concepts on *Operations on Fractions* and how they can be taught and assessed (NTS 1a, 2b, 2c, 3a, and 3o).
2. Teach and reflect on a lesson on *Operations on Fractions* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content for *Operations on Fractions* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Operations on Fractions.*

2.2 Give constructive feedback on the lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning (NTS 1a, 2e).

1.2 As a critical friend, share the feedback you gave/received during the lesson observed (what went well and what could have been done differently) (NTS 1a, 2e).

2. Plan and Practice Together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lesson(s) on *Operations on Fractions.*

b) note the pedagogical and assessment strategies that have been recommended for teaching *Operations on Fractions* (*NTS 1a, 2b, and 3o*).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s), based on your review on 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) ***Pedagogy: Technology Integration:*** *Learners use calculators or educational apps to practise solving fraction problems involving all four operations.*

b) ***Assessment: Peer Assessment****: Learners solve problems involving addition of unlike fractions and exchange their work with a colleague to assess and give feedback, etc.*

2.3 Review the activities in the Learner Material for the lesson on *Operations on Fractions* and select activity(ies) best suited for the pedagogical and assessment strategy(ies) you will use in your lesson(s) (NTS 2e, 3a).

E.g.

Activity 2.6: *"Multiplication and Division of Fractions" by modelling, etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (*NTS 3j*).

E.g.

Number lines: *Multiplying fractions and whole numbers on number lines, etc.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed under 2.2 above.

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 4 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 5 on *Algebraic Expressions* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Material and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 5: Algebraic Expressions

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Material and assessment strategies that can support teaching and learning of *Algebraic Expressions*.

Learning Outcomes

1. Review your Teacher Manual and Learner Materials for concepts on *Algebraic Expressions* and how they can be taught and assessed (NTS 1a, 2b, 2c, 3a, and 3o).
2. Teach and reflect on a lesson on *Algebraic Expressions* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content of *Algebraic Expressions* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Algebraic Expressions.*

2.2 Give constructive feedback on the lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning (NTS 1a, 2e).

1.2 As a critical friend, share the feedback you gave/received during the lesson observed (what went well and what could have been done differently) (NTS 1a, 2e).

2. Plan and Practice Together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lesson(s) on *Algebraic Expressions*

b) note the pedagogical and assessment strategies that have been recommended for teaching *Algebraic Expressions* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s), based on your review on 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) ***Pedagogy: Experiential learning****: Engage learners in hands-on by providing sets of algebraic expressions on cards or tiles and ask learners to group them based on the likeness of terms. Encourage discussions among learners to justify their groupings.*

b) ***Group Presentation****: Each group use tiles to represent algebraic expression and present their model to the class, explaining how they did it and the challenges they faced during the modelling, etc.*

2.3 Review the activities in the Learner Material for the lesson on *Algebraic Expressions* and select activity(ies) best suited for the pedagogical strategy(ies) you will use in your lesson(s) (NTS 2e, 3a).

E.g.

Activity 3.3: *"Exploring Algebraic Expressions", etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (*NTS 3j*).

E.g.

Algebra Tiles: *Using algebra tiles to add and subtract like terms, etc.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed under 2.2 above

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 5 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 6 on *Simplification of Algebraic Expressions* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Material and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 6: Simplification of Algebraic Expressions

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Material and assessment strategies that can support teaching and learning of *Simplification of Algebraic Expressions*.

Learning Outcomes

1. Review your Teacher Manual and Learner Materials for concepts on *Simplification of Algebraic Expressions* and they can be taught and assessed (NTS 1a, 2b, 2c, 3a, and 3o).
2. Teach and reflect on a lesson on *Simplification of Algebraic Expressions* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content of *Simplification of Algebraic Expressions* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Simplification of Algebraic Expressions.*

2.2 Give constructive feedback on the lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning (NTS 1a, 2e).

1.2 As a critical friend, share the feedback you gave/received during the lesson observed (what went well and what could have been done differently) (NTS 1a, 2e).

2. Plan and Practice Together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lesson(s) on *Simplification of Algebraic Expressions.*

b) note the pedagogical and assessment strategies that have been recommended for teaching *Simplification of Algebraic Expressions* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s), based on your review on 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) ***Pedagogy: Initiating Talk for learning****: In a whole class discussion, review the previous lesson on algebraic expressions with learners, etc.*

b) ***Assessment: Manipulation of algebraic tiles:*** *Each group manipulates algebraic tiles to find the factors of algebraic expressions, etc.*

2.3 Review the activities in the Learner Material for the lesson on *Simplifying Algebraic Expressions* and select activity(ies) best suited for the pedagogical and assessment strategy(ies) you will use in your lesson(s) (NTS 2e, 3a).

E.g.

Activity 3.4: *"Exploring Algebraic Expressions Using Algebra Tiles" to model operations, etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

Algebra Tiles: *Using algebra tiles to expand and simplify algebraic expressions, etc.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed under 2.2 above.

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 6 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 7 *Algebraic Equations* on and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Material and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 7: Algebraic Equations

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Material and assessment strategies that can support teaching and learning of *Algebraic Equations*.

Learning Outcomes

1. Review your Teacher Manual and Learner Materials for concepts on *Algebraic Equations and how they can be taught and assessed* (NTS 1a, 2b, 2c, 3a, and 3o).
2. Teach and reflect on a lesson on *Algebraic Equations* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content of *Algebraic Equations* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Algebraic Equations.*

2.2 Give constructive feedback on the lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning (NTS 1a, 2e).

1.2 As a critical friend, share the feedback you gave/received during the lesson observed (what went well and what could have been done differently) (NTS 1a, 2e).

2. Plan and Practice together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lesson(s) on *Algebraic Equations*

b) note the pedagogical and assessment strategies that have been recommended for teaching *Algebraic Equations* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s), based on your review on 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) ***Pedagogy: Experiential learning****: In mixed-gender/ability groups, engage learners to solve equations using the pictorial method, etc.*

b) ***Assessment: Reflection-*** *individually, reflect on the steps involve in solving algebraic equations, etc.*

2.3 Review the activities in the Learner Material for the lesson on *Algebraic Equations* and select activity(ies) best suited for the pedagogical and assessment strategy(ies) you will use in your lesson(s) (NTS 2e, 3a).

E.g.

Activity 3.8: *"Reinforcing Solving Equations Pictorially and Symbolically", etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

Algebra Tiles: *Using algebra tiles to solve linear algebraic equations, etc.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed under 2.2 above

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 7 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 8 on *The Concept of Lines and their Applications* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Material and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 8: The Concept of Lines and Its Applications

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Material and assessment strategies that can support teaching and learning of *The Concept of Lines and Its Applications*.

Learning Outcomes

1. Review your Teacher Manual and Learner Materials for concepts on *The Concept of Lines and Its Applications* and how they can be taught and assessed (NTS 1a, 2b, 2c, 3a, and 3o).
2. Teach and reflect on a lesson on *The Concept of Lines and Its Applications* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content for *The Concept of Lines and Its Applications* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *The Concept of Lines and Its Applications.*

2.2 Give constructive feedback on the lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning (NTS 1a, 2e).

1.2 As a critical friend, share the feedback gave/received during the lesson observed (what went well and what could have been done differently) (NTS 1a, 2e).

2. Plan and Practice Together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lesson(s) on *The Concept of Lines and their Applications*

b) note the pedagogical and assessment strategies that have been recommended for teaching *The Concept of Lines and Its Applications* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s), based on your review on 2.1above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*
ii. *help me differentiate activities to meet the diverse needs of my learners?*
iii. *support GESI responsiveness throughout lessons?*
iv. *help me assess learners' understanding throughout the lesson?*
v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) Pedagogy: Problem-based learning- *provide learners in their mixed-ability gender groups, a variety of lines. Ask learners to think, ink and share the properties of each line using the guiding questions, etc.*

b) Assessment: Checklist- *in pairs, learners go round the school compound to identify paths that are examples of straight lines, curved lines, and line segments, etc.*

2.3 Review the activities in the Learner Material for the lesson on *The Concept of Lines and Its Applications* and select activity(ies) best suited for the pedagogical and assessment strategy(ies) you will use in your lesson(s) (NTS 2e, 3a).

E.g.

Activity 4.1: *"Exploring Lines, Line Segments, and Rays", etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*
b) *connect to real-world situations that learners can relate to?*
c) *make the lesson more engaging or fun for the learners?*
d) *require adjustment in complexity to match learners' abilities?*
e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

String and torchlight: *Using string or yarn to support learners to differentiate between lines, line segments and rays, etc.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed under 2.2 above

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 8 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 9 on *Measurement of Area* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Material and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 9: Measurement of Area

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Material and assessment strategies that can support teaching and learning of *Measurement of Area*.

Learning Outcomes

1. Review your Teacher Manual and Learner Materials for concepts on *The Concept of Measurement of Area* and how they can be taught and assessed (NTS 1a, 2b, 2c, 3a, and 3o).
2. Teach and reflect on a lesson on *Measurement of Area* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content for *Measurement of Area* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Measurement of Area.*

2.2 Give constructive feedback on the lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning (NTS 1a, 2e).

1.2 As a critical friend, share the feedback gave/received during the lesson observed (what went well and what could have been done differently) (NTS 1a, 2e).

