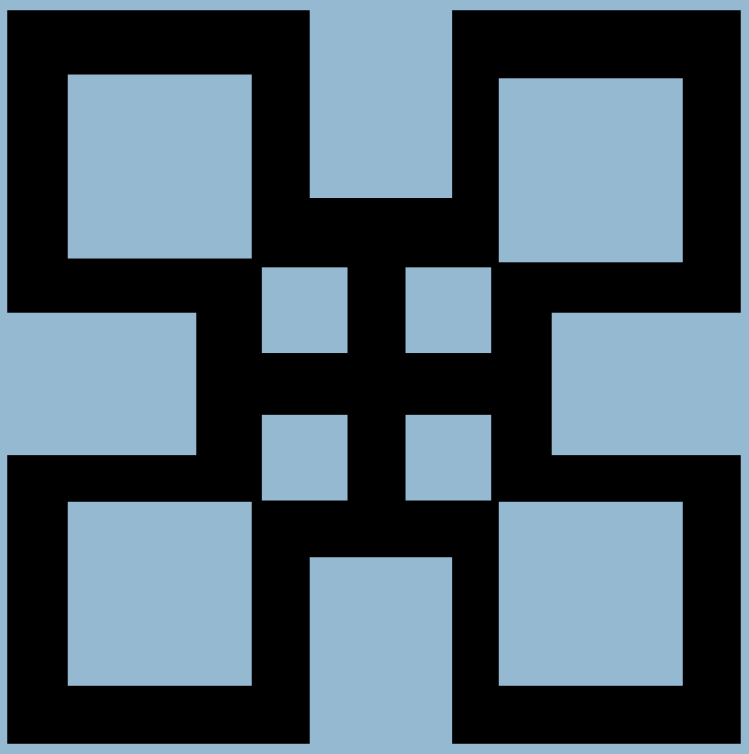
Secondary Education Professional Development Programme

Professional Learning Community Handbook

Additional Mathematics

Year One



Ghana Education Service (GES)

NaCCA
NATIONAL COUNCIL FOR CURRICULUM AND ASSESSMENT

NTC

Professional Learning Community Handbook

Additional Mathematics

Year One

REPUBLIC OF GHANA

Contents

Introduction

This Professional Learning Community (PLC) Handbook is designed to enable teachers to deliver effective lessons for Year One of the new Additional Mathematics Curriculum. 'Effective' is defined as meaning that each lesson:

i. Has a weekly learning plan which is aligned with the content and pedagogy set out in the relevant Teacher Manual;

ii. Incorporates the relevant Learner Material which are available on the curriculum microsite;

iii. Contains assessment strategies which are aligned with the Teacher Manual, Learner Material and Transcript Assessment Guidance;

iv. Is delivered by the teacher in close adherence (Fidelity of Implementation) with i.) to iii.) above.

The PLC Handbook has a strong focus on assessment, outlining structured approaches to assessment derived from the Teacher Assessment Manual and Toolkit (TAMT), emphasising the attainment of learning outcomes, timely feedback to learners and recording learning outcomes accurately.

Additionally, this Handbook prescribes nine (9) main assessment events which teachers should score and record to constitute each learner's academic transcript for the academic year as follows: Two (2) Class exercises or Homework, one (1) Individual Portfolio, one (1) Group Project, two (2) Mid-semester examinations (in first and second semesters), two (2) End of Semester examinations (in first and second semester) and one (1) Individual project. It also promotes continuous weekly assessment for learning across all DoK levels, supporting teachers to deliver an all-inclusive Economics education by inculcating 21st century skills, ICT, national values and support to special needs learners.

The TAMT identifies six modes of assessment which cover the nine events described above. The modes are described below.

a) **Class exercises/Homework**: This assessment may be conducted starting from week 1 in the first semester and from week 13 of the second semester refer to PLC Session 1 and 13. It is recommended to have at least 3 individual class exercises and 2 group exercises each semester. The best scores should be recorded in the transcript each semester.

b) **Mid-semester examination**: This assessment is recommended to be conducted in week 6 of the first semester and week 18 of the second semester. PLC sessions 6 and 18 should serve as preparatory sessions for these examinations.

c) **End of Semester examination**: This is the final assessment for each semester and is suggested to be conducted at the end of both the first and second semesters. Discussions and preparations for this assessment should take place during PLC sessions 12 and 24.

d) **Individual project**: It is recommended that teachers assign this assessment to learners in week 13 in the second semester. It is recommended that individual projects be submitted by week 22.

e) **Individual Practical Portfolio Assessment**: This assessment strategy should be assigned to learners on the first week of semester one and may run into week 22 of the next semester.

f) **Group Project**: It is suggested to be done in the first semester. It is recommended that group projects be assigned to learners in week 2 and submitted by week 8 as suggested in PLC Session 2.

PLC Session 0: Internal Assessment Structure and Transcript System for SHS/SHTS And STEM Schools

1. Introduction (20 minutes)

This Professional Learning Community (PLC) session focuses on enhancing internal assessment and transcript system to ensure it aligns with the new Senior High School, Senior High Technical School and Science, Technology, Engineering and Mathematics curriculum and effectively supports student learning.

In this session, you will discuss the structure and frequency of assessments, strategies for involving learners in the assessment process, methods for providing constructive feedback and the implementation of a robust transcript system.

1.1 Share two ways in which you have used assessment in the past to support teaching and learning.

1.2 Share your observation on how a colleague used assessment in the past to support teaching and learning.

2. Internal assessment structure and frequency (60 minutes)

2.1 Read the purpose, learning outcome and learning indicators for the session.

Purpose

The purpose of the session is to strengthen teachers' understanding and competence in assessment techniques to effectively teach and assess the new SHS, SHTS and STEM Curriculum.

Learning Outcome

To ensure teachers understand the assessment structure and acquire the skill to design, administer and provide feedback of the assessments that accurately reflect the learning outcomes for each week.

Learning Indicators

1. Discuss the formative and summative assessment strategies recommended for the new curriculum.
2. Discuss in detail, the relevance and structure of the assessment transcript system and its use/implementation.

2.2 Discuss *formative assessment strategies* which can be used in your subject area.

E.g.

Questioning, etc.

2.3 Discuss *summative assessment strategies* which can be used in your subject area.

E.g.

End of Semester Examinations, etc.

2.4 *Discuss* as a subject group how you would administer a given assessment strategy.

E.g.

Class Exercise:

i. *Inform learners ahead of time*

ii. *Write the questions on the board, etc.*

2.5 Discuss methods of providing constructive feedback to learners on their performance.

E.g.

Provide individual comments on learners' work, etc.

2.6 Discuss as a subject group some of the do's and don'ts of constructing assessment items/ tasks.

E.g.

Do: Align the purpose of the assessment with the task, etc.

Don't: Do not give clues in the stem, etc.

2.7 Discuss as a subject group the main assessments that would be recorded in the transcript system in the academic year.

E.g.

Class exercise, etc.

2.8 Discuss how and where you would record and submit learners' assessments for the transcript system.

E.g.

Record learners scores immediately, etc.

3. Reflection (10 minutes)

3.1 Reflect and share your views on the session.

3.2 Remember to:

a) read PLC Session 1 and related Learner Material

b) bring along your Teacher Manual, PLC Handbook and learning plan on *week 1* in preparation for the next session.

PLC SESSION 1: Binary Operations

1. Introduction (20 minutes)

1.1 Share two things you did in the classroom based on your experience in the various PLC sessions you have attended (NTS 1a, 1b and 2a–2e).

1.2 Share your observation on what a colleague did by way of application of lessons learned from previous PLC sessions attended (NTS 1a, 1b and 2a–2e).

2. Review of learning plans (60 minutes)

2.1 Read the purpose, learning outcome and learning indicators for the session.

Purpose

The purpose of the session is to review the learning plan for *week 1* by aligning the plan with the Learner Material and appropriate assessment strategies.

Learning Outcome

Review your learning plan for *week 1* considering the cross-cutting issues (NTS 2b, 2c, 2e, 2f, 3a, 3d, 3e, 3g-3k and 3o).

Learning Indicators

1. 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 for the week.
2. Discuss and develop assessment tasks and rubrics/marking schemes for the learning indicators for the week.

2.2 Review the pedagogical approaches proposed for teaching *week 1*in your learning plan and identify activities that align with those in the Learner Material. Indicate the activities in your learning plan (NTS 2a – 2f, 3a – 3j).

Note

The selected activities should be included in the teacher/learner activity section of the learning plan

2.3 Develop assessment tasks/items based on the learning indicator(s) for the week. This week's recommended mode of assessment is **group discussion** (NTS 3k, 3p).

E.g.

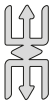
a) Given the operation * is defined on the set of real numbers $\mathbb{R}$ by: $p * q = 2p + q - 2pq$, *find the value of* p *if* $p * 4 = -2$

b) *I am a binary operator. I can combine two elements and my result is the sum of the squares of the two elements minus twice their product. Write a mathematical statement for this scenario*

Refer to Section 1 of the Learner Material (LM) and pages 18 – 19 of the Teacher Manual (TM) for more assessment tasks for group discussion

Hint

1. *Discuss all the various assessment strategies with learners at the beginning of the semester. For example, some class exercises will be conducted as unannounced quizzes, etc.*
2. *Portfolio assessment for the academic year 1 should be assigned in Week 1 of semester 1 and may run through to Week 20 of Semester 2. Refer to* ***Appendix A*** *in PLC session 1 for a sample portfolio assessment.*



Note

i. *The assessment tasks may cover levels 1 to 4 where appropriate to ensure that assessment is differentiated for all.*

ii. *The selected activities should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities in the learning plan*

2.4 Discuss (and agree as a subject group) how you will develop the marking scheme/rubrics for scoring the assessment task(s)/item(s) for the week's recommended assessment. (NTS 3k, 3p).

E.g.

*Given the operation * is defined on the set of real numbers* $\mathbb{R}$ *by:*

$p * q = 2p + q - 2pq$

We need to find the value of p such that $p * 4 = -2$

Substituting $q = 4$ *and setting the expression to be* $= -2$

$$\Rightarrow p * 4 = 2p + 4 - 2p(4) = -2 \qquad (M_1)$$

$$2p + 4 - 8p = -2$$

$$-6p + 4 = -2$$

$$-6p = -2 - 4$$

$$-6p = -6 \qquad (M_1)$$

$$\Rightarrow p = 1$$

Thus, the value of $p = 1$ (A_1)

Note

i. *The marking scheme and rubrics for scoring the assessment tasks/items should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/ learner activities in the learning plan.*

ii. *Take into consideration different modes of responses provided by learners.*

iii. *Discuss how you will observe and integrate character qualities, national values and 21st-century skills that align with the lesson for the week and include these in your scoring*

2.5 Discuss how you will administer the assessment task(s)/item(s) as a subject group (NTS 3k, 3p).

E.g.

Provide each group unique question to discuss and make short class presentation on, etc.

Refer to the Teacher Assessment Manual and Toolkit pages 80 – 83 for more guidelines on class exercise as an assessment strategy

2.6 Discuss how to provide feedback, and where appropriate, record and submit the assessment scores for each learner in the class (NTS 3l–3n).