2. Plan and Practice Together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lesson(s) on *Measurement of Area*

b) note the pedagogical and assessment strategies that have been recommended for teaching *Measurement of Area* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s), based on your review on 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) ***Pedagogy: Experiential learning*** *– guide learners to cut-out square shapes from used boxes to cover the classroom in order to determine the area of the classroom floor, etc.*

b) ***Assessment: Portfolio*** *– have students gather varieties of 2D shapes, such as rectangles, triangles, circles and include them in their portfolio. For each shape students can measure the dimensions (length, width, radius, etc), and calculate the area using appropriate formula., etc.*

2.3 Review the activities in the Learner Material for the lesson on *Measurement of Area* and select activity(ies) best suited for the pedagogical and assessment strategy(ies) you will use in your lesson(s) (NTS 2e, 3a).

E.g.

Activity 4.3: *"Measuring the Area of Real-Life Rectangular and Square Objects", etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

Ruler or Tape measure: *Using ruler or tape measure to measure the area of plain surfaces found in the house like surface of rectangular tables, doors, windows, etc.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed under 2.2 above.

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 9 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 10 on *Measurement of Volume* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Material and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 10: Measurement of Volume

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Material and assessment strategies that can support teaching and learning of *Measurement of Volume*.

Learning Outcomes

1. Review your Teacher Manual and Learner Material for concepts on *Measurement of Volume* and how they can be taught and assessed (NTS 1a, 2b, 2c, 3a, and 3o).
2. Teach and reflect on a lesson on *Measurement of Volume* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content of *Measurement of Volume* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Measurement of Volume.*

2.2 Give constructive feedback on the lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning (NTS 1a, 2e).

1.2 As a critical friend, share the feedback you gave/received during the lesson observed (what went well and what could have been done differently) (NTS 1a, 2e).

2. Plan and Practice Together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lesson(s) on *Measurement of Volume*

b) note the pedagogical and assessment strategies that have been recommended for teaching *Measurement of Volume* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s), based on your review on 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) ***Pedagogy: Collaborative learning***: *In convenient mixed-ability groups, learners discuss the meaning of volume and establish how it can be measured, etc.*

b) ***Assessment***: Presentation: *Put students into mixed-ability groups and assign each to a task. Each group present their findings to the class. This allows for peer feedback and discussion of different perspectives, etc.*

2.3 Review the activities in the Learner Material for *measurement of volume* and select activity(ies) best suited for the pedagogical and assessment strategy(ies) you will use in your lesson(s) (NTS 2e, 3a).

E.g.

Activity 4.6: *"Determining Volumes Using Cubes and Cuboids", etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

Grid Paper: *Support learners to use grid paper to model 3D shapes (cube, cuboid, pyramids). etc.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed under 2.2 above.

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 10 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 11 on *Measurement of Time* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Material and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 11: Measuring Time in Everyday Life

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Material and assessment strategies that can support teaching and learning of *Measuring Time in Everyday Life.*

Learning Outcomes

1. Review your Teacher Manual and Learner Material for concepts on *Measuring Time in Everyday Life* and how they can be taught and assessed (NTS 1a, 2b, 2c, 3a, and 3o).
2. Teach and reflect on a lesson on *Measuring Time in Everyday Life* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content of *Measuring Time in Everyday Life* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Measuring Time in Everyday Life.*

2.2 Give constructive feedback on the lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning (NTS 1a, 2e).

1.2 As a critical friend, share the feedback you gave/received during the lesson observed (what went well and what could have been done differently) (NTS 1a, 2e).

2. Plan and Practice together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lesson(s) on *Measuring Time in Everyday Life.*

b) note the pedagogical and assessment strategies that have been recommended for teaching *Measuring Time in Everyday Life* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s), based on your review on 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) ***Pedagogy: Collaborative/Problem-Based learning:*** *In mixed-ability groups, learners convert between the various units of time and solve real-life problems on time, etc.*

b) ***Assessment: Project:*** *for each day of the week, record the number of minutes you spend on your phone entertaining yourself and the minutes you spend of your personal studies as a student. For each of the activities, sum the minutes for the week convert it to ours and compare which of them you spend much time on, etc.*

2.3 Review the activities in the Learner Material for *Measuring Time in Everyday Life* and select activity(ies) best suited for the pedagogical and assessment strategy(ies) you will use in your lesson(s) (NTS 2e, 3a).

E.g.

Activity 4.6: *"Units of Time and Their Relationships & Converting Between Units", etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

Hourglass: *Support learners to improvise hourglass using plain polytene, water or sand and thread. Learners use their hourglass to determine the duration of activities and compare them, etc.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed under 2.2 above

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 11 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 12 on *Data Collection Methods and their Uses* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Material and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 12: Data Collection Methods and their Uses

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Material and assessment strategies that can support teaching and learning of *Data Collection Methods and their Uses*.

Learning Outcomes

1. Review your Teacher Manual and Learner Material for concepts on *Data Collection Methods and their Uses* and how they can be taught and assessed (NTS 1a, 2b, 2c, 3a, and 3o).
2. Teach and reflect on a lesson on *Data Collection Methods and their Uses* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content of *Data Collection Methods and their Uses* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Data Collection Methods and their Uses.*

2.2 Give constructive feedback on the lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning (NTS 1a, 2e).

1.2 As a critical friend, share the feedback you gave/received during the lesson observed (what went well and what could have been done differently) (NTS 1a, 2e).

2. Plan and Practice together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lesson(s) on *Data Collection Methods and their Uses*

b) note the pedagogical and assessment strategies that have been recommended for teaching *Data Collection Methods and their Uses* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s), based on your review on 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*
ii. *help me differentiate activities to meet the diverse needs of my learners?*
iii. *support GESI responsiveness throughout lessons?*
iv. *help me assess learners' understanding throughout the lesson?*
v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) ***Pedagogy: Experiential learning:*** *In small groups, engage learners to discuss the means (methods) through which data on real life activities could be collected and complete questions (eg, questionnaire or interview guides), etc.*

b) ***Assessment: Exercise:*** *A short exercise was conducted to assess students' knowledge of key terms, definitions, and examples of Data Collection Methods and their Uses. etc.*

2.3 Review the activities in the Learner Material for *Data Collection Methods and their Uses* and select activity(ies) best suited for the pedagogical and assessment strategy(ies) you will use in your lesson(s) (NTS 2e, 3a).

E.g.

Activity 5.2: *"Creating and Using Data Collection Guides", etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*
b) *connect to real-world situations that learners can relate to?*
c) *make the lesson more engaging or fun for the learners?*
d) *require adjustment in complexity to match learners' abilities?*
e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

Graph sheet: *Learners use graph sheets to graphically represent the data they collected about the type of food their classmates took as breakfast that day, etc.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed under 2.2 above

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 12 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 1 of Module 3 on *Sets and their Operations* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Material and PLC Handbook for the next session (NTS 1c, 1f).

Module 3

PLC Session 1: Sets and Its Operations

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Material and assessment strategies that can support teaching and learning on *Sets and Its Operations*.

Learning Outcomes

1. Review your Teacher Manual and Learner Material for concepts on *Sets and Its Operations* and how they can be taught and assessed (NTS 1a, 2b, 2c,3a, and 3o).
2. Teach and reflect on a lesson on *Sets and Its Operations* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content of *Sets and Its Operations* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Sets and Its Operations.*

2.2 Give constructive feedback on the lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning.

1.2 As a critical friend, share the feedback you gave/received during the lesson observed (what went well and what could have been done differently).

2. Plan and Practice Together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lesson(s) on *Sets and Its Operations.*

b) note the pedagogical and assessment strategies that have been recommended for teaching *Sets and Its Operations* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s), based on your review on 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) ***Pedagogy: Problem based learning***: *In small mixed ability/gender groups, learners think, ink and share ideas on answering questions (such as "write a set containing numbers that appear on a six-sided die greater than 7") to introduce the types of sets.*

b) ***Assessment: Group Presentation:*** *In small mixed ability groups, learners perform tasks involving operations of sets and share the process and results with the whole class, etc.*

2.3 Review the activities in the Learner Material for *Sets and Its Operations* and select activity(ies) best suited for the pedagogical and assessment strategy(ies) you will use in your lesson(s) (NTS 2e, 3a).

E.g.

Activity 1.1: *"Exploring Types of Sets", etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

Stationery*: Learners group the stationery found in their bags based on common characteristics and name the groups they have formed, etc.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c, 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed under 2.2 above

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c, and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 1 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 2 on *Fractions and Decimals* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Material and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 2: Fractions and Decimals

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Material and assessment strategies that can support teaching and learning on *Fractions and Decimals*.

Learning Outcomes

1. Review your Teacher Manual and Learner Material for concepts on *Fractions and Decimals* and how they can be taught and assessed (NTS 1a, 2b, 2c,3a, and 3o).
2. Teach and reflect on a lesson on *Fractions and Decimals* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content of *Fractions and Decimals* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Fractions and Decimals*.

2.2 Give constructive feedback on the lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning.

1.2 As a critical friend, share the feedback you gave/received during the lesson observed (what went well and what could have been done differently).

2. Plan and Practice Together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lesson(s) on *Fractions and Decimals.*

b) note the pedagogical and assessment strategies that have been recommended for teaching *Fractions and Decimals* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s), based on your review on 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) ***Pedagogy: Experiential learning:*** *In a whole class activity, learners shade to represent fractions on fractional bars and write their corresponding numerals, etc.*

b) ***Assessment: Computational Assessment:*** *In pairs, learners solve real-life problems that require them to apply their knowledge on operations of fractions, etc.*

2.3 Review the activities in the Learner Material for *Fractions and Decimals* and select activity(ies) best suited for the pedagogical and assessment strategy(ies) you will use in your lesson(s) (NTS 2e, 3a).

E.g.

Activity 1.6: *"Mix and Match Fractions", etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

Paper folding*: Learners in small mixed ability groups fold papers to solve problems on addition and subtraction of fractions, etc.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c, 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed under 2.2 above.

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c, and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 2 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 3 on *Ratios and Its Applications* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Material and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 3: Ratios and Its Applications

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Material and assessment strategies that can support teaching and learning on *Ratios and their Applications.*

Learning Outcomes

1. Review your Teacher Manual and Learner Material for concepts on *Ratios and Its Applications* and how they can be taught and assessed (NTS 1a, 2b, 2c,3a, and 3o).
2. Teach and reflect on a lesson on *Ratios and Its Applications* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content of *Ratios and Its Applications* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Ratios and Its Applications*.

2.2 Give constructive feedback on the lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning.

1.2 As a critical friend, share the feedback you gave/received during the lesson observed (what went well and what could have been done differently).

2. Plan and Practice Together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lesson(s) on *Ratios and Its Applications.*

b) note the pedagogical and assessment strategies that have been recommended for teaching *Ratios and Its Applications* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s), based on your review on 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) ***Pedagogy: Collaborative learning:*** *In mixed ability/gender groups learners to solve tasks on ratios and equivalent ratios. Encourage learners to assist their friends, etc.*

b) ***Assessment: Project:*** *Learners visit the tailoring shop to take data on the measurement of 5 customers. They then compare the parts that were measured for the dresses and write them in ratio form. For instance, comparing the bust to the waist, or comparing the bust to the hip, etc.*

2.3 Review the activities in the Learner Material for *Ratios and Its Applications* and select activity(ies) best suited for the pedagogical and assessment strategy(ies) you will use in your lesson(s) (NTS 2e, 3a).

E.g.

Activity 1.6: *"Exploring Equivalent Ratios", etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e,3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

Coloured Papers*: Learners in small mixed ability groups cut coloured papers into strips and weave them into patterns, by applying their knowledge in ratio, etc.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c, 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed under 2.2 above.

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c, and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 3 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 4 on *Working with Percentages* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Material and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 4: Working with Percentages

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Material and assessment strategies that can support teaching and learning on *Working with Percentages.*

Learning Outcomes

1. Review your Teacher Manual and Learner Material for concepts on *Working with Percentages* and how they can be taught and assessed (NTS 1a, 2b, 2c,3a, and 3o).
2. Teach and reflect on a lesson on *Working with Percentages* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content of *Working with Percentages* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Working with Percentages*.

2.2 Give constructive feedback on the lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning.

1.2 As a critical friend, share the feedback you gave/received during the lesson observed (what went well and what could have been done differently).

2. Plan and Practice Together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lesson(s) on *Working with Percentages*

b) note the pedagogical and assessment strategies that have been recommended for teaching *Working with Percentages* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s), based on your review on 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) ***Pedagogy: Experiential learning:*** *Learners work in pairs to identify the relationship between percentages, fractions, decimals, and the quantities they represent using manipulatives like fraction bars or circles or grid papers to provide hands-on learning experiences, etc.*

b) ***Assessment: Self-Assessment:*** *Learners individually reflect on the lesson to identify the misconceptions they had in the topic and how the lesson has helped them to clear those misconceptions, etc.*

2.3 Review the activities in the Learner Material for *Working with Percentages* and select activity(ies) best suited for the pedagogical and assessment strategy(ies) you will use in your lesson(s) (NTS 2e, 3a).

E.g.

Activity 2.4: *"Expressing Percentages as Fractions", etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

Hundredth Square grid*: Learners in pairs use the grid by shading or colouring to convert fractions as percentages and vice versa, etc.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c, 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed under 2.2 above.

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c, and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 4 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 5 on *Applications of Percentages* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Material and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 5: Applications of Percentages

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Material and assessment strategies that can support teaching and learning on *Applications of Percentages.*

Learning Outcomes

1. Review your Teacher Manual and Learner Material for concepts on *Applications of Percentages* and how they can be taught and assessed (NTS 1a, 2b, 2c,3a, and 3o).
2. Teach and reflect on a lesson on *Applications of Percentages* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content of *Applications of Percentages* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Applications of Percentages*.

2.2 Give constructive feedback on the lesson modelled

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning.

1.2 As a critical friend, share the feedback you gave/received during the lesson observed (what went well and what could have been done differently).

2. Plan and Practice Together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lesson(s) on *Applications of Percentages.*

b) note the pedagogical and assessment strategies that have been recommended for teaching *Applications of Percentages* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s), based on your review on 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) ***Pedagogy: Collaborative learning:*** *Foster group discussions or cooperative learning activities where learners work together to solve percentage-related problems, etc.*

b) ***Assessment: Case study:*** *Learners in small mixed ability groups study and solve a case that requires the application of percentages, etc.*

2.3 Review the activities in the Learner Material for *Applications of Percentages* and select activity(ies) best suited for the pedagogical and assessment strategy(ies) you will use in your lesson(s) (NTS 2e, 3a).

E.g.

Activity 2.10: *"Using Percentages to Compare and Order Fractions", etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e,3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

Price tag with Discount: *learners in pairs visit a shop doing promotion of their goods and take data (original price and the percentage of the discount) for 3 items. They then calculate the new price of the commodities and the amount that customers of that commodity can save, etc.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c, 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed under 2.2 above

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c, and 3o).

3. Reflection (10 minutes)

3.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

3.2 Identify a critical friend to observe your lesson in relation to PLC Session 5 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

3.3 Remember to:

a) read PLC Session 6 on *Factorisation* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Material and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 6: Factorisation

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Material and assessment strategies that can support teaching and learning on *Factorisation.*

Learning Outcomes

1. Review your Teacher Manual and Learner Material for concepts on *Factorisation* and how they can be taught and assessed (NTS 1a, 2b, 2c,3a, and 3o).
2. Teach and reflect on a lesson on *Factorisation* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content of *Factorisation* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Factorisation*.

2.2 Give constructive feedback on the lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning.

1.2 As a critical friend, share the feedback you gave/received during the lesson observed (what went well and what could have been done differently).

2. Plan and Practice Together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lesson(s) on *Factorisation*

b) note the pedagogical and assessment strategies that have been recommended for teaching *Factorisation* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s), based on your review on 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) ***Pedagogy: Technology Integration:*** *Learners utilise interactive software or online platforms that offer virtual manipulatives or interactive tutorials for factorisation. They explore factorisation concepts independently or collaboratively using technology tools, providing them with immediate feedback and opportunities for self-directed learning, For instance. Algebrator-step-by-step solver, etc.*

b) ***Assessment: Class Exercise:*** *Learners individually, write step by step explaining how they solved a given expression using their knowledge in factorisation, etc.*

2.3 Review the activities in the Learner Material for *Factorisation* and select activity(ies) best suited for the pedagogical and assessment strategy(ies) you will use in your lesson(s) (NTS 2e, 3a).

E.g.

Activity 3.1: *"Factorisation Practice Using the Common Factor Method and the Difference of Two Squares Method", etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

Algebraic Tiles: *learners in pairs find factors of given expressions by using algebra tiles, etc.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c, 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed under 2.2 above

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c, and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 6 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 7 on *Substitution and Change of Subject* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Material and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 7: Substitution and Change of Subject

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Material and assessment strategies that can support teaching and learning on *Substitution and Change of Subject.*

Learning Outcomes

1. Review your Teacher Manual and Learner Material for concepts on *Factorisation* and how they can be taught and assessed (NTS 1a, 2b, 2c,3a, and 3o).
2. Teach and reflect on a lesson on *Substitution and Change of Subject* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content of *Substitution and Change of Subject* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Substitution and Change of Subject*.

2.2 Give constructive feedback on the lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning.

1.2 As a critical friend, share the feedback you gave/received during the lesson observed (what went well and what could have been done differently).

2. Plan and Practice Together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lesson(s) on *Substitution and Change of Subject.*

b) note the pedagogical and assessment strategies that have been recommended for teaching *Substitution and Change of Subject* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s), based on your review on 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) ***Pedagogy: Collaborative Problem-Solving:*** *Divide learners into small groups and assign them problems related to substitution and change of subject. Encourage collaboration as they work together to solve the problems, discussing different approaches and strategies, etc.*

b) ***Assessment: Presentation:*** *Learners in their groups present their solution to a task involving change of subject and paste them on the walls for gallery walk, etc.*

2.3 Review the activities in the Learner Material for *Substitution and Change of Subject* and select activity(ies) best suited for the pedagogical and assessment strategy(ies) you will use in your lesson(s) (NTS 2e, 3a).