E.g.

Explain solutions and misconceptions to the class on binary operations, etc.

Note

In giving feedback on assessment tasks/items, guide learners to make the necessary corrections that will improve learning.

3. Reflection (10 minutes)

3.1 Reflect and share your views on the session (NTS 1a, 1b).

3.2 Identify a critical friend to observe your lesson in relation to PLC Session 1 to provide feedback on your lesson (NTS 1f, 3g).

3.3 Remember to:

a) provide constructive feedback to learners record their assessment scores in the required format and document where appropriate (NTS 3l – 3n).

b) read PLC Session 2 and related Learner Material (NTS 3a).

c) bring along your Teacher Manual, PLC Handbook and learning plan on *week 2* in preparation for the next session (NTS 3a).

Appendix A: Sample Practical Portfolio

Refer to the Teacher Assessment Manual and Toolkit Section 7.1 on pages 27 – 30 for guidelines on portfolio assessment

1. Description

Apply the concept of binary operations to real-life financial problems. Collect real-life financial data from diverse scenarios and apply binary operations on the data to solve real-life financial problems such as profit optimisation.

Time Frame: To be submitted in week 22 of the second semester

Steps:

a) Gather at least three real-life financial scenarios within the next eight to fifteen weeks in your local context e.g. combined family expenses, education and health expenses, rent and utility bills, etc.

b) reflect on the effectiveness of the binary operation in solving these real-life problems, etc.

2. Example of marking scheme/rubrics for scoring Portfolio Assessment

Rubrics:

Introduction (5 marks)

Scenario Description (2 marks per scenario, at most 5 scenarios)

Data and materials (receipts, water bill, etc) collection (10 marks)

Mathematical binary operation (10 marks)

Explanation (5 marks)

Reflection (4 marks)

Presentation (10 marks)

Introduction (5 marks)

This working portfolio explores the application of binary operations to solve real-life financial problems in the local context of learners. The binary operation used is $a * b = a + b + 2$. Three scenarios are selected: combined family expenses, shared business profits, and calculating the total cost of a community project.

Scenario 1: Combined Family Expenses (1 mark)

Description (3 marks): The Mensah family needs to calculate their combined monthly expenses. Mr. Mensah's expenses are GH¢ 1,200, and Mrs. Mensah's expenses are GH¢ 800.

Application (5 marks): Using the binary operation: $a * b = a + b + 2$

Let $a = 1200$ and $b = 800$

$1200 * 800 = 1200 + 800 + 2 = 2002$

Explanation (1 mark): The combined monthly expenses for the Mensah family are GH¢ 2,002.

Scenario 2: Shared Business Profits (1 mark)

Description **(3 marks):** Two friends, Selorm and Abena, share profits from their business. Selorm's share is GH¢ 1,500, and Abena's share is GH¢ 1,000.

Application **(5 marks):** Using the binary operation: $a * b = a + b + 2$:

Let $a = 1500$ and $b = 1000$:

$1500 * 1000 = 1500 + 1000 + 2 = 2502$

Explanation **(1 mark):** The total shared profit for Kwame and Abena is GH¢ 2,502.

Scenario 3: Community Project Cost (1 mark)

Description **(3 marks):** The community needs to calculate the total cost of a project. The first phase costs GH¢ 2,000, and the second phase costs GH¢ 1,800.

Application **(5 marks):** Using the binary operation: $a * b = a + b + 2$

Let $a = 2000$ and $b = 1800$:

$2000 * 1800 = 2000 + 1800 + 2 = 3802$

Explanation **(1 mark):** The total cost of the community project is GH¢ 3,802, etc.

Presentation: (Should include receipts of bills. E.g.Family expenses on utilities like water, electricity, etc.) **(15 marks)**

Hint

Get learners to include their class exercises, class tests, quizzes, homework, mid-semester and end-of-semester examination scripts, etc as part of artefacts to submit for their portfolios.

Total marks: 50

3. Example of Portfolio Assessment Mode of Administration

a) Assign tasks to learners with clear instructions and guidelines.

b) Learners work throughout the semester, with regular guidance from the teacher, etc.

4. Example of Feedback for Portfolio Assessment

a) The teacher should make allowance for peer review sessions where learners present their scenarios and solutions for constructive feedback.

b) Provide detailed feedback on the final submitted portfolio, highlighting strengths and areas for improvement, etc.

PLC SESSION 2: Sets

1. Introduction (20 minutes)

1.1 Share one thing on the lesson for *week 1* delivered last week that:

a) went well (NTS 1a, 1b and 2a-2e)

b) you found challenging (NTS 1a, 1b and 2a-2e)

1.2 Share your experience in conducting and/or recording the assessment for the previous week.

1.3 Share your observation on what a colleague did by way of application of lessons learned from the previous session for *week 1* that supported learning (NTS 2e, 2f, 3d–3j).

2. Review of Learning Plans (60 minutes)

2.1 Read the purpose, learning outcome and learning indicators for the session:

Purpose

The purpose of the session is to review the learning plan for *week 2* by aligning the learning plan with Learner Material and appropriate assessment strategies.

Learning Outcome

Review your learning plan for *week 2* considering the cross-cutting issues (NTS 2b, 2c, 2e, 2f, 3a, 3d, 3e, 3g-3k and 3o).

Learning Indicators

1. 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 for the week.
2. Discuss and develop assessment tasks and rubrics/marking scheme for the learning indicators for the week.

2.2 Review the pedagogical approaches proposed for teaching *week 2* in your learning plan, identify activities that align with these in the Learner Material. Indicate the activities in your learning plan (NTS 2a – 2f, 3a – 3j).

Note

The selected activities should be included in the teacher/learner activity section of the learning plan.

2.3 Develop assessment tasks/items based on the learning indicator(s) on assessment for the week. This week's recommended mode of assessment is **poster presentation** (NTS 3k, 3p).

E.g.

A survey asked people what alternative transportation modes they use. 30% use the bus; 20% ride a bicycle, 25% walk; 5% use the bus and ride a bicycle 10% ride a bicycle and walk; 12% use the bus and walk; 2% use all three. Represent this information on a poster using a Venn diagram. Also, determine;

i. *What percent of people only ride the bus?*

ii. *How many people don't use any alternate transportation?*

Refer to Section 2 of LM and pages 21 – 26 of Year 1 Book 1 of TM for more assessment keys learners could use for poster presentation

Hint

*Assign a group project assessment in week 2 of semester 1. Refer to **Appendix B** in PLC Session 2 for a sample group project assessment.*

Note

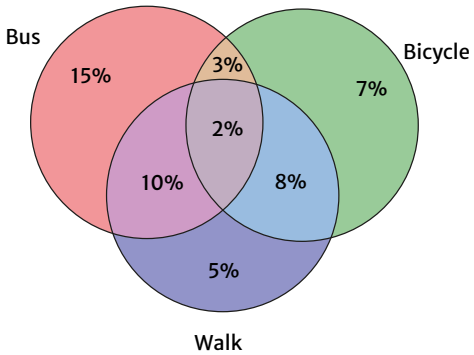
i. *The assessment tasks/items may cover levels 1 to 4 where appropriate to ensure that assessment is differentiated for all.*

ii. *The selected activities should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities of the learning plan.*

2.4 Discuss (and agree as a subject group) how you will develop the marking scheme/rubrics for scoring the assessment task(s)/item(s) for the week's recommended assessment.

E.g.

Alternative Transportation Modes Used



(A_5)

Let: ***B*** *denotes people who use the bus*

C *denotes people who ride a bicycle*

W *denotes people who walk* (M_1)

From the question;

$B = 30\%$

$C = 20\%$

$W = 25\%$

$B \cup C = 5\%$

$C \cap W = 10\%$

$B \cap W = 12\%$

$B \cap C \cap W = 2\%$ (M_1)

People who use only one mode of transportation:

People who only use the bus:

$$B - (B \cap C + B \cap W - B \cap C \cap W) = 30\% - (5\% + 12\% - 2\%)$$
$$= 30\% - 15\% = 15\% \quad (M_1)$$

People who only ride a bicycle:

$$C - (B \cap C + C \cap W - B \cap C \cap W) = 20\% - (5\% + 10\% - 2\%)$$
$$= 20\% - 13\% = 7\% \quad (M_1)$$

People who only walk:

$$(W - (B \cap W + C \cap W - B \cap C \cap W) = 25\% - (12\% + 10\% - 2\%)$$
$$= 25\% - 20\% = 5\% \quad (M_1)$$

Note

i. *The marking scheme and rubrics for scoring the assessment tasks/items should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/ learner activities in the learning plan.*

ii. *Take into consideration different modes of responses provided by learners.*

iii. *Discuss how you will observe and integrate character qualities, national values and 21st century skills that align with the lesson for the week and include these in your scoring.*

2.5 Discuss how you will administer the assessment task(s)/item(s) as a subject group (NTS 3n–3p).

E.g.

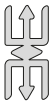
Pre-inform learners at the beginning of the lesson about the poster presentation, etc.

Refer to the Teacher Assessment Manual and Toolkit pages 97 – 99 for more guidelines on poster as an assessment strategy

2.6 Discuss how to provide feedback, and where appropriate, record and submit the assessment scores for each learner in the class (NTS 3n–3p).

E.g.

Explain any misconceptions and areas for improvement, etc.



Note

In giving feedback on assessment tasks/items, guide learners to make the necessary corrections that will improve learning.

3. Reflection (10 minutes)

3.1 Reflect and share your views on the session (NTS 1a, 1b).

3.2 Identify a critical friend to observe your lesson in relation to PLC Session 2 and provide feedback on your lesson (NTS 1f, 3g).

3.3 Remember to:

a) provide constructive feedback to learners record their assessment scores in the required format and document them where appropriate (NTS 3l – 3n).

b) read PLC Session 3 and related Learner Material (NTS 3a).

c) bring along your Teacher Manual, PLC Handbook and learning plan on *week 3* in preparation for the next session (NTS 3a).

Appendix B: Example of Group Project

The group project should be assigned in Week 2 and submitted by Week 8

1. Sample Group Project Assessment

Task: Analyse Family Budget Using Sets and Venn Diagrams

Description: Collect data on different categories of the family's expenses, e.g. food, clothing, rent etc. and represent the data using sets, and create Venn diagrams to visualise overlaps and relationships between categories.