E.g.

Activity 3.5: *"Substitution and Change of Subject", etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e,3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

Flag Chart/ Flow chart: *Learners in pairs use the flag chart to find solution to a given equation involving change of subject, etc.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c, 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed under 2.2 above

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c, and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 7 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 8 on *Angles and Its Applications* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Material and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 8: Angles & Its Applications

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Material and assessment strategies that can support teaching and learning on *Angles and Its Applications.*

Learning Outcomes

1. Review your Teacher Manual and Learner Material for concepts on *Angles and Its Applications* and how they can be taught and assessed (NTS 1a, 2b, 2c,3a, and 3o).
2. Teach and reflect on a lesson on *Angles and Its Applications* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content of *Angles and Its Applications* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Angles and Its Applications*.

2.2 Give constructive feedback on the lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning.

1.2 As a critical friend, share the feedback you gave/received during the lesson observed (what went well and what could have been done differently).

2. Plan and Practice Together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lesson(s) on *Angles and Its Applications.*

b) note the pedagogical and assessment strategies that have been recommended for teaching *Angles and Its Applications* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s), based on your review on 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) ***Pedagogy: Problem-based learning :*** *Learners think, ink, and share the properties of angle pair using diagrams of parallel and transversal lines. etc.*

b) ***Assessment: Peer-Assessment:*** *Learners in pairs identify and ink angles found in and out of their classrooms. They then exchange their works with their partners to review and give them feedback, etc.*

2.3 Review the activities in the Learner Material for *Angles and Its Applications* and select activity(ies) best suited for the pedagogical and assessment strategy(ies) you will use in your lesson(s) (NTS 2e, 3a).

E.g.

Activity 4.2: *"Finding Missing Angles", etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

Pair of compasses and ruler: *Learners in pairs use pair of compasses and ruler to construct special pair angles and measure the angles with a protractor to establish the relationship between them, etc.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c, 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed under 2.2 above.

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c, and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 8 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 9 on *Measurement of Perimeter* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Material and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 9: Measurement of Perimeter

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Material and assessment strategies that can support teaching and learning on *Measurement of Perimeter.*

Learning Outcomes

1. Review your Teacher Manual and Learner Material for concepts on *Measurement of Perimeter* and how they can be taught and assessed (NTS 1a, 2b, 2c,3a, and 3o).
2. Teach and reflect on a lesson on *Measurement of Perimeter* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content of *Measurement of Perimeter* that can support your lesson(s).

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Measurement of Perimeter*.

2.2 Give constructive feedback on the lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning.

1.2 As a critical friend, share the feedback you gave/received during the lesson observed (what went well and what could have been done differently).

2. Plan and Practice Together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lesson(s) on *Measurement of Perimeter.*

b) note the pedagogical and assessment strategies that have been recommended for teaching *Measurement of Perimeter* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s), based on your review on 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) ***Pedagogy: Experiential Learning:*** *In small mixed ability/gender groups, learners use strings to measure the perimeter of various circular shapes and write their findings in the table provided, etc.*

b) Assessment: ***Gamification:*** *Learners throw dice and record the numbers that show up in columns of length and width and then determine the perimeter of a rectangle with the dimensions obtained. The winner is the learner with the highest perimeter, etc.*

2.3 Review the activities in the Learner Material for *Measurement of Perimeter* and select activity(ies) best suited for the pedagogical and assessment strategy(ies) you will use in your lesson(s) (NTS 2e, 3a).

E.g.

Activity 4.3: *"Exploring Circumference and Radius of a Circle", etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

Tape Measure: *Learners in pairs use tape measures to measure the perimeter of plane figures in and out of their classroom, such as the floor of their classroom, doors, windows, football park, etc.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c, 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed under 2.2 above

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c, and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 9 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 10 on *Measurement of Surface Area and Volume of Prisms* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Material and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 10: Measurement of Surface Area and Volume of Prisms

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Materials and assessment strategies that can support teaching and learning on *Measurement of Surface Area and Volume of Prisms.*

Learning Outcomes

1. Review your Teacher Manual and Learner Material on the concept of *Measurement of Surface Area of Prisms* (NTS 1a, 2b, 2c, 3a and 3o).
2. Teach and reflect on a lesson on *Measurement of Surface Area and Volume of Prisms* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content of *Measurement of Surface Area and Volume of Prisms* that can support your lesson.

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Measurement of Surface Area and Volume of Prisms.*

2.2 Give constructive feedback on a lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning (NTS 1a, 2e).

1.2 As a critical friend share the feedback you gave/received during the lesson observed (what went well and what could have been done differently) (NTS 1a, 2e).

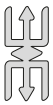
2. Plan and Practice Together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lessons(s) on *Measurement of Surface Area and Volume of Prisms* (NTS 1a, 2b and 3o).

b) note the pedagogical and assessment strategies that have been recommended for teaching *Measurement of Surface Area and Volume of Prisms* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s) based on your review on 2.1 above (NTS 3e - 3g).



Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) ***Pedagogy: Experiential learning:*** *Learners use visual aids such as pictorial representations to illustrate the concepts of surface area of prisms, etc.*

b) ***Assessment: Class Exercise****: Learners individually solve tasks and exchange their work for peer review, etc.*

2.3 Review the activities in the Learner Material for *Measurement of Surface Area and Volume of Prisms* and select activity(ies) best suited for the pedagogical strategy(ies) you will use in your lesson(s) (NTS 2e, 3a).

E.g.

Activity 4.5: *"Calculating the Total Surface Area of 3D Shapes", etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c). *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

Prisms and their nets*: Provide prisms and their nets to learners to identify and develop the concept of surface area of prisms, etc.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c, 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed in 2.2 above.

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 10 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 11 *Measurement of Surface Area and Volume of Prisms* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Material and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 11: Measurement of Surface Area and Volume of Prisms

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Materials and assessment strategies that can support teaching and learning on *Measurement of Surface Area and Volume of Prisms.*

Learning Outcomes

1. Review your Teacher Manual and Learner Material on the concept of *Measurement of Surface Area and Volume of Prisms* (NTS 1a, 2b, 2c, 3a and 3o).
2. Teach and reflect on a lesson on *Measurement of Surface Area and Volume of Prisms* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content of *Measurement of Surface Area and Volume of Prisms* that can support your lesson.

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Measurement of Surface Area and Volume of Prisms.*

2.2 Give constructive feedback on a lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning (NTS 1a, 2e).

1.2 As a critical friend share the feedback you gave/received during the lesson observed (what went well and what could have been done differently) (NTS 1a, 2e).

2. Plan and Practice Together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lessons(s) on *Measurement of Surface Area and Volume of Prisms* (NTS 1a, 2b and 3o).

b) note the pedagogical and assessment strategies that have been recommended for teaching *Measurement of Surface Area and Volume of Prisms* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s) based on your review on 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*
ii. *help me differentiate activities to meet the diverse needs of my learners?*
iii. *support GESI responsiveness throughout lessons?*
iv. *help me assess learners' understanding throughout the lesson?*
v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) ***Pedagogy: Experiential learning:*** *Learners stuck plastic cubes into containers to illustrate volumes of rectangular prisms,*

b) ***Assessment: Class Exercise:*** *Individually, learners solve tasks on measurement of volumes and exchange their solutions for peer review, etc.*

2.3 Review the activities in the Learner Material for *Measurement of Surface Area and Volume of Prisms* and select activity(ies) best suited for the pedagogical strategy(ies) you will use in your lesson(s) (NTS 2e, 3a).

E.g.

Activity 4.6*: "Calculating the Volume of Triangular Prisms and Cylinders", etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*
b) *connect to real-world situations that learners can relate to?*
c) *make the lesson more engaging or fun for the learners?*
d) *require adjustment in complexity to match learners' abilities?*
e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

Prisms, diagrams of prisms*: Provide prisms, diagrams of prisms to learners to identify and develop the concept of surface volume of prisms, etc.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c, 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed in 2.2 above.

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 11 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to:

a) read PLC Session 12 *Probability* and related Teacher Manual and Learner Material (NTS 1b, 2c and 3b).

b) bring along your Teacher Manual, Learner Material and PLC Handbook for the next session (NTS 1c, 1f).

PLC Session 12: Probability

Purpose

The purpose of the session is to review the concepts and pedagogies in the Teacher Manual and select appropriate activities in the Learner Materials and assessment strategies that can support teaching and learning on *Probability.*

Learning Outcomes

1. Review your Teacher Manual and Learner Material on the concept of *Probability* (NTS 1a, 2b, 2c, 3a and 3o).
2. Teach and reflect on a lesson on *Probability* (NTS 1a, 2c, 2e, 2f, 3a–3m, 3o and 3p).

Learning Indicators

1.1 Review the pedagogies in the Teacher Manual and identify appropriate pedagogical strategies based on the content of *Probability* that can support your lesson.

1.2 Review the activities in the Learner Material and identify appropriate activities based on the pedagogical approaches and assessment strategies in the Teacher Manual that can support your lesson(s).

2.1 Model an activity on *Probability.*

2.2 Give constructive feedback on a lesson modelled.

1. Review of Previous Session (10 minutes)

1.1 Individually, share one thing you did in your class based on the previous PLC's activities which impacted learning (NTS 1a, 2e).

1.2 As a critical friend share the feedback you gave/received during the lesson observed (what went well and what could have been done differently) (NTS 1a, 2e).

2. Plan and Practice Together (45 Minutes)

2.1 Review the Teacher Manual and

a) identify the concepts to be delivered for the lessons(s) on *Probability* (NTS 1a, 2b and 3o).

b) note the pedagogical and assessment strategies that have been recommended for teaching *Probability* (NTS 1a, 2b, and 3o).

2.2 Select and discuss the pedagogical strategies you will use to deliver your lesson(s) based on your review on 2.1 above (NTS 3e - 3g).

Note

Remember to select strategies which cater for individual learner's needs using the prompts below.

Does the pedagogy;

i. *ensure that all learners are actively engaged in this lesson?*

ii. *help me differentiate activities to meet the diverse needs of my learners?*

iii. *support GESI responsiveness throughout lessons?*

iv. *help me assess learners' understanding throughout the lesson?*

v. *help me incorporate collaborative learning opportunities in this lesson? etc.*

E.g.

a) ***Pedagogy: Experiential learning:*** *In small groups, learners toss a coin, throw a die two times or select 2 balls one at a time from a bag of identical balls (with different colours) and describe the outcomes, etc.*

b) ***Assessment: Group Presentation:*** *In small gender/mixed ability groups, learners solve given tasks and present their findings on A4 sheets to the class, etc.*

2.3 Review the activities in the Learner Material for *Probability* and select activity(ies) best suited for the pedagogical strategy(ies) you will use in your lesson(s) (NTS 2e, 3a).

E.g.

Activity 5.1: *"Classifying Events as Likely, Unlikely, or Certain", etc.*

2.4 Discuss the activities you will use to deliver your lesson (s), using the prompts below (NTS 2e, 3a).

Does this activity;

a) *help learners achieve the intended outcomes?*

b) *connect to real-world situations that learners can relate to?*

c) *make the lesson more engaging or fun for the learners?*

d) *require adjustment in complexity to match learners' abilities?*

e) *make room for SEL and GESI? etc.*

2.5 Discuss the teaching and learning resources that you will use for the lesson (NTS 3j).

E.g.

Dice*: Provide dice for learners to perform experiments by tossing, etc.*

3. Modelling (25 minutes)

3.1 Model a teaching activity in the lesson that can support all learners (NTS 1b, 1f, 2c, 2e, 2f and 3c-3m).

Hint

Ensure you use the pedagogical and assessment strategies discussed in 2.2 above

3.2 Provide feedback on the lesson modelled (NTS 1a, 1e, 2c and 3o).

4. Reflection (10 minutes)

4.1 Reflect and share your views on the session (NTS 1a, 1e, 2c and 3o).

4.2 Identify a critical friend to observe your lesson in relation to PLC Session 12 to provide feedback on your lesson (NTS 3f, 3l, 3n and 3o).

4.3 Remember to continuously engage positively with colleagues as part of a community of practice, to revise the content of the PLC Handbook, Teacher Manual and Learner Material and apply the various concepts, pedagogical and assessment strategies acquired in your lessons to improve teaching and learning.

Appendix 1: Guidelines for Intervention Mathematics

1. Introduction

Learners enter Senior High Schools (SHSs) from a wide range of backgrounds. Many of these learners may have experienced deficiencies in Mathematics and English Language teaching at primary and JHS level.

For the first time the Government of Ghana has introduced Intervention English and Intervention Mathematics in SHSs to address these deficiencies and ensure that all learners have the best chance to succeed during their 3 years in SHS.

Intervention English and Intervention Mathematics are being piloted in 295 schools in 2024/25 before national roll-out in 2025/26.

Intervention English and Intervention Mathematics Teacher Manuals, PLC Handbooks and Learner Materials have been written to support teachers to deliver these classes, which will be timetabled for three hours per week for those learners who require intervention. These intervention subjects will have to be taken in addition to Core Mathematics and Core English Language.

These guidelines set out how schools will run intervention classes, starting with identifying learners who require intervention upon entry to SHS 1, taking steps to improve their literacy and numeracy and assessing that they no longer require intervention.

2. Initial Assessments

The initial assessment (IA) is a short assessment of 35 questions which will be conducted at the beginning of SHS 1 for all learners entering from JHS in English Language and Mathematics. For 2024/25 these questions will be provided to schools.

The purpose of this initial assessment is to identify those learners who require intervention, placing them at the appropriate level. Intervention English and Mathematics operate at Level One and Level Two.

Learners who score between 10 and 13 will require Intervention Level Two whilst learners who score below 10 will require Intervention Level One. Learners who score above 13 may not require Intervention but can be placed there at the discretion of the school.

Schools must provide learners with orientation on the purpose and content of the assessment; how and when the assessment will be administered; what is required of them (*before*, *during* and *after*) and how the results will be used to their benefit. This orientation should stress that this is not a 'high-stakes' examination and that participating in Intervention classes will provide learners with a better chance of success in their final WASSCE examinations.

Schools should provide a conducive environment and the essential examination materials and staff for the effective conduct of the initial assessments.

Schools should mark, analyse the results from the IA and submit these marks to NaCCA through GES.

During this initial pilot phase, any school which carries out the IA effectively and submits completed marks to NaCCA through GES within two weeks of conducting the assessment will receive a package of IT equipment as a reward.

3. Parental Involvement

Schools should:

- engage parents or guardians in the intervention process.
- provide parents with information about their wards' learning needs and progress during the intervention process.
- indicate the ways parents can support their wards' learning (at home especially if the learners are day students).

4. Management and Oversight

Schools should set up an Intervention Implementation Committee consisting of (but not limited to) Assistant Head Academic, HoDs for Mathematics and English Language, Assessment Officer (a representative of the examination committee) and the Guidance and Counselling Coordinator.

This Committee must:

- collect and manage learners' information in relation to the intervention.
- ensure that Intervention classes are timetabled in line with NaCCA and GES's guidance on subject combinations.
- assign teachers (and ensure they are trained) to deliver Intervention English and Mathematics
- monitor teachers and learners attendance, and teaching and learning activities.
- assess the effectiveness of interventions and make necessary adjustments based on ongoing (formative) evaluations, including conducting internal assessments at the end of each semester to identify those learners who can progress off Intervention.
- follow-up on learners in-school and out of school.

5. Teacher Manuals and Learner Materials

Teacher Manuals, PLC Handbooks and Learner Materials have been written for Intervention English and Mathematics at both Levels One and Level Two. Hardcopies of all Teacher Manuals and PLC Handbooks are being distributed to all pilot schools. Learner Materials can be accessed online through the curriculum microsite (Home - Ministry of Education (curriculumresources.edu.gh). These materials will be sufficient to teach Intervention however teachers may also use other supplementary materials and readers.

6. Teacher Training and Capacity Building

Two teachers from each of the 295 pilot schools (one teacher each for English and Mathematics) will receive a week of residential training on Intervention English and Mathematics. This training will equip these teachers on the conduct of the initial assessment and how to use the results to place learners. It will equip teachers with the knowledge and skills to run weekly PLC sessions to support their peers to deliver intervention classes effectively. The training will also cover the information to be shared with learners.

Schools should assign teachers to teach Intervention English and Intervention Mathematics as set out in section 4 above. These teachers should attend the weekly PLC sessions to ensure that they are well prepared to deliver effectively.

7. Monitoring and Evaluation

The school, under the guidance of the Intervention Implementation Committee, should arrange to conduct internal assessment at the end of every Semester, in addition to the formative assessments carried out by teachers. This will be used to identify learners who are ready to progress from Intervention Level One to Intervention Level Two or from Intervention Level Two off Intervention. These assessment findings should be shared with NaCCA through GES so that a record is maintained of school-based attainment. These findings can be used to develop a 'Value-Added' rating for each school, quantifying the improvements that they have brough about in literacy and numeracy. This rating may provide a fairer reflection of the school's teaching and learning than a ranking based on WASSCE results.

8. Material and Resources

The school should provide:

- adequate teaching staff to enable Intervention classes to take place,
- teaching and learning materials,
- report sheets, including school-based transcript,
- support services (i.e., Guidance and Counselling) to ensure the success of the interventions.

9. Documentation and Reporting

Schools should:

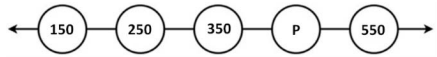
- maintain detailed records of learners' attendance and progress in the interventions.
- generate reports to track the overall effectiveness of the interventions and the impact on learning outcomes.