2. Example of marking scheme/rubrics for scoring Group Project Assessment

Rubrics: (50 Marks)

a) **Data Collection (10 points):**
   i. Completeness and accuracy of data collected.
   ii. Proper categorisation of expenses.

b) **Data Representation (15 points):**
   i. Accuracy and clarity in representing data using sets.
   ii. Correct creation and interpretation of Venn diagrams.

c) **Analysis (15 points):**
   i. Insightfulness and accuracy in analysing relationships and overlaps between categories.
   ii. Quality of the written report.

d) **Presentation (10 points):**
   i. Clarity and organisation of the presentation.
   ii. Ability to answer questions and engage with peers.

a) Data Collection:
   i. Categories of expenses: Food, Utilities, Education, Rent (**3 marks**)
   ii. Collected data for at least 8 weeks:
      Food: GH¢ 500 (**1 mark**)
      Education: GH¢ 300 (**1 mark**)
      Rent: GH¢ 150 (**1 mark**)
      Overlaps (e.g., expenses that fall into both food and rent): GH¢ 50 (**1 mark**)
      Food and education: GH¢ 120 (**1 mark**)

b) Data Representation:

i. Set of food expenses (F): { GH¢ 500} (**1 mark**)

ii. Set of utility expenses (U): { GH¢ 200} (**1 mark**)

iii. Set of education expenses (E): {GH¢ 300} (**1 mark**)

iv. Set of rent expenses (R): { GH¢ 150} (**1 mark**)

v. Overlap between food and rent (F ∩ R): { GH¢ 50}, etc. (**1 mark**)

vi. Overlap between food and education (*F ∩ E)*: {GH¢ 150} **(1 mark),** etc.

3. Example of Group Project Assessment Mode of Administration

a) Provide examples of categories such as food, utilities, education, entertainment, rent, etc.

b) Learners gather data on their family's expenses for at least one month, categorising them into different sets (e.g., set of food expenses, set of utility expenses)

c) Learners represent the collected data using sets, etc.

4. Example of Feedback for Group Project Assessment

a) Provide ongoing feedback during data collection and diagram creation.

b) Provide constructive feedback on the clarity and accuracy of the Venn diagrams and analysis during the presentation, etc.

PLC SESSION 3: Binomial Expressions

1. Introduction (20 minutes)

1.1 Share one thing on the lesson for *week 2* delivered last week that:

a) went well (NTS 1a, 1b and 2a-2e)

b) you found challenging (NTS 1a, 1b and 2a-2e)

1.2 Share your experience in conducting and/or recording the assessment for the previous week.

1.3 Share your observation on what a colleague did by way of application of lessons learned from the previous session for *week 2* that supported learning (NTS 2e, 2f, and 3d–3j).

2. Review of Learning Plans (60 minutes)

2.1 Read the purpose, learning outcome and learning indicators for the session:

Purpose

The purpose of the session is to review the learning plan for *week 3* by aligning the learning plan with Learner Material and appropriate assessment strategies.

Learning Outcome

Review your learning plan for *week 3* considering the cross-cutting issues (NTS 2b, 2c, 2e, 2f, 3a, 3d, 3e, 3g-3k and 3o).

Learning Indicators

1. 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 for the week.
2. Discuss and develop assessment tasks and rubrics/marking scheme for the learning indicators for the week.

2.2 Review the pedagogical approaches proposed for teaching *week 3* in your learning plan, identify activities that align with these in the Learner Material. Indicate the activities in your learning plan (NTS 2a – 2f, and 3a – 3j).

Note

The selected activities should be included in the teacher/learner activity section of the learning plan.

2.3 Develop assessment tasks/items based on the learning indicator(s) on assessment for the week. This week's recommended mode of assessment is an **unannounced quiz** (NTS 3k, 3p).

E.g.

a) *Expand the binomial expression* $(x + y)^3$ *using Pascal's triangle*

b) *Determine the coefficient of the* x^3y^2 *term in the expansion of* $(x + y)^5$ *using the combination approach*

c) *Define the binomial theorem and use it to expand* $(2a - 3b)^4$, *etc.*

Refer to Section 3 of the LM and pages 31-32 of Year 1 Book 1 of TM for more assessment tasks for quizzes.

Note

i. The assessment tasks/items may cover levels 1 to 4 where appropriate to ensure that assessment is differentiated for all.

ii. The selected activities should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities of the learning plan.

2.4 Discuss (and agree as a subject group) how you will develop the marking scheme/rubrics for scoring the assessment task(s)/item(s) for the week's recommended assessment.

E.g.

a) $(x + y)^3 = x^3 + 3x^2y + 3xy^2 + y^3$ $(\boldsymbol{A}_2)$

b) *The binomial theorem is expressed as:*

$$(x + y)^n = \sum_{k=0}^{n} \binom{n}{k} x^{n-k}y^k \ (\boldsymbol{M}_1)$$

The coefficient of x^3y^2 *term in the expansion of* $(x + y)^5 \Rightarrow n = 5$, *x has an exponent of 3 and y has exponent 3*

$$\binom{5}{2} = \frac{5!}{2!(5-2)!} = \frac{5!}{2!\cdot 3!} = \frac{5\cdot 4\cdot 3!}{2!\cdot 3!} = \frac{5\cdot 4}{2\cdot 1} = 10 \ (\boldsymbol{M}_1)$$

Therefore, the coefficient of the x^3y^2 *term in the expansion of* $(x + y)^5$ *is 10* $(\boldsymbol{A}_1)$

Note

i. *The marking scheme and rubrics for scoring the assessment tasks/items should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities in the learning plan.*

ii. *Take into consideration different modes of responses provided by learners.*

iii. *Discuss how you will observe and integrate character qualities, national values and 21st-century skills that align with the lesson for the week and include these in your scoring.*

2.5 Discuss how you will administer the assessment task(s)/item(s) as a subject group (NTS: 3n–3p).

E.g.

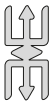
Announce there will be an unannounced quiz at the beginning of the semester, etc.

Refer to the Teacher Assessment Manual and Toolkit pages 80 – 83 for more guidelines on quizzes as an assessment strategy

2.6 Discuss how to provide feedback, and where appropriate, record and submit the assessment scores for each learner in the class (NTS 3n–3p).

E.g.

The teacher should explain solutions and misconceptions to the class on Binomial Expansion, etc.



Note

In giving feedback on assessment tasks/items, guide learners to make the necessary corrections that will improve learning.

3. Reflection (10 minutes)

3.1 Reflect and share your views on the session (NTS 1a, 1b).

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

3.3 Remember to:

a) provide constructive feedback to learners record their assessment scores in the required format and document them where appropriate (NTS 3l-3n).

b) read PLC Session 4 and related Learner Material (NTS 3a).

c) bring along your Teacher Manual, PLC Handbook and learning plan on *week 4* in preparation for the next session (NTS 3a).

PLC SESSION 4: Surds

1. Introduction (20 minutes)

1.1 Share one thing on the lesson for *week 3* delivered last week that:

a) went well (NTS 1a, 1b and 2a-2e)

b) you found challenging (NTS 1a, 1b and 2a-2e)

1.2 Share your experience in conducting and/or recording the assessment for the previous week.

1.3 Share your observation on what a colleague did by way of application of lessons learned from the previous session for *week 3* that supported learning (NTS 2e, 2f, and 3d–3j).

2. Review of Learning Plans (60 minutes)

2.1 Read the purpose, learning outcome and learning indicators for the session:

Purpose

The purpose of the session is to review the learning plan for *week 4* by aligning the learning plan with Learner Material and appropriate assessment strategies.

Learning Outcome

Review your learning plan for *week 4* considering the cross-cutting issues (NTS 2b, 2c, 2e, 2f, 3a, 3d, 3e, 3g-3k and 3o).

Learning Indicators

1. 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 for the week.
2. Discuss and develop assessment tasks and rubrics/marking scheme for the learning indicators for the week.

2.2 Review the pedagogical approaches proposed for teaching *week 4* in your learning plan, identify activities that align with these in the Learner Material. Indicate the activities in your learning plan (NTS 2a – 2f, and 3a – 3j).

Note

The selected activities should be included in the teacher/learner activity section of the learning plan.

2.3 Develop assessment tasks/items based on the learning indicator(s) on assessment for the week. This week's recommended mode of assessment is **group homework** (NTS 3k, 3p).

E.g.

Put the following surds in their simplest form where possible. For those that cannot be further simplified, state the reasons why:

i. $\sqrt{5} + \sqrt{7}$

ii. $3\sqrt{2} + 5\sqrt{2}$

iii. $\sqrt{7} - \sqrt{5}$

iv. $3\sqrt{2} - 5\sqrt{2}$

v. $3\sqrt{2} \times 5\sqrt{2}$

vi. $\sqrt{15} \div \sqrt{5}$

Refer to Section 4 of LM and pages 35 – 39 of Year 1 Book 1 of TM for more assessment tasks for group homework

Note

i. The assessment tasks/items may cover levels 1 to 4 where appropriate to ensure that assessment is differentiated for all.

ii. The selected activities should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities of the learning plan.

2.4 Discuss (and agree as a subject group) how you will develop the marking scheme/rubrics for scoring the assessment task(s)/item(s) for the week's recommended assessment (NTS 3k, 3p).

E.g.

i. $\sqrt{5} + \sqrt{7}$ *This cannot be simplified further as* $\sqrt{5}$ *and* $\sqrt{7}$ *are irrational and are unlike terms.* (A_1)

ii. $3\sqrt{2} + 5\sqrt{2} = 8\sqrt{2}$ *(Combine like terms)* (A_1)

iii. $\sqrt{7} - \sqrt{5}$ *This cannot be simplified further as* $\sqrt{5}$ *and* $\sqrt{7}$ *are irrational and unlike terms.* (A_1)

iv. $3\sqrt{2} - 5\sqrt{2} = -2\sqrt{2}$ *(Combine like terms)* (A_1)

v. $3\sqrt{2} \times 5\sqrt{2} = 15 \times 2 = 30$ *(Multiply the coefficients and the radicands)* (A_1)

vi. $\frac{\sqrt{15}}{\sqrt{5}} = \sqrt{\frac{15}{5}} = \sqrt{3}$ *(Simplify the fraction inside the square root), etc.* (A_1)

Note

i. The marking scheme and rubrics for scoring the assessment tasks/items should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities in the learning plan.

ii. Take into consideration different modes of responses provided by learners.

iii. *Discuss how you will observe and integrate character qualities, national values and 21st century skills that align with the lesson for the week and include these in your scoring.*

2.5 Discuss how you will administer the assessment task(s)/item(s) as a subject group (NTS 3n–3p).

E.g.

Provide clear written and verbal instructions for each task and any other relevant materials, etc.

Refer to the Teacher Assessment Manual and Toolkit pages 80 – 83 for more guidelines on class exercise as an assessment strategy

2.6 Discuss how to provide feedback, and where appropriate, record and submit the assessment scores for each learner in the class (NTS 3n – 3p).

E.g.

Provide each group with an answer key and marking rubric, etc.

Note

In giving feedback on assessment tasks/items, guide learners to make the necessary corrections that will improve learning.

3. Reflection (10 minutes)

3.1 Reflect and share your views on the session (NTS 1a, 1b).

3.2 Identify a critical friend to observe your lesson in relation to PLC Session 4 and provide feedback on your lesson (NTS 1f, 3g).

3.3 Remember to:

a) provide constructive feedback to learners and record their assessment scores in the required format and document where appropriate (NTS 3l – 3n).

b) read PLC Session 5 and related Learner Material (NTS 3a).

c) bring along your Teacher Manual, PLC Handbook and learning plan on *week 5* in preparation for the next session (NTS 3a).

PLC SESSION 5: Surds, Indicial Equations and Logarithms

1. Introduction (20 minutes)

1.1 Share one thing on the lesson for *week 4* delivered last week that:

a) went well (NTS 1a, 1b and 2a-2e)

b) you found challenging (NTS 1a, 1b and 2a-2e)

1.2 Share your experience in conducting and/or recording the assessment for the previous week.

1.3 Share your observation on what a colleague did by way of application of lessons learned from the previous session for *week 4* that supported learning (NTS 2e, 2f, and 3d–3j).

2. Review of Learning Plans (60 minutes)

2.1 Read the purpose, learning outcome and learning indicators for the session:

Purpose

The purpose of the session is to review the learning plan for *week 5* by aligning the learning plan with Learner Material and appropriate assessment strategies.

Learning Outcome

Review your learning plan for *week 5* considering the cross-cutting issues (NTS 2b, 2c, 2e, 2f, 3a, 3d, 3e, 3g-3k and 3o).

Learning Indicators

1. 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 for the week.
2. Discuss and develop assessment tasks and rubrics/marking scheme for the learning indicators for the week.

2.2 Review the pedagogical approaches proposed for teaching *week 5* in your learning plan, identify activities that align with these in the Learner Material. Indicate the activities in your learning plan (NTS 2a – 2f, 3a – 3j).

Note

The selected activities should be included in the teacher/learner activity section of the learning plan.

2.3 Develop assessment tasks/items based on the learning indicator(s) on assessment for the week. This week's recommended mode of assessment is **group class exercise** (NTS 3k, 3p).

E.g.

Learners work in groups to solve problems related to the week's learning indicators and present their solutions in class.

a) *Solve the following indicial equations.*

i. $2^{x+1} = 16$

ii. $5^{2x} = 125$

iii. $3^{x-1} = \frac{1}{9}$

b) *Solve for x in the following logarithmic equations:*

i. $log_2 8 = x$

ii. $log_5 125 = x$

iii. $log_{10} 1000 = x$

c) *Given that* $log_b x = y$, *express x in terms of b and y.*

Refer to Section 5 of LM and pages 40 – 47 of Year 1 Book 1 of TM for more assessment tasks for group class exercise.

Note

i. *The assessment tasks/items may cover levels 1 to 4 where appropriate to ensure that assessment is differentiated for all.*

ii. *The selected activities should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities of the learning plan.*

2.4 Discuss (and agree as a subject group) how you will develop the marking scheme/rubrics for scoring the assessment task(s)/item(s) for the week's recommended assessment (NTS 3k, 3p).

E.g.

b)

i. $log_2 8 = x$

$\Rightarrow 2^x = 8$

$\Rightarrow 2^x = 2^3$

$\Rightarrow x = 3\ (A_1)$

ii. $log_5 125 = x$

$\Rightarrow 5^x = 125$

$\Rightarrow 5^x = 5^3$

$\Rightarrow x = 3 \qquad (A_1)$

iii. $log_{10} 1000 = x$

$\Rightarrow 10^x = 1000$

$\Rightarrow 10^x = 10^3$

$\Rightarrow x = 3 \qquad (A_1)$

c) *Express x in terms of b and y*

$log_b x = y$

$\Rightarrow b^y = x$

$Or\ x = b^y \qquad (A_1)$

Note

i. *The marking scheme and rubrics for scoring the assessment tasks/items should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/ learner activities in the learning plan.*

ii. *Take into consideration different modes of responses provided by learners.*

iii. *Discuss how you will observe and integrate character qualities, national values and 21st century skills that align with the lesson for the week and include these in your scoring.*

2.5 Discuss how you will administer the assessment task(s)/item(s) as a subject group (NTS 3n, 3p).

E.g.

Distribute different sets of problems to each group and monitor groups, providing guidance and support as needed, etc.

Refer to the Teacher Assessment Manual and Toolkit pages 80 – 83 for more guidelines on class exercise as an assessment strategy

2.6 Discuss how to provide feedback, and where appropriate, record and submit the assessment scores for each learner in the class (NTS 3n – 3p).

E.g.

Provide verbal feedback during the presentations and highlight strong points and areas for improvement, etc.

Note

In giving feedback on assessment tasks/items, guide learners to make the necessary corrections that will improve learning.

3. Reflection (10 minutes)

3.1 Reflect and share your views on the session (NTS 1a, 1b).

3.2 Identify a critical friend to observe your lesson in relation to PLC Session 5 and provide feedback on your lesson (NTS 1f, 3g).

3.3 Remember to:

a) provide constructive feedback to learners and record their assessment scores in the required format and document where appropriate (NTS 3l – 3n).

b) read PLC Session 6 and related Learner Material (NTS 3a).

c) bring along your Teacher Manual, PLC Handbook and learning plan on *week 6* in preparation for the next session (NTS 3a).

PLC SESSION 6: Preparing for Mid-Semester Examination

1. Introduction (20 minutes)

1.1 Share one thing on the lesson for *week 5* delivered last week that:

a) went well (NTS 1a, 1b and 2a-2e)

b) you found challenging (NTS 1a, 1b and 2a-2e)

1.2 Share your experience in conducting and/or recording the assessment for the previous week.

1.3 Share your observation on what a colleague did by way of application of lessons learned from the previous session for *week 5* that supported learning (NTS 2e, 2f, and 3d–3j).

2. Review of Learning Plans (60 minutes)

2.1 Read the purpose, learning outcome and learning indicators for the session:

Purpose

The purpose of the session is to review the learning plan for *week 6 lessons and mid-semester examination* by aligning the learning plan with Learner Material and appropriate assessment strategies.

Learning Outcome

Review your learning plan for *week 6 and prepare for mid-semester examination* considering the cross-cutting issues (NTS 2b, 2c, 2e, 2f, 3a, 3d, 3e, 3g-3k and 3o).

Learning Indicators

1. 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 for the week.
2. Discuss and develop assessment tasks and rubrics/marking scheme for the learning indicators for the week.

2.2 Review the pedagogical approaches proposed for teaching *week 6* in your learning plan, identify activities that align with these in the Learner Material. Indicate the activities in your learning plan (NTS 2e, 2f, and 3d–3j).

Note

The selected activities should be included in the teacher/learner activity section of the learning plan.

2.3 Develop assessment tasks/items based on the learning indicator(s) on assessment for the week. This week's recommended mode of assessment is **mid-semester examination** (NTS 3n, 3k).

a) *Cover content from weeks 1-5*

i. *Section A- Multiple Choice (15 questions)*

ii. *Section B- (5 short answer questions, all to be answered)*

iii. *Section C- Real-life Application (2 questions, 1 to be answered).*

b) *Time: 1 hour.*

c) *Total Score: 100 marks*

d) *Table of specification (See **Appendix C** in PLC Session 6)*

E.g.

a) *Multiple choice:*

If $\log_b x = y$, *which of the following is true?*

A. $b^y = x$

B. $b = x^y$

C. $y = bx$

D. $x = b^y$

b) *Short answer question:*

In the operation defined by $a * b = a + b + 2$, *find the inverse* $*$

c) *Real-life Problem:*

In a community project, volunteers planted trees in rows. The first row had 4 trees, the second row had 8 trees, the third row had 12 trees, and so on. If this pattern continues, how many trees will be in the 15th row?

Refer to Sections 1 - 5 of the LM and pages 18 – 49 of the Year 1 Book 1 TM for more assessment items

Note

i. The assessment tasks/items may cover levels 1 to 4 where appropriate to ensure that assessment is differentiated for all.

ii. The selected activities should be included in the 'Assessment DoK aligned to Curriculum and TM' section below the teacher/learner activities of the learning plan.

2.4 Discuss (and agree as a subject group) how you will develop the marking scheme/rubrics for scoring the assessment task(s)/item(s) for the week's recommended assessment. (NTS: 3k and 3p)

E.g.

Key:

a) A

((A_1) for each correct answer)

b) Let e satisfy $a * e = a$ for any a. $(M_{0.5})$

Using the operation definition:

$a * b = a + b + 2$

$a * e = a + e + 2$ $(M_{0.5})$

$a + e + 2 = a$

$e = -2$ (A_1)

Note

i. *The marking scheme and rubrics for scoring the assessment tasks/items should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities in the learning plan.*

ii. *Take into consideration different modes of responses provided by learners.*

iii. *Discuss how you will observe and integrate character qualities, national values and 21st-century skills that align with the lesson for the week and include these in your scoring.*

2.5 Discuss how you will administer the assessment task(s)/item(s) as a subject group (NTS 3k, 3p).

E.g.

During the Examination: Monitor the exam to ensure no malpractices occur, etc.

Refer to the Teacher Assessment Manual and Toolkit pages 83 – 85, 94 – 97 for more guidelines on examination assessment strategies

2.6 Discuss how to provide feedback, and where appropriate, record and submit the assessment scores for each learner in the class (NTS 3n – 3p).

E.g.

Mark and score learners' answer booklets using your answer key and scoring rubrics, etc.

Note

In giving feedback on assessment tasks/items, guide learners to make the necessary corrections that will improve learning.

3. Reflection (10 minutes)

3.1 Reflect and share your views on the session (NTS 1a, 1b).

3.2 Identify a critical friend to observe your lesson in relation to PLC Session 6 and provide feedback on your lesson (NTS 1f, 3g).

3.3 Remember to:

a) provide constructive feedback to learners and record their assessment scores in the required format and document where appropriate (NTS 3l – 3n).

b) read PLC Session 7 and related Learner Material (NTS 3a).

c) bring along your Teacher Manual, PLC Handbook and learning plan on *week 7* in preparation for the next session (NTS 3a).

Appendix C: Sample Table of Specification for Mid-Semester Examination

Weeks	Focal Area(s)	Type of Questions	DoK Levels				Total
			1	2	3	4	
1	1. The concept of binary operations 2. Properties of binary operations 3. Identity and the Inverse of an Element	Multiple Choice	2	1	1		4
		Short answer		1			1
		Real-life Application Question					
2	1. Sets, Properties of Sets and Operations on Sets	Multiple Choice	1	1	1		3
		Short answer		1			1
		Real-life Application Question		1			1
3	1. The concept of binomial theorem 2. Binomial expansion and Pascal's triangle 3. Combination Approach	Multiple Choice	1	1	1		3
		Short answer		1			1
		Real-life Application Question		1	1		2
4	1. Definition, properties and simplification of surds 2. Rationalisation of surds	Multiple Choice	1	1			2
		Short answer		1			1
		Real-life Application Question		1			1
5	1. Definition and laws of indices 2. Simplification of expressions (surds and indices) 3. Indicial equations 4. Definition and relationship between indices and logarithms and logarithmic equations	Multiple Choice	1	1	1		3
		Short answer		1			1
		Real-life Application Question					
	Total		6	13	5	0	24

PLC SESSION 7: Function

1. Introduction (20 minutes)

1.1 Share one thing on the lesson for *week 6 and mid-semester examination* delivered that:

a) went well (NTS 1a, 1b and 2a-2e)

b) you found challenging (NTS 1a, 1b and 2a-2e)

1.2 Share your experience in conducting and/or recording the assessment for the previous week.

1.3 Share your observation on what a colleague did by way of application of lessons learned from the previous session for *week 6* that supported learning (NTS 2e, 2f, and 3d–3j).