NB: *Schools should give out information about learners to ONLY stakeholders who are involved in the intervention process.*

Annexes

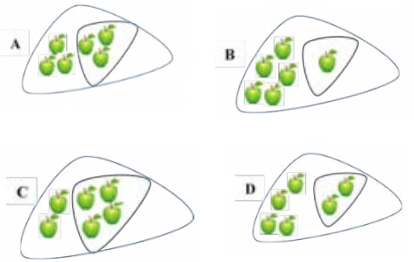
Annex 1: Scheme of learning areas for Intervention Mathematics

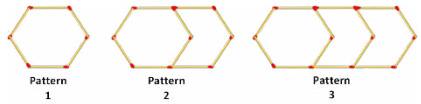
Secondary Intervention Level One

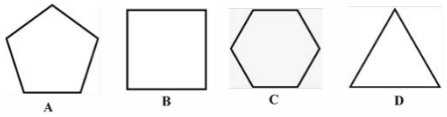
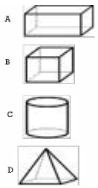
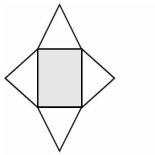
Strand	Sub-strand	Content Standard	Learning Indicator	Performance Indicator	Sample Item
Numbers for everyday life	Counting, Representation & Cardinality	Demonstrate an understanding of quantities and place value for multi-digit numerals up to 1000,000	Read, write and Compare modelled number quantities up to 1,000,000 using graph sheets and multi-base block	Count (including skip counting) numbers up to 1000.	What is the value of P on the number line? ********  A. 250 B. 350 C. 450 D. 550
				Write given amount in figures	What is three hundred and fifty thousand, seven hundred and ninety-five in numerals? A. 305795 B. 350795 C. 3050795 D. 30050795
				Identify the place value of digits in a given figure	Find the value of 2 in 92748. A. 20 B. 200 C. 2000 D. 20000

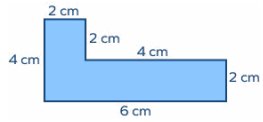
Strand	Sub-strand	Content Standard	Learning Indicator	Performance Indicator	Sample Item
			Round (off, up, down) whole numbers up to 100,000 to the nearest ten thousands, thousands, hundreds and tens	Round given amount to nearest 10 and 100 using real-life contest.	Which of the following amounts in Ghana cedis is *closer* to the total amount of money in the wallet? ***  A. GH¢60 B. GH¢70 C. GH¢80 D. GH¢90
		Demonstrate an understanding of factors, multiples of numbers including composite, even, odd and prime numbers from 1 to 100	Identify even and odd numbers between 1 and 100 as number that can be arrayed in twos array and those which cannot	Identify a given number as odd or even.	
			Identify factors and multiples and determine the highest common factor of any 2 or 3 numbers of whole numbers 1 - 100	Determine the least/ highest common multiple of any 2 or 3 numbers of whole numbers 1 - 100	What is the Least Common Multiple (LCM) of 5 and 6? ****** A. 11 B. 25 C. 30 D. 36

Strand	Sub-strand	Content Standard	Learning Indicator	Performance Indicator	Sample Item
	Number Operations	Describe and apply mental mathematics strategies and number properties involving the four basic operations to solve problems.	Apply mental addition and subtraction strategies to solve problems (up to 100, 000).		
			Apply mental multiplication and related division strategies to solve problems (up to 2 by 3 digits).		
			Solve multi step word problems involving the four basic operations using mental strategies.	Solve multi step word problems involving the four basic operations.	
		demonstrate conceptual understating Interpret negative and positive numbers in context	Describe real life situations using positive and negative numbers		
			Perform operations with positive and negative whole numbers and apply it to solve problems.	Solve real life problems on positive and negative whole numbers up to 100.	

Strand	Sub-strand	Content Standard	Learning Indicator	Performance Indicator	Sample Item
	Fractions	Develop knowledge and understanding of the concept of fractions and its application in real life.	Model and represent given fractions. [naming fractions, representing quantities as a fraction	Represent a given quantity as a fraction	Which one of the following collections of objects shows that $\frac{1}{3}$ has been selected? * 
			Recognise and name equivalent fractions using pictorial representations and number line.	Identify equivalent fractions for given fractions	
			Compare and order fractions with like denominators by using pictorial representations and >, < and =.	Compare and order fractions (>, < and =) with like denominators	
			Solve problems on fractions involving the four basic operations.	Solve real-life problems on fractions involving the four basic operations.	

Strand	Sub-strand	Content Standard	Learning Indicators	Performance Indicators	Sample Item
Algebra	Patterns and Relations	Determine the pattern rule to make predictions about subsequent elements.	Represent and extend a given pattern visually, and explain how each element differs from the preceding one.	Extend a given pictorial pattern and determine subsequent patterns.	If the pattern below continues, how many sticks will be in the fifth pattern? *  A. 18 B. 20 C. 22 D. 24
			Describe orally or in writing, a given pattern (rule), using mathematical language and predict subsequent elements in the pattern	Describe a pattern rule and orally and algebraically.	
			Solve a given problem (including tables/ charts) by using a pattern rule to determine subsequent elements (predictions)	Solve a given problem (including tables/ charts) by using a pattern rule to determine subsequent elements (predictions)	
	Algebraic Expressions	Demonstrate understanding of algebraic expressions	Model real life situations as mathematical statements.		
			Perform basic operations (add, subtract and multiplication) on algebraic expressions.	Solve problems involving addition and subtraction on algebraic expressions.	
	Variables and Equations	Solve problems involving single variable, one-step equations with whole number coefficients	Express a given problem as an equation where the unknown is represented by a letter to variable.	Express a given problem as an equation where the unknown is represented by a letter to variable.	
			Identify the unknown in a problem and solve the problem pictorially or symbolically.	Solve for an unknown in a given problem.	
			Create a problem for a given equation		

Strand	Sub-strand	Content Standard	Indicator	Performance Indicator	Sample Item
Geometry and Measurement	Shape and Space	Demonstrate conceptual understanding of geometric shapes and solids.	Identify and sort 2D shapes according to their attributes	Identify 2D shapes according to their attributes	Which of the following plane figures is a pentagon? **** 
			Identify and describe prisms and pyramids in the environment	Identify and describe 3D shapes according to their attributes	Which of the following solid shapes is a cube? ***** 
					How many faces does a rectangular prism have? A. 2 B. 5 C. 6 D. 8
				Construct the nets of prisms and pyramids.	What solid shape does the net below represent?  A. Rectangular prism B. Square pyramid C. Triangular prism D. Triangular pyramid

Strand	Sub-strand	Content Standard	Indicator	Performance Indicator	Sample Item
	Measurement	Estimate and measure perimeter of 2-D shapes using centimetres and metres	Measure and record perimeter for regular and irregular shapes in cm and m.	Calculate the perimeter of square and rectangular shapes in cm and m	
				Calculate the perimeter of irregular 2D shapes	What is the perimeter of the figure below?  A. 12cm B. 18 cm C. 20 cm D. 24 cm
			Develop and apply a formula for determining perimeter of given shapes in centimetres and metres.	Use formula of determining perimeter of square and rectangular shapes in centimetres and metres	
			Estimate perimeter using referents for centimetres and metre, and calculate the actual perimeter and compare.		
			Construct different rectangles for a given perimeter (cm, m) to demonstrate that many shapes are possible for a perimeter.		

Strand	Sub-strand	Content Standard	Indicator	Performance Indicator	Sample Item
		Estimate and measure the area of 2-D shapes using centimetre and metre squared	Measure and record area for regular and irregular shapes in squared cm and squared m using grid sheets.	Calculate the area squares and rectangles in cm and m	What is the area of the square shape below?  A. 6 cm² B. 12 cm² C. 24 cm² D. 36 cm²
			Develop and apply a formula for determining area of given shapes in centimetres and metres squared.	Use formula for determining area of squares and rectangles in centimetres and metres	
			Estimate area using referents for centimetres and metre squared, and calculate the actual area and compare.		
		Demonstrate an understanding of volume/capacity of common 3D shapes.	Determine the volume of boxes by finding how many cubes of sizes 1cm3 each contains	Determine the volume of given 3D shapes/objects	
			Determine different sizes of boxes that have the same volume.		
			Determine different sizes of containers that have the same capacity.		
		Demonstrate understanding of time taken by events in minutes and hours	Determine the time taken to conduct an event.		
			Determine the starting or ending time of events given a duration.		

Strand	Sub-strand	Content Standard	Indicator	Performance Indicator	Sample Items
Collecting and Handling Data	Handling Data	Demonstrate an understanding of many-to-one correspondence in displaying, and reading or interpreting, graphs	Use an understanding of many-to-one correspondence to construct and interpret graphs	Construct and interpret s given graph of many-to-one correspondent	1
			Interpret double bar graphs, complete with title, labelled axes, key or legend, to represent data collected (up to 3 pairs of categories of data and use it to solve problems.	Construct and interpret a given double bar graph	
		Select, justify, and use appropriate methods of collecting data, including questionnaires, interview, observation, experiments, databases, electronic media, etc.	Select a method for collecting data to answer a given question and justify the choice		
			Design and administer a questionnaire for collecting data to answer a given question and record the results		
			Design and administer a questionnaire for collecting data to answer given question(s), record the data, analyse and graph the results to solve problems		

Strand	Sub-strand	Content Standard	Indicator	Performance Indicator	Sample Items
	Probability	Describe the likelihood of a single outcome occurring using words such as impossible, possible, and certain	Classify the likelihood of a single outcome occurring in a probability experiment as impossible, possible, or certain	Classify a given event as impossible, possible, or certain	
			Design and conduct an experiment in which the likelihood of a single outcome occurring is impossible, possible (likely or unlikely), certain.		
			Conduct a given probability experiment a number of times, recording the outcomes, and explaining the results.		