2. Review of Learning Plans (60 minutes)

2.1 Read the purpose, learning outcome and learning indicators for the session:

Purpose

The purpose of the session is to review the learning plan for *week 7* by aligning the learning plan with Learner Material and appropriate assessment strategies.

Learning Outcome

Review your learning plan for *week 7* considering the cross-cutting issues (NTS 2b, 2c, 2e, 2f, 3a, 3d, 3e, 3g-3k and 3o).

Learning Indicators

1. 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 for the week.
2. Discuss and develop assessment tasks and rubrics/marking scheme for the learning indicators for the week.

2.2 Review the pedagogical approaches proposed for teaching *week 7* in your learning plan, identify activities that align with these in the Learner Material. Indicate the activity(ies) in your learning plan (NTS 2e, 2f and 3d–3j).

Note

The selected activities should be included in the teacher/learner activity section of the learning plan.

2.3 Develop assessment tasks/items based on the learning indicator(s) on assessment for the week. This week's recommended mode of assessment is **questioning (group)** (NTS 3k, 3p).

E.g.

a) *List and describe three types of relations, giving a real-life example for each*

b) *Given the function* $f(x) = 3x^2 - 2x + 5$, *evaluate* $f(2)$, $f(-1)$ *and* $f(0)$

c) *Given two functions* $f(x) = x + 2$ *and* $g(x) = 2x$, *find the composite functions* $f(g(x))$ *and* $g(f(x))$, *etc.*

Refer to Activities in Section 7 of the LM and pages 72-73 of the Year 1 Book 1 TM for more assessment keys for questioning.

Hint

Alert learners that they are to submit their group projects in week 8

Note

i. *The assessment tasks/items may cover levels 1 to 4 where appropriate to ensure that assessment is differentiated for all.*

ii. *The selected activities should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities of the learning plan.*

2.4 Discuss (and agree as a subject group) how you will develop the marking scheme/rubrics for scoring the assessment task(s)/item(s) for the week's recommended assessment (NTS 3k, 3p).

E.g.

a) *Three Types of Relations with Real-life examples*

i. *Reflexive Relation:*

A relation R on a set A is reflexive if every element is related to itself. In other words, $(a, a) \in R$ *for all* $a \in A$. *Example: The relation "is equal to" on the set of real numbers. For any real number* x, $x = x$ $(\mathbf{A}_2)$.

ii. *Symmetric Relation:*

A relation R on a set A is symmetric if for every pair $(a, b) \in R$, *the pair* $(b, a) \in R$ *as well. Example: The relation "is a sibling of" in a family. If person A is a sibling of person B, then person B is a sibling of person A.* $(\mathbf{A}_2)$.

Etc.

Note

i. *The marking scheme and rubrics for scoring the assessment tasks/items should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/ learner activities in the learning plan.*

ii. *Take into consideration different modes of responses provided by learners.*

iii. *Discuss how you will observe and integrate character qualities, national values and 21st century skills that align with the lesson for the week and include these in your scoring.*

2.5 Discuss how you will administer the assessment task(s)/item(s) as a subject group (NTS 3n, 3p).

E.g.

Question learners in groups on learning outcomes and indicators, etc.

Refer to the Teacher Assessment Manual and Toolkit pages 37 – 41 for more guidelines on questioning as an assessment strategy

2.6 Discuss how to provide feedback, and where appropriate, record and submit the assessment scores for each learner in the class. (NTS 3n – 3p)

E.g.

Write, project or print solutions for the homework task and let learners exchange exercise books with their peers to mark and score each other, etc.

Note

In giving feedback on assessment tasks/items, guide learners to make the necessary corrections that will improve learning.

3. Reflection (10 minutes)

3.1 Reflect and share your views on the session. (NTS 1a, 1b)

3.2 Identify a critical friend to observe your lesson in relation to PLC Session 7 and provide feedback on your lesson (NTS 1f, 3g).

3.3 Remember to:

a) provide constructive feedback to learners and record their assessment scores in the required format and document where appropriate (NTS 3l – 3n).

b) read PLC Session 8 and related Learner Material (NTS 3a).

c) bring along your Teacher Manual, PLC Handbook and learning plan on *week 8* in preparation for the next session (NTS 3a).

PLC SESSION 8: Graphs of Linear and Quadratic Functions

1. Introduction (20 minutes)

1.1 Share one thing on the lesson for *week 7* delivered last week that:

a) went well (NTS 1a, 1b and 2a-2e)

b) you found challenging (NTS 1a, 1b and 2a-2e)

1.2 Share your experience in conducting and/or recording the assessment for the previous week.

1.3 Share your observation on what a colleague did by way of application of lessons learned from the previous session for *week 7* that supported learning (NTS 2e, 2f and 3d–3j).

2. Review of Learning Plans (60 minutes)

2.1 Read the purpose, learning outcome and learning indicators for the session:

Purpose

The purpose of the session is to review the learning plan for *week 8* by aligning the learning plan with Learner Material and appropriate assessment strategies.

Learning Outcome

Review your learning plan for *week 8* considering the cross-cutting issues (NTS 2b, 2c, 2e, 2f, 3a, 3d, 3e, 3g-3k and 3o).

Learning Indicators

1. 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 for the week.
2. Discuss and develop assessment tasks and rubrics/marking scheme for the learning indicators for the week.

2.2 Review the pedagogical approaches proposed for teaching *week 8* in your learning plan, identify activities that align with these in the Learner Material. Indicate the activity(ies) in your learning plan (NTS 2e, 2f and 3d–3j).

Note

The selected activities should be included in the teacher/learner activity section of the learning plan.

2.3 Develop assessment tasks/items based on the learning indicator(s) on assessment for the week. This week's recommended mode of assessment is test of **practical knowledge** (TPK) (NTS 3k, 3p).

E.g.

Plot the graph of the linear function $y = 2x + 3$. Use a range of x values from -5 to 5. Clearly label the $x-$ axis and $y-$ axis and mark the intercepts. Write a brief report explaining the steps to plot the graph, including how you determined the intercepts, etc.

Refer to Section 8 of the LM and pages 85 - 86 of the Year 1 Book 1 TM for more assessment task for test of practical knowledge

Hint

Remind and schedule a period for learners to submit their group projects in week 8

Note

i. *The assessment tasks/items may cover levels 1 to 4 where appropriate to ensure that assessment is differentiated for all.*

ii. *The selected activities should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities of the learning plan.*

2.4 Discuss (and agree as a subject group) how you will develop the marking scheme/rubrics for scoring the assessment task(s)/item(s) for the week's recommended assessment (NTS 3k, 3p).

E.g.

Rubrics

a) *Graph Plotting:*

Accurate plotting of points: $(\boldsymbol{A}_5)$

Correct labelling of axes and intercepts: $(\boldsymbol{A}_5)$

b) *Report on Steps Taken:*

Clear explanation of steps: $(\boldsymbol{A}_3)$

Identification of intercepts: $(\boldsymbol{A}_2)$

Note

i. *The marking scheme and rubrics for scoring the assessment tasks/items should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities in the learning plan.*

ii. *Take into consideration different modes of responses provided by learners.*

iii. *Discuss how you will observe and integrate character qualities, national values and 21st century skills that align with the lesson for the week and include these in your scoring.*

2.5 Discuss how you will administer the assessment task(s)/item(s) as a subject group (NTS 3n, 3p).

E.g.

Inform learners they will need graph paper, pencils, rulers, and/or access to a computer to create graphs and PowerPoint presentation, etc.

Refer to the Teacher Assessment Manual and Toolkit pages 41 – 43 for more guidelines on test of practical knowledge as an assessment strategy

2.6 Discuss how to provide feedback, and where appropriate, record and submit the assessment scores for each learner in the class (NTS 3n – 3p).

E.g.

Provide detailed feedback on graph, written reports and oral presentations, highlighting strengths and areas for improvement, etc.

Note

In giving feedback on assessment tasks/items, guide learners to make the necessary corrections that will improve learning.

3. Reflection (10 minutes)

3.1 Reflect and share your views on the session (NTS 1a, 1b).

3.2 Identify a critical friend to observe your lesson in relation to PLC Session 8 and provide feedback on your lesson (NTS 1f, 3g).

3.3 Remember to:

a) provide constructive feedback to learners and record their assessment scores in the required format and document where appropriate (NTS 3l – 3n).

b) read PLC Session 9 and related Learner Material (NTS 3a).

c) bring along your Teacher Manual, PLC Handbook and learning plan on *week 9* in preparation for the next session (NTS 3a).

PLC SESSION 9: Systems of Linear Equations

1. Introduction (20 minutes)

1.1 Share one thing on the lesson for *week 8* delivered last week that:

a) went well (NTS 1a, 1b and 2a-2e)

b) you found challenging (NTS 1a, 1b and 2a-2e)

1.2 Share your experience in conducting and/or recording the assessment for the previous week.

1.3 Share your observation on what a colleague did by way of application of lessons learned from the previous session for *week 8* that supported learning (NTS 2e, 2f and 3d–3j).

2. Review of Learning Plans (60 minutes)

2.1 Read the purpose, learning outcome and learning indicators for the session:

Purpose

The purpose of the session is to review the learning plan for *week 9* by aligning the learning plan with Learner Material and appropriate assessment strategies.

Learning Outcome

Review your learning plan for *week 9* considering the cross-cutting issues (NTS 2b, 2c, 2e, 2f, 3a, 3d, 3e, 3g-3k and 3o).

Learning Indicators

1. 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 for the week.
2. Discuss and develop assessment tasks and rubrics/marking scheme for the learning indicators for the week.

2.2 Review the pedagogical approaches proposed for teaching *week 9* in your learning plan, identify activities that align with these in the Learner Material. Indicate the activity(ies) in your learning plan (NTS 2e, 2f and 3d–3j).

Note

The selected activities should be included in the teacher/learner activity section of the learning plan.

2.3 Develop assessment tasks/items based on the learning indicator(s) on assessment for the week. This week's recommended mode of assessment is **computational tasks** (NTS 3k, 3p).

E.g.

a) *Solve the system of linear equations:*

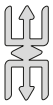
$2x + 3y = 12$

$x - y = 3$

Show all steps taken to arrive at your solution.

b) *A farmer has 20 animals, consisting of chickens and cows. The total number of legs of the animals is 54. Formulate and solve a system of linear equations to determine the number of chickens and cows. Explain the steps taken to form the equations and solve them, etc.*

Refer to Section 9 of the LM and pages 86 – 93 of the Year 1 Book 1 TM for more assessment items for computational tasks.



Note

i. *The assessment tasks/items may cover levels 1 to 4 where appropriate to ensure that assessment is differentiated for all.*

ii. *The selected activities should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities of the learning plan.*

2.4 Discuss (and agree as a subject group) how you will develop the marking scheme/rubrics for scoring the assessment task(s)/item(s) for the week's recommended assessment (NTS 3k, 3p).

E.g.

Expected Response:

Let's denote:

i. *c as the number of chickens.*

ii. *w as the number of cows.* $(\boldsymbol{M}_1)$

Two key pieces of information:

i. *The total number of animals is 20.*

ii. *The total number of legs is 54.* $(\boldsymbol{M}_1)$

From these pieces of information, we can form the following system of linear equations:

i. $c + w = 20$ *(each animal is either a chicken or a cow)*

ii. $2c + 4w = 54$ *(chickens have 2 legs and cows have 4 legs), etc.* $(\boldsymbol{M}_2)$

Note

i. *The marking scheme and rubrics for scoring the assessment tasks/items should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/ learner activities in the learning plan.*

ii. *Take into consideration different modes of responses provided by learners.*

iii. *Discuss how you will observe and integrate character qualities, national values and 21st century skills that align with the lesson for the week and include these in your scoring.*

2.5 Discuss how you will administer the assessment task(s)/item(s) as a subject group (NTS 3n, 3p).

E.g.

a) *Explain the task to learners at the beginning of the period, emphasising the importance of showing all work*

b) *Ensure learners have graph paper, pencils, rulers, calculators, etc.*

2.6 Discuss how to provide feedback, and where appropriate, record and submit the assessment scores for each learner in the class (NTS 3n – 3p).

E.g.

a) *After the task, allow learners to exchange their work with a peer for initial evaluation*

b) *Discuss common misconceptions and correct solutions with the class, etc.*

Refer to the Teacher Assessment Manual and Toolkit pages 49 – 51 for more guidelines on computational tasks as an assessment strategy

Note

In giving feedback on assessment tasks/items, guide learners to make the necessary corrections that will improve learning.

3. Reflection (10 minutes)

3.1 Reflect and share your views on the session (NTS 1a, 1b).

3.2 Identify a critical friend to observe your lesson in relation to PLC Session 9 and provide feedback on your lesson (NTS 1f, 3g).

3.3 Remember to:

a) provide constructive feedback to learners and record their assessment scores in the required format and document where appropriate (NTS 3l – 3n).

b) read PLC Session 10 and related Learner Material (NTS 3a).

c) bring along your Teacher Manual, PLC Handbook and learning plan on *week 10* in preparation for the next session (NTS 3a).

PLC SESSION 10: Quadratic Functions and Polynomial Graphs

1. Introduction (20 minutes)

1.1 Share one thing on the lesson for *week 9* delivered last week that:

a) went well (NTS 1a, 1b and 2a-2e)

b) you found challenging (NTS 1a, 1b and 2a-2e)

1.2 Share your experience in conducting and/or recording the assessment for the previous week.

1.3 Share your observation on what a colleague did by way of application of lessons learned from the previous session for *week 9* that supported learning (NTS 2e, 2f and 3d–3j).

2. Review of Learning Plans (60 minutes)

2.1 Read the purpose, learning outcome and learning indicators for the session:

Purpose

The purpose of the session is to review the learning plan for *week 10* by aligning the learning plan with Learner Material and appropriate assessment strategies.

Learning Outcome

Review your learning plan for *week 10* considering the cross-cutting issues (NTS 2b, 2c, 2e, 2f, 3a, 3d, 3e, 3g-3k and 3o).

Learning Indicators

1. 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 for the week.
2. Discuss and develop assessment tasks and rubrics/marking scheme for the learning indicators for the week.

2.2 Review the pedagogical approaches proposed for teaching *week 10* in your learning plan, identify activities that align with these in the Learner Material. Indicate the activity(ies) in your learning plan (NTS 2e, 2f and 3d–3j).

Note

The selected activities should be included in the teacher/learner activity section of the learning plan.

2.3 Develop assessment tasks/items based on the learning indicator(s) on assessment for the week. This week's recommended mode of assessment is a **class test** (NTS 3k, 3p).

E.g.

a) *Find the roots of the quadratic equation* $x^2 + 2x - 8 = 0$.

b) *Plot the graph of the polynomial function* $y = x^3 - 3x^2 - 4x + 12$ *for* x *values ranging from* -3 *to* 3. *Clearly label the* $x-$*axis and* $y-$*axis, mark the intercepts, and identify the turning points, etc.*

Refer to Section 7 of the LM and pages 72-73 of the Year 1 Book 1 TM for more assessment keys for class tests.

Note

i. *The assessment tasks/items may cover levels 1 to 4 where appropriate to ensure that assessment is differentiated for all.*

ii. *The selected activities should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities of the learning plan.*

2.4 Discuss (and agree as a subject group) how you will develop the marking scheme/rubrics for scoring the assessment task(s)/item(s) for the week's recommended assessment (NTS 3k, 3p).

E.g.

a) Correct roots: $x = -4, x = 2$ *(*$(\boldsymbol{A}_1)$ *for each correct root)*

b) Graph Plotting:

Accurate plotting of points and labelling: $(\boldsymbol{A}_5)$

Identification of intercepts: $(\boldsymbol{M}_1)$

Identification of turning points: $(\boldsymbol{M}_1)$

Note

i. *The marking scheme and rubrics for scoring the assessment tasks/items should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities in the learning plan.*

ii. *Take into consideration different modes of responses provided by learners.*

iii. *Discuss how you will observe and integrate character qualities, national values and 21st century skills that align with the lesson for the week and include these in your scoring.*

2.5 Discuss how you will administer the assessment task(s)/item(s) as a subject group (NTS 3n, 3p).

E.g.

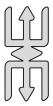
Explain the class test task to learners before they begin, emphasising the importance of showing all work, etc.

Refer to the Teacher Assessment Manual and Toolkit pages 80 – 83 for more guidelines on class test exercise as an assessment strategy

2.6 Discuss how to provide feedback, and where appropriate, record and submit the assessment scores for each learner in the class (NTS 3n – 3p).

E.g.

Correct solutions with the class and discuss common misconceptions in quadratic and polynomial functions, etc.



Note

In giving feedback on assessment tasks/items, guide learners to make the necessary corrections that will improve learning.

3. Reflection (10 minutes)

3.1 Reflect and share your views on the session (NTS 1a, 1b).

3.2 Identify a critical friend to observe your lesson in relation to PLC Session 9 and provide feedback on your lesson (NTS 1f, 3g).

3.3 Remember to:

a) provide constructive feedback to learners and record their assessment scores in the required format and document where appropriate (NTS 3l – 3n).

b) read PLC Session 11 and related Learner Material (NTS 3a).

c) bring along your Teacher Manual, PLC Handbook and learning plan on *week 11* in preparation for the next session (NTS 3a).

PLC SESSION 11: Rational Functions

1. Introduction (20 minutes)

1.1 Share one thing on the lesson for *week 10* delivered last week that:

a) went well (NTS 1a, 1b and 2a-2e)

b) you found challenging (NTS 1a, 1b and 2a-2e)

1.2 Share your experience in conducting and/or recording the assessment for the previous week.

1.3 Share your observation on what a colleague did by way of application of lessons learned from the previous session for *week 10* that supported learning (NTS 2e, 2f and 3d–3j).

2. Review of Learning Plans (60 minutes)

2.1 Read the purpose, learning outcome and learning indicators for the session:

Purpose

The purpose of the session is to review the learning plan for *week 11* by aligning the learning plan with Learner Material and appropriate assessment strategies.

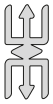
Learning Outcome

Review your learning plan for *week 11* considering the cross-cutting issues (NTS 2b, 2c, 2e, 2f, 3a, 3d, 3e, 3g-3k and 3o).

Learning Indicators

1. 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 for the week.
2. Discuss and develop assessment tasks and rubrics/marking scheme for the learning indicators for the week.

2.2 Review the pedagogical approaches proposed for teaching *week 11* in your learning plan, identify activities that align with these in the Learner Material. Indicate the activity(ies) in your learning plan (NTS 2e, 2f and 3d–3j).



Note

The selected activities should be included in the teacher/learner activity section of the learning plan.

2.3 Develop assessment tasks/items based on the learning indicator(s) on assessment for the week. This week's recommended mode of assessment is **group homework** (NTS 3k, 3p).

E.g.

a) *Why is the function* $k(x) = \frac{x^2+1}{x-2}$ *defined for all real numbers except* $x = 2$.

b) *The function* $h(x) = \frac{x^2-4}{x+2}$ *has a zero at* $x = 2$. *Does this necessarily mean the original function* $h'(x) = x^2 - 4$ *will also have a zero at* $x = 2$*? Briefly explain, etc.*

Refer to Section 11 of the LM and pages 72-73 of the Year 1 Book 1 TM for more assessment keys.

Note

i. *The assessment tasks/items may cover levels 1 to 4 where appropriate to ensure that assessment is differentiated for all.*

ii. *The selected activities should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities of the learning plan.*

2.4 Discuss (and agree as a subject group) how you will develop the marking scheme/rubrics for scoring the assessment task(s)/item(s) for the week's recommended assessment (NTS 3k, 3p).

E.g.

For the rational function $k(x) = \frac{x^2+1}{x-2}$ *to be defined, the denominator cannot be zero because division by zero is undefined in mathematics.* $(\boldsymbol{M}_1)$

The denominator of $k(x)$ *is* $x - 2$

To determine where the function is undefined, equate $x - 2$ *to zero and solve for* x*:*

$x - 2 = 0$

$x = 2$

Thus, the function $k(x)$ *is undefined at* $x = 2$. *For all other real numbers, the denominator* $x - 2$ *is not zero, so the function is defined.* $(\boldsymbol{A}_1)$

Note

i. *The marking scheme and rubrics for scoring the assessment tasks/items should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities in the learning plan.*

ii. *Take into consideration different modes of responses provided by learners.*

iii. *Discuss how you will observe and integrate character qualities, national values and 21st century skills that align with the lesson for the week and include these in your scoring.*

2.5 Discuss how you will administer the assessment task(s)/item(s) as a subject group (NTS 3n, 3p).

E.g.

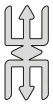
Provide clear written and verbal instructions for each task, etc.

Refer to the Teacher Assessment Manual and Toolkit pages 57– 60 for more guidelines on homework as an assessment strategy.

2.6 Discuss how to provide feedback, and where appropriate, record and submit the assessment scores for each learner in the class (NTS 3n – 3p).

E.g.

Provide each group with an answer key and marking rubric and address common errors and misconceptions in a follow-up class discussion, etc.



Note

In giving feedback on assessment tasks/items, guide learners to make the necessary corrections that will improve learning.

3. Reflection (10 minutes)

3.1 Reflect and share your views on the session (NTS 1a, 1b).

3.2 Identify a critical friend to observe your lesson in relation to PLC Session 11 and provide feedback on your lesson (NTS 1f, 3g).

3.3 Remember to:

a) provide constructive feedback to learners and record their assessment scores in the required format and document where appropriate (NTS 3l – 3n).

b) read PLC Session 12 and related Learner Material (NTS 3a).

c) bring along your Teacher Manual, PLC Handbook and learning plan on *week 12* in preparation for the next session (NTS 3a).

PLC SESSION 12: Preparing for End of Semester Examination

1. Introduction (20 minutes)

1.1 Share one thing on the lesson for *week 11* delivered last week that:

a) went well (NTS 1a, 1b and 2a-2e)

b) you found challenging (NTS 1a, 1b and 2a-2e)

1.2 Share your experience in conducting and/or recording the assessment for the previous week.

1.3 Share your observation on what a colleague did by way of application of lessons learned from the previous session for *week 11* that supported learning (NTS 2e, 2f and 3d–3j).