Secondary Intervention Level Two

Strand	Sub-strand	Content standards	Learning outcomes	Learning indicators	Performance indicators	Sample Items
Numbers for everyday life	Number Sense	Demonstrate understanding of number concepts and basic operations.	Describe the relationship between subsets of real numbers and perform operations on them.	1. Categorise real numbers as natural/ counting numbers, whole numbers, integers, rational and Irrational numbers. [1]	Identify a given set as counting numbers, whole numbers, integers, rational and Irrational numbers. **[Level 1]**	Which one of the following sets of numbers has an integer? A. $\left\{-\frac{1}{3}\right\}$ B. $\left\{\frac{1}{6}\right\}$ C. {2.7} D. {5}
				1. Perform operations on the set of real numbers using real-life contexts. [1] 2. Identify properties of operations on sets and apply them in solving real life problems. [2]	Solve a real life problem on two sets Venn diagram **[Level 3]**	In a certain class, 20 students are in the Writers' Club and 29 students are in the Music Club. If 12 students are in both clubs, how many students are in the class? A. 32 B. 37 C. 49 D. 61

Strand	Sub-strand	Content standards	Learning outcomes	Learning indicators	Performance indicators	Sample Items
Numbers for everyday life	Proportional Reasoning	1. Demonstrate understanding of the basic operations of common and decimal fractions and apply them to solve real-life problems.	1. Compare, order and operate fractions and decimals in real-life contexts.	1. Name, compare and order numbers expressed as a quotient of two integers where the denominator is not equal to zero. [2]	Solve problems on comparing and ordering two fractions of different denominators. **[Level 3]**	At an athletics competition, Eric, Evans and Edward completed $\frac{3}{5}$, $\frac{2}{3}$ and $\frac{4}{7}$ of the distance of the race respectively. Order the friends according to the distance they covered from the longest to the shortest. A. Edward, Evans, Eric B. Eric, Edward, Evans C. Eric, Evans, Edward D. Evans, Eric, Edward
					Convert fractions to decimals. **[Level 1]**	Convert $\frac{3}{7}$ into a decimal fraction. ** A. 0.30 B. 0.37 C. 0.43 D. 0.48
				3. Perform operations on fractions with like and unlike denominators, operate and approximate decimals. [3]	Solve addition and subtraction of fractions with like denominators **[Level 1]**	Solve $2\frac{1}{3}+3\frac{1}{3}$. **** A. $\frac{5}{6}$ B. $\frac{17}{6}$ C. $5\frac{2}{3}$ D. $17\frac{2}{3}$

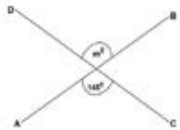
<table>
<tr><th>Strand</th><th>Sub-strand</th><th>Content standards</th><th>Learning outcomes</th><th>Learning indicators</th><th>Performance indicators</th><th>Sample Items</th></tr>
<tr><td></td><td></td><td></td><td></td><td>4.</td><td>Round decimals to the nearest hundredths (word problems) [Level 3]</td><td>Round 12.567 mm to the nearest hundredth.
A. 1.25 mm
B. 12.57 mm
C. 12.60 mm
D. 13.00 mm</td></tr>
<tr><td></td><td></td><td></td><td>Demonstrate understanding of ratio concepts and apply it in solving real life problems.</td><td>Compare and estimate quantities in a given ratio. [1]</td><td>Compare two given ratios [Level 2]</td><td>A farmer mixes potassium and phosphorus to make fertilizer for her crops. She uses different ratios to obtain various mixtures as shown in the table below.
<table>
<tr><th>Mixture</th><th>Potassium: Phosphorus</th></tr>
<tr><td>1</td><td>3: 5</td></tr>
<tr><td>2</td><td>4: 9</td></tr>
<tr><td>3</td><td>3: 7</td></tr>
<tr><td>4</td><td>2: 5</td></tr>
</table>
Which of the mixtures has the highest fraction of potassium?
A. 1
B. 2
C. 3
D. 4</td></tr>
</table>

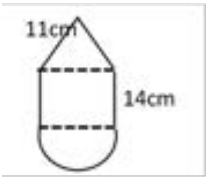
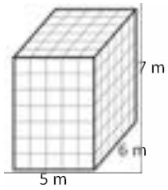
<table>
<tr><th>Strand</th><th>Sub-strand</th><th>Content standards</th><th>Learning outcomes</th><th>Learning indicators</th><th>Performance indicators</th><th>Sample Items</th></tr>
<tr><td></td><td></td><td></td><td></td><td></td><td>Apply the concept of ratio to concert between standard units [L2]</td><td>If one kilogram is the same as 1000 grams, how many grams make 3 kilograms?
****
A. 1000g
B. 2000g
C. 3000g
D. 4000g</td></tr>
<tr><td></td><td></td><td></td><td></td><td>2. Express one quantity as a percentage of another and vice versa. [2]</td><td>Change a given quantity into percentage [Level 2]</td><td>Asana has a monthly salary of GH¢1,200. She bought the following items from her salary:
<table><tr><th>Item</th><th>Amount (GH¢)</th></tr><tr><td>Mattress</td><td>500</td></tr><tr><td>Pillows</td><td>150</td></tr><tr><td>Bed sheets</td><td>250</td></tr></table>If Asana was given a discount of GH¢108, how much of her salary is left?
A. GH¢192
B. GH¢292
C. GH¢300
D. GH¢408</td></tr>
</table>

Strand	Sub-strand	Content standards	Learning outcomes	Learning indicators	Performance indicators	Sample Items
					Determine the percentage of a given quantity **[Level 2]**	A laptop costs GH¢800. If a student was given a discount of 20%, calculate the amount paid for the laptop. A. GH¢80 B. GH¢160 C. GH¢640 D. GH¢780 In a class of 75 learners, 45 are girls. What percentage of the learners are boys? A. 25% B. 30% C. 40% D. 60%
					Change a given quantity into percentage **[Level 2]**	Which of the following fractions is equivalent to 50%? ** A. $\frac{2}{5}$ B. $\frac{1}{4}$ C. $\frac{3}{4}$ D. $\frac{1}{2}$

Strand	Sub-strand	Content standards	Learning outcomes	Learning indicators	Performance indicators	Sample Items
Algebra	Equations and Inequalities	1. Demonstrate understanding and perform operations on algebraic expressions in real life contexts.	1. Form mathematical statements using variables and factorise algebraic expressions. .	1. **Model real-life situations into mathematical statements and perform operations on them. [2]**	Simplify simple algebraic expressions **[Level 1]**	Jonathan bought a number of shirts (S) and a number of trousers (T) from a shop. The cost of a shirt is GH¢150, and the cost of a pair of trousers is GH¢200. Which of the following algebraic expressions represents the total amount paid for the items? A. 150 + S + 200 + T B. 150S + 200T C. 150T + 200 + S D. 150T + 200S
				2. Expand by removing brackets and simplify algebraic expressions using the properties of operations. [2]	Expand given algebraic expressions by removing brackets. **[Level 1]**	Expand and simplify the expression $2x(2x + y + 4x)$. A. $12x + 2xy$ B. $4x^2 + 2xy + 4x$ C. $4x + y + 8x$ D. 12x2 + 2xy
				3. Identify and apply the methods of factorisation on algebraic expressions [1]	Factorise algebraic expressions **[Level 2]**	Factorise: $x^2 + 5x + 6 = 0$. A. $(x - 2)(x - 3)$ B. $(x + 2)(x + 3)$ C. $(x + 5)(x + 6)$ D. $(x + 3)(x + 3)$

Strand	Sub-strand	Content standards	Learning outcomes	Learning indicators	Performance indicators	Sample Items
		Demonstrate understanding of rearranging a formula from a given context to solve problems	Solve problems involving change of subject of a formula.	1. Use the inverse property to rearrange a formula in one or two steps to change the subject. [2]		
				2. Change the subject in a given formula by rearranging before substituting in values of the variables and vice versa. [2]	Change the subject of a formula expressed in terms of other variables. **[level 1]** x2	Given the relation n = 3m-5. Make m the subject of the relation. A. $m = \frac{n+5}{3}$ B. $m = \frac{n+3}{5}$ C. $m = \frac{n-3}{5}$ D. $m = \frac{n-5}{3}$
					Substitute values into a formula, change subject and solve OR Change subject, substitute values and solve **[Level 2]**	The conversion of Kelvin (K) to Celsius (oC) is given as K = (C + 273), what is the temperature in degree Celsius if K = 350? A. 73 oC B. 77 oC C. 623 oC D. 632 oC
		1. Demonstrate understanding of geometric solids in real life.	Create models to demonstrate properties and nets of solids	1. Categorise solids as prisms, pyramids and spheres. [1]		
		2.		2. Identify properties of solids and model their nets. [2]		