2. Review of Learning Plans (60 minutes)

2.1 Read the purpose, learning outcome and learning indicators for the session:

Purpose

The purpose of the session is to review the learning plan for *week 12* lessons and end of semester examination by aligning the learning plan with Learner Material and appropriate assessment strategies.

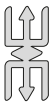
Learning Outcome

Review your learning plan for *week 12 and prepare for end of semester examination* considering the cross-cutting issues (NTS 2b, 2c, 2e, 2f, 3a, 3d, 3e, 3g-3k and 3o).

Learning Indicators

1. 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 for the week.
2. Discuss and develop assessment tasks and rubrics/marking scheme for the learning indicators for the week.

2.2 Review the pedagogical approaches proposed for teaching *week 12* in your learning plan, identify activities that align with these in the Learner Material. Indicate the activity(ies) in your learning plan (NTS 2e, 2f and 3d–3j).



Note

The selected activities should be included in the teacher/learner activity section of the learning plan.

2.3 Develop assessment tasks/items based on the learning indicator(s) on assessment for the week. This week's recommended mode of assessment is **end of semester examination** (NTS 3k, 3p).

E.g.

Structure:

a) *Cover content from weeks 1-12*

b) *Take into consideration DoK levels*

   i. *Section A- Multiple Choice (30 questions)*

   ii. *Section B- (5 short answer questions, all to be answered)*

   iii. *Section C- Real-life Application (3 questions, 2 to be selected).*

c) *Time: 1 hour 30 minutes to 2 hours.*

d) *Total Score: 100 marks.*

e) *Table of specification (ToS)*

*See **Appendix D** in PLC Session 6 for sample table of specification*

a) *Multiple Choice Question:*

   Solve the following system of equations: $2x + 3y = 6$ *and* $4x - y = 8$. *What is the value of x?*

   A. 1

   B. 2

   C. 3

   D. 4

b) *Short Answer Question:*

   i. Calculate the area enclosed by the graphs of $y = x$ *and* $y = -x + 4$.

   ii. Decompose the rational function $\frac{3x+5}{x^2-x-2}$ *into partial fractions.*

c) *Real-life Application Question:*

   A farmer in Ghana uses two types of fertilizers, A and B, for his maize and cocoa plants. The effectiveness of the fertilizers is represented by the quadratic functions $E_{A(x)} = 2x^2 + 3x + 1$ *and* $E_{B(x)} = x^2 + 4x + 2$, *where x is the amount of fertilizer used in kilograms. Determine the optimal amount of each fertilizer to use to maximize the effectiveness for both crops. Explain your solution and interpret the results in the context of the farmer's situation.*

Refer to Sections 1 – 12 of the LM and pages 14 – 86 of the Year 1 Book 1 TM for more assessment tasks to conduct end of semester examination.

Note

i. *The assessment tasks/items may cover levels 1 to 4 where appropriate to ensure that assessment is differentiated for all.*

ii. *The selected activities should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities of the learning plan.*

2.4 Discuss (and agree as a subject group) how you will develop the marking scheme/rubrics for scoring the assessment task(s)/item(s) for the week's recommended assessment (NTS 3k, 3p).

E.g.

Scoring rubrics and marking scheme

Multiple Choice Questions: (A_1) *each*

Fill-in Questions: (A_2) *each*

Real-life application questions: (A_{15}) *each*

a) Multiple Choice Questions

B. $((A_1)$*each correct answer)*

b) Short-answer questions

i. The area is a triangle with base 4 and height 4, so the area $= \frac{1}{2} \times 4 \times 4 = 8$ *square units.* (A_2)

ii. $\frac{3x+5}{x^2-x-2} = \frac{3x+5}{(x-2)(x+1)} = \frac{A}{(x-2)} + \frac{B}{(x+1)}$ (M_1)

Solving for A and B: $3x + 5 = A(x + 1) + B(x - 2)$

$A = 1, B = 2$, *so* $\frac{3x+5}{x^2-x-2} = \frac{1}{x-2} + \frac{2}{x+1}$ (A_1)

Note

i. *The marking scheme and rubrics for scoring the assessment tasks/items should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities in the learning plan.*

ii. *Take into consideration different modes of responses provided by learners.*

iii. *Discuss how you will observe and integrate character qualities, national values and 21st century skills that align with the lesson for the week and include these in your scoring.*

2.5 Discuss how you will administer the assessment task(s)/item(s) as a subject group (NTS 3n, 3p).

E.g.

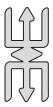
During the examination: Monitor the examination to ensure no malpractices occur, etc.

Refer to the Teacher Assessment Manual and Toolkit pages 83 – 85, 94 – 97 for more guidelines on examination assessment strategies

2.6 Discuss how to provide feedback, and where appropriate, record and submit the assessment scores for each learner in the class (NTS 3n – 3p).

E.g.

Provide detailed feedback on each learner's performance, highlighting strengths and areas for improvement, etc.



Note

In giving feedback on assessment tasks/items, guide learners to make the necessary corrections that will improve learning.

3. Reflection (10 minutes)

3.1 Reflect and share your views on the session (NTS 1a, 1b).

3.2 Identify a critical friend to observe your lesson in relation to PLC Session 12 and provide feedback on your lesson (NTS 1f, 3g).

3.3 Remember to:

a) provide constructive feedback to learners and record their assessment scores in the required format and document where appropriate (NTS 3l – 3n).

b) read PLC Session 13 and related Learner Material (NTS 3a).

c) bring along your Teacher Manual, PLC Handbook and learning plan on *week 13* in preparation for the next session (NTS 3a).

PLC SESSION 13: Properties and Equations of Straight Lines

1. Introduction (20 minutes)

1.1 Share one thing on the lesson for *week 12 and end of semester examination* that:

a) went well (NTS 1a, 1b and 2a-2e)

b) you found challenging (NTS 1a, 1b and 2a-2e)

1.2 Share your experience in conducting and/or recording the assessment for the previous week.

1.3 Share your observation on what a colleague did by way of application of lessons learned from the previous session for *week 12* that supported learning (NTS 2e, 2f and 3d–3j).

2. Review of Learning Plans (60 minutes)

2.1 Read the purpose, learning outcome and learning indicators for the session:

Purpose

The purpose of the session is to review the learning plan for *week 13* by aligning the learning plan with Learner Material and appropriate assessment strategies.

Learning Outcome

Review your learning plan for *week 13* considering the cross-cutting issues (NTS 2b, 2c, 2e, 2f, 3a, 3d, 3e, 3g-3k and 3o).

Learning Indicators

1. 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 for the week.
2. Discuss and develop assessment tasks and rubrics/marking scheme for the learning indicators for the week.

2.2 Review the pedagogical approaches proposed for teaching *week 13* in your learning plan, identify activities that align with these in the Learner Material. Indicate the activity(ies) in your learning plan (NTS 2e, 2f and 3d–3j).

Note

The selected activities should be included in the teacher/learner activity section of the learning plan.

2.3 Develop assessment tasks/items based on the learning indicator(s) on assessment for the week. This week's recommended mode of assessment is **group discussion** (NTS 3k, 3p).

E.g.

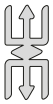
Discuss in groups, write a brief report and present on:

a) *Derivation of the equation of a straight line given two points*

b) *The formula for finding the distance between a point and a line and provide an example.*

c) *The properties of interior angles of a triangle and how they can be used to solve problems involving triangles, etc.*

Refer to Section 13 of LM and pages 7- 17 of Year 1 Book 2 of TM for more items for group discussion



Note

i. *The assessment tasks/items may cover levels 1 to 4 where appropriate to ensure that assessment is differentiated for all.*

ii. *The selected activities should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities of the learning plan.*

2.4 Discuss (and agree as a subject group) how you will develop the marking scheme/rubrics for scoring the assessment task(s)/item(s) for the week's recommended assessment (NTS 3k, 3p).

E.g.

Rubrics:

a) *Content Accuracy and Depth* $(\boldsymbol{A}_{10})$

b) *Group Collaboration* $(\boldsymbol{A}_{5})$

c) *Presentation Skills* $(\boldsymbol{A}_{5})$

d) *Engagement and Interaction* $(\boldsymbol{A}_{5})$

Marking Scheme

The slope-intercept form of a line's equation is given as: $y = mx + b$.

Two lines are parallel ***if and only if their slopes are equal.*** $(\boldsymbol{M}_1)$

i. *If the equations of the two lines are* $y = m_1 x + b_1$ *and* $y = m_2 x + b_2$, *the lines are parallel if* $m_1 = m_2$. $(\boldsymbol{M}_1)$

ii. *If the equations of the two lines are in the form* $Ax + By = C$ *and* $Dx + Ey = F$, *first convert these equations to the slope-intercept form to find their slopes:*

For $Ax + By = C$, *solve for* y:

$$y = -\frac{A}{B}x + \frac{C}{b}$$

The slope $m_1 = -\frac{A}{B}$ (M_1)

For $Dx + Ey = F$, *solve for y:*

$y = -\frac{D}{E}x + \frac{F}{E}$

The slope $m_2 = -\frac{D}{E}$ (M_1)

The lines are parallel if $-\frac{A}{B} = -\frac{D}{E}$ (A_1)

Two lines are perpendicular if and only if the product of their slopes is -1. (M_1)

i. *If the equations of the two lines are* $y = m_1x + b_1$ *and* $y = m_2x + b_2$, *the lines are perpendicular if* $m_1 \cdot m_2 = -1$. (M_1)

ii. *Similar to the parallel case, convert the standard form equations* $Ax + By = C$ *and* $Dx + Ey = F$ *to slope-intercept form to find their slopes:*

For $Ax + By = C$, *solve for y:*

$y = -\frac{A}{B}x + \frac{C}{b}$

The slope $m_1 = -\frac{A}{B}$ (M_1)

For $Dx + Ey = F$, *solve for y:*

$y = -\frac{D}{E}x + \frac{F}{E}$

The slope $m_2 = -\frac{D}{E}$ (M_1)

The lines are perpendicular if $-\frac{A}{B} \cdot -\frac{D}{E} = -1$, *which simplifies to* $\frac{AD}{BE} = -1$, (A_1) *etc.*

Note

i. *The marking scheme and rubrics for scoring the assessment tasks/items should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/ learner activities in the learning plan.*

ii. *Take into consideration different modes of responses provided by learners.*

iii. *Discuss how you will observe and integrate character qualities, national values and 21st century skills that align with the lesson for the week and include these in your scoring.*

2.5 Discuss how you will administer the assessment task(s)/item(s) as a subject group (NTS 3n, 3p).

E.g.

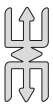
Each group will present their findings (e.g., 10 minutes per group), etc.

Refer to the Teacher Assessment Manual and Toolkit pages 80 – 83 for more guidelines on group discussion class exercise as an assessment strategy

2.6 Discuss how to provide feedback, and where appropriate, record and submit the assessment scores for each learner in the class (NTS 3n – 3p).

E.g.

Provide feedback and correct misconceptions in properties and equations of straight lines, etc.