Strand	Sub-strand	Content standards	Learning outcomes	Learning indicators	Performance indicators	Sample Items
				3. Identify and apply parallel, perpendicular, complementary, supplementary angles, vertical and parallel lines cut by transversal in real life contexts. [2]	Determine given angles as corresponding, alternate, vertically opposite or co-interior. **[Level 1]**	What is the value of the angle marked 'm' in the figure below?  A. 15o B. 35o C. 145o D. 180o
		Demonstrate knowledge and understanding of fundamental geometrical ideas, including lines, angles and polygons and their application in real life situations.	Investigate and establish the relationships between solid planes and explore their properties.	1. Develop and apply strategies for determining the perimeter of plane figures. [2]	Calculate the perimeter of a rectangle (Word problem) **[Level 3]**	A rectangular envelope has a length of 15cm and a width of 8cm. If a decorative ribbon is added around the envelop, extending each side by 1cm, calculate the total perimeter of the envelop with the ribbon. A. 48 cm B. 54 cm C. 120 cm D. 144 cm

Strand	Sub-strand	Content standards	Learning outcomes	Learning indicators	Performance indicators	Sample Items
				2.	Calculate the perimeter of an irregular shape **[Level 2]**	The figure below shows an isosceles triangle on top of a square with a semicircle at the bottom, all joined together. Calculate the perimeter of the figure. [take $\pi = \frac{22}{7}$]  A. 50cm B. 72cm C. 83cm D. 94cm
				3. Develop and apply strategies for determining the area and volume of prisms. [2]	Calculate the area of a 2D shape **[Level 2]** Calculate the volume of a prism **[Level 2]**	Find the volume of the shape below.  A. 18 m^3 B. 42 m^3 C. 180 m^3 D. 210 m^3

Annex 2: Table of specification for Intervention Mathematics (IA): SHS 1 (35 Items)

Strand	Sub-strand	DOK			Total of Items/Tasks
		Level 1	Level 2	Level 3	
Numbers for everyday life **[19 (54%)]**	Number Sense	x	x		**14(40%)**
		x	x	x	
		x	x		
		x	x		
		x			
		x			
		x			
		x			
		x			
	Proportional Reasoning		x	x	**5(14%)**
			x	x	
			x		
Algebraic Reasoning **[5(14%)]**	Algebraic Expressions, Equations and Inequalities	x	x		**5(14%)**
			x		
			x		
			x		
Geometry Around us **[11(32%)]**	Spatial Sense	x	x	x	**11(32%)**
		x	x	x	
		x			
		x			
		x			
		x			
		x			
	Total	49%(17)	37%(13)	14%(5)	35 (100%)

Annex 3: Mathematics Intervention Placement Rubric

Category	Highly Proficient	Proficient	Approaching Proficient	Needs Intervention (L2)	Needs Intervention (L1)
Number Sense (19items)	**14-19 correct** Demonstrates a strong understanding of number sense concepts, solving the majority of items correctly.	**13-15 correct** Shows a good grasp of number sense but may have made a few errors.	**8-13 correct** Demonstrates some understanding but struggles with key concepts.	**0-7 correct** Shows limited understanding of number sense concepts.	**0-5 correct** Shows poor understanding of number sense concepts
Algebra (5 items)	**4-5 correct** Displays a high level of proficiency in solving algebraic problems.	**3 correct** Demonstrates a good understanding of algebraic concepts, with a few errors.	**2 correct** Shows some understanding but struggles with certain algebraic concepts.	**0-1 correct** Exhibits significant challenges in solving algebraic problems.	**0-1 correct** Struggles significantly in solving algebraic problems
Geometry (11 items)	**10-11 correct** Shows mastery of geometry concepts, solving the majority of items correctly.	**6-8 correct** Demonstrates a good understanding of geometry, with a few errors.	**4-6 correct** Shows some understanding but struggles with certain geometry concepts.	**0-4 correct** Displays limited understanding of geometry.	**0-3 correct** Show very limited understanding of geometry.
Aggregate Score	**28 – 35 (80-100%)** Demonstrates a strong understanding of number sense concepts, algebraic problems and geometry concepts solving the majority of items correctly.	**22 – 27 (61 – 79%)** Shows a good grasp of number sense, algebraic and geometric reasoning but may have made a few errors.	**14– 21 (36 – 60%)** Demonstrates some understanding number, algebra and geometry concepts but struggles with key concepts in all these areas.	**0 – 13 (≤ 35%)** Exhibits significant challenges in solving number, algebraic and geometry problems.	**0 – 9 (≤ 35%)** Demonstrates poor ability in solving number, algebraic and geometry problems.

List of Contributors

NaCCA Team	
Name of Staff	**Designation**
Matthew Owusu	Deputy Director-General, Technical Services
Reginald Quartey	Ag. Director, Curriculum Development Directorate
Nii Boye Tagoe	Senior Curriculum Development Officer (History)
Abigail Birago Owusu	Senior Research, Planning, Monitoring and Evaluation Officer
Sharon Antwi-Baah	Assistant Instructional Resource Officer
Dennis Adjasi	Instructional Resource Officer

No.	Subject	Name of Writer	Institution
1.	Aviation and Aerospace Engineering	David Kofi Oppong	Kwame Nkrumah University of Science and Technology
2.	Agriculture	Dr. Esther Fobi Donkor	University of Energy and Natural Resources, Sunyani
3.	Arabic	Dr. Murtada Mahmoud Muaz	AAMUSTED
4.		Dr Mohammed Almu Mahaman	University for Development Studies
5.	Applied Technology	Michael Korblah Tsorgali	AAMUSTED
6.		Gilbert S. Odjamgba	Ziavi Senior High Technical School
7.		Engr. Dr. Prosper Mensah	CSIR - Forestry Research Institute of Ghana
8.	Home Economics	Rev. Sr. Jusinta Kwakyewaa	St. Francis Senior High Technical School
9.	Performing Arts	Prof. Emmanuel Obed Acquah	University of Education Winneba
10.	French	Maurice Adjetey	
11.	Art and Design Foundation	Angela Owusu-Afriyie	Opoku Ware School
12.	Ghanaian Language	David Sarpei Nunoo	University of Education Winneba, Ajumako Campus

No.	Subject	Name of Writer	Institution
13.	Art and Design Studio	Dzorka Etonam Justice	Kpando SHS
14.	Agricultural Science	Issah Abubakari	Half-Assini SHS
15.	Manufacturing Engineering	Dr. Kofi Owura Amoabeng	Kwame Nkrumah University of Science and Technology
16.		Ali Morrow Fatormah	Mfantsipim School
17.		Benjamin Atribawuni Asaaga	Kwame Nkrumah University of Science and Technology
18.	Design and Communication Technology	Henry Angmor Mensah	Anglican Senior High School, Kumasi
19.	Religious Studies	Anthony Mensah	Abetifi College of Education
20.	Spanish	Franklina Kabio-Danlebo	University of Ghana
21.	Social Studies	Dr. Frank Awuah	Dambai College of Education
22.	Religious and Moral Education	Clement Nsorwineh Atigah	Tamale Senior High School
23.	Literature-in-English	Angela Aninakwah	West African Senior High School
24.		Blessington Dzah	Ziavi Senior High Technical School
25.	Chemistry	Michael Amissah	St. Augustine's College
26.	Biology	Abraham Kabu Otu	Prampram Senior High School
27.	Mathematics	Collins Kofi Annan	Mando Senior High School
28.	Additional Mathematics	Gershon Kwame Mantey	University of Education, Winneba
29.	General Science	Saddik Mohammed	Ghana Education Service
30.	English Language	Perfect Quarshie	Mawuko Girls SHS
31.	Biomedical Science	Jennifer Fafa Adzraku	Université Libre de Bruxelles
32.		Davidson N.K. Addo	Bosomtwi STEM
33.	Robotics	Dr. Nii Longdon Sowah	University of Ghana
34.		Isaac Nzoley	Wesley Girls High School

No.	Subject	Name of Writer	Institution
35.	Engineering	Valentina Osei-Himah	Atebubu College of Education
36.		Daniel Agbogbo	Kwabeng Anglican Senior High School
37.	Physical Education and Health (Core and Elective)	Benedictus Kondoh	St. Thomas Acquinas Senior High School
38.		Bagonluri Kizito Mwining-Kumo	Wa Technical Institute
39.	Computing	Osei Amankwa Gyampo	Wesley Girls SHS, Kumasi
40.	Information Communication Technology	Raphael Senyo Dordoe	Ziavi Senior High Technical School
41.	Geography	George Boateng	Berekum College of Education
42.	History	Kofi Adjei Akrasi	Opoku Ware School
43.	Economics	Salitsi Freeman Etornam	Anlo Senior High School
44.	Government	Samuel Kofi Adu	Fettehman Senior High School
45.	Business Studies	Theodosia Larteley Oppong	Aburi Girls Senior High School
46.		Ansbert Avole Baba	Bolgatanga Senior High School, Winkogo
47.	Physics	John Tetteh	Benso SHTS
48.	Technical Support	Benjamin Sundeme	St. Ambrose College of Education
49.		Edward Mills Dadson	University for Education, Winneba
50.		Eric Abban	Mt. Mary College of Education
51.		Jennifer Fafa Adzraku	Université Libre de Bruxelles