Note

In giving feedback on assessment tasks/items, guide learners to make the necessary corrections that will improve learning.

3. Reflection (10 minutes)

3.1 Reflect and share your views on the session (NTS1a, 1b).

3.2 Identify a critical friend to observe your lesson in relation to PLC Session 13 and provide feedback on your lesson (NTS 1f, 3g).

3.3 Remember to:

a) provide constructive feedback to learners and record their assessment scores in the required format and document where appropriate (NTS 3l – 3n).

b) read PLC Session 14 and related Learner Material (NTS 3a).

c) bring along your Teacher Manual, PLC Handbook and learning plan on *week 13* in preparation for the next session (NTS 3a).

PLC SESSION 14: Vectors and Operations on Vectors

1. Introduction (20 minutes)

1.1 Share one thing on the lesson for *week 13* delivered last week that:

a) went well (NTS 1a, 1b and 2a-2e)

b) you found challenging (NTS 1a, 1b and 2a-2e)

1.2 Share your experience in conducting and/or recording the assessment for the previous week.

1.3 Share your observation on what a colleague did by way of application of lessons learned from the previous session for *week 13* that supported learning (NTS 2e, 2f and 3d–3j).

2. Review of Learning Plans (60 minutes)

2.1 Read the purpose, learning outcome and learning indicators for the session:

Purpose

The purpose of the session is to review the learning plan for *week 14* by aligning the learning plan with Learner Material and appropriate assessment strategies.

Learning Outcome

Review your learning plan for *week 14* considering the cross-cutting issues (NTS 2b, 2c, 2e, 2f, 3a, 3d, 3e, 3g-3k and 3o).

Learning Indicators

1. 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 for the week.
2. Discuss and develop assessment tasks and rubrics/marking scheme for the learning indicators for the week.

2.2 Review the pedagogical approaches proposed for teaching *week 14* in your learning plan, identify activities that align with these in the Learner Material. Indicate the activity(ies) in your learning plan (NTS 2e, 2f and 3d–3j).

Note

The selected activities should be included in the teacher/learner activity section of the learning plan.

2.3 Develop assessment tasks/items based on the learning indicator(s) on assessment for the week. This week's recommended mode of assessment is **class exercise** (NTS 3k, 3p).

E.g.

a) *Given two vectors* $\boldsymbol{A}=\begin{pmatrix}3\\4\end{pmatrix}$ *and* $\boldsymbol{B}=\begin{pmatrix}1\\2\end{pmatrix}$, *calculate:*

i. $\boldsymbol{A}+\boldsymbol{B}$

ii. $\boldsymbol{A}-\boldsymbol{B}$

b) *A farmer is marking his land, and he walks 5 meters north and then 7 meters east. Represent his walk using vectors and calculate the resultant displacement vector.*

c) *If* $\boldsymbol{C}=\begin{pmatrix}6\\8\end{pmatrix}$, *find the magnitude of* $\boldsymbol{C}$

Refer to Section 14 of LM and pages 20 – 28 of Year 1 Book 2 of TM for more items for class exercise

Hint:

Assign an individual project assessment in semester 2 week 14. Refer to the Teacher Assessment Manual and Toolkit Section 7.3 on Pages 34 – 37 and ***Appendix D*** *for further information on Project assessment.*

Note

i. The assessment tasks/items may cover levels 1 to 4 where appropriate to ensure that assessment is differentiated for all.

ii. The selected activities should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities of the learning plan.

2.4 Discuss (and agree as a subject group) how you will develop the marking scheme/rubrics for scoring the assessment task(s)/item(s) for the week's recommended assessment (NTS 3k, 3p).

E.g.

a) *Given* $\boldsymbol{A}=\begin{pmatrix}3\\4\end{pmatrix}$ *and* $\boldsymbol{B}=\begin{pmatrix}1\\2\end{pmatrix}$

i. $\boldsymbol{A}+\boldsymbol{B}=\begin{pmatrix}3+1\\4+2\end{pmatrix}=\begin{pmatrix}4\\6\end{pmatrix}$ $(\boldsymbol{A}_1)$

ii. $\boldsymbol{A}-\boldsymbol{B}=\begin{pmatrix}3-1\\4-1\end{pmatrix}=\begin{pmatrix}2\\2\end{pmatrix}$ $(\boldsymbol{A}_1)$

b) *The farmer's walk:*

North walk: $\boldsymbol{N} = \begin{pmatrix} 0 \\ 5 \end{pmatrix}$ $(\boldsymbol{M}_1)$

East walk: $\boldsymbol{E} = \begin{pmatrix} 7 \\ 0 \end{pmatrix}$ $(\boldsymbol{M}_1)$

Resultant displacement vector: $\boldsymbol{D} = \boldsymbol{N} + \boldsymbol{E} = \begin{pmatrix} 0 \\ 5 \end{pmatrix} + \begin{pmatrix} 7 \\ 0 \end{pmatrix} = \begin{pmatrix} 7 \\ 5 \end{pmatrix}$, *etc.* $(\boldsymbol{A}_1)$

Note

i. *The marking scheme and rubrics for scoring the assessment tasks/items should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities in the learning plan.*

ii. *Take into consideration different modes of responses provided by learners.*

iii. *Discuss how you will observe and integrate character qualities, national values and 21st century skills that align with the lesson for the week and include these in your scoring.*

2.5 Discuss how you will administer the assessment task(s)/item(s) as a subject group (NTS 3n, 3p).

E.g.

Pre-inform learners at the beginning of the lesson about the class exercise, etc.

Refer to the Teacher Assessment Manual and Toolkit pages 80 – 83 for more guidelines on class exercise as an assessment strategy

2.6 Discuss how to provide feedback, and where appropriate, record and submit the assessment scores for each learner in the class (NTS 3n – 3p).

E.g.

Highlight correct answers, point out mistakes, and suggest areas for improvement, etc.

Note

In giving feedback on assessment tasks/items, guide learners to make the necessary corrections that will improve learning.

3. Reflection (10 minutes)

3.1 Reflect and share your views on the session (NTS 1a, 1b).

3.2 Identify a critical friend to observe your lesson in relation to PLC Session 14 and provide feedback on your lesson (NTS 1f, 3g).

3.3 Remember to:

a) provide constructive feedback to learners and record their assessment scores in the required format and document where appropriate (NTS 3l – 3n).

b) read PLC Session 15 and related Learner Material (NTS 3a).

c) bring along your Teacher Manual, PLC Handbook and learning plan on *week 15* in preparation for the next session (NTS 3a).

Appendix D: Individual Project Work

1. Sample Individual Project

Title: Map and Analyse the Layout of Your School Compound

Description: *I*dentify and measure various line segments, determine equations of paths (straight lines), analyse angles formed by intersecting paths, and apply vector principles to describe movements within your school compound. The project will require learners to use mathematical theories and principles related to lines, angles, and vectors as well as instruments such as the meter rule, compasses, protractors, markers, etc.

Submission date: Week 22

2. Example of marking scheme/rubrics for scoring Individual Project

Rubrics:

a) Planning and Organisation (A_5)

b) Data Collection (A_{10})

c) Analysis and Calculations (A_{15})

d) Report Writing (A_{10})

e) Presentation (A_{10})

Planning and Data Collection:

Identified paths: Main path from the gate to the school building, path from the building to the playground.

Measured distances:

Gate to building: 100 meters

Building to a playground: 80 meters

Measured angles:

The angle between the main path and the path to the playground: 120^o

Analysis:

Equation of the main path: $y = 0.5x + 10$

Equation of path to the playground: $y = -0.8x + 80$

Determined paths are not parallel or perpendicular.

Distance from the gate to the main path: 10 *meters*.

Interior angles of the triangular section formed by paths:

angle A $= 60^\circ$

angle B $= 90^\circ$

$angle\ C = 30^\circ$

Vector from gate to building: $\overrightarrow{AB} = \left(100, 0\right)$

Vector from building to playground:

$\overrightarrow{BC} = \left(80cos\left(120^\circ\right), 80sin\left(120^\circ\right)\right) = \left(-40, 69.28\right)$, etc.

3. Example of Individual Project Mode of Administration

Week 14: Introduce the project, provide an overview, and explain the objectives and expectations.

Week 15: Learners will plan their project, including identifying the paths, angles, and vectors to be analysed.

Weeks 16 – 17: Learners will collect necessary data by measuring distances, angles, and identifying paths within the school compound.

Weeks 18 – 19: Learners will analyse the collected data, calculate equations of lines, determine parallel and perpendicular lines, calculate distances, and apply vector operations.

Week 20 - 21: Learners will compile their findings into a detailed report, including diagrams and calculations.

Week 22: Learners will submit and present their findings to the class.

4. Example of Feedback for Group Project Assessment

a) Provide continuous feedback during each phase of the project to ensure learners are on the right track.

b) Provide detailed feedback on the final report and presentation, highlighting strengths and areas for improvement.

PLC SESSION 15: Trigonometric Functions and Quadrantile Angles

1. Introduction (20 minutes)

1.1 Share one thing on the lesson for *week 14* delivered last week that:

a) went well (NTS 1a, 1b and 2a-2e)

b) you found challenging (NTS 1a, 1b and 2a-2e)

1.2 Share your experience in conducting and/or recording the assessment for the previous week.

1.3 Share your observation on what a colleague did by way of application of lessons learned from the previous session for *week 14* that supported learning (NTS 2e, 2f and 3d–3j).

2. Review of Learning Plans (60 minutes)

2.1 Read the purpose, learning outcome and learning indicators for the session:

Purpose

The purpose of the session is to review the learning plan for *week 15* by aligning the learning plan with Learner Material and appropriate assessment strategies.

Learning Outcome

Review your learning plan for *week 15* considering the cross-cutting issues (NTS 2b, 2c, 2e, 2f, 3a, 3d, 3e, 3g-3k and 3o).

Learning Indicators

1. 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 for the week.
2. Discuss and develop assessment tasks and rubrics/marking scheme for the learning indicators for the week.

2.2 Review the pedagogical approaches proposed for teaching *week 15* in your learning plan, identify activities that align with these in the Learner Material. Indicate the activity(ies) in your learning plan (NTS 2e, 2f and 3d–3j).

Note

The selected activities should be included in the teacher/learner activity section of the learning plan.

2.3 Develop assessment tasks/items based on the learning indicator(s) on assessment for the week. This week's recommended mode of assessment is **case study** (NTS 3k, 3p).

E.g.

A climber needs to reach the top of an electric pole to perform maintenance. The electric pole is 10 meters tall, and the ladder used is 12 meters long. The ladder is positioned at an angle to the ground. Learners will apply trigonometric concepts to determine the necessary measurements and angles involved. They will present their findings in a written report.

Specifically, learners should:

a) *Define the trigonometric ratios used in the analysis.*

b) *Determine the angle of elevation from the base of the ladder to the top of the pole*

c) *Identify any special angles involved*

d) *Convert the calculated angle of elevation from degrees to radians.*

Note

i. The assessment tasks/items may cover levels 1 to 4 where appropriate to ensure that assessment is differentiated for all.

ii. The selected activities should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities of the learning plan.

2.4 Discuss (and agree as a subject group) how you will develop the marking scheme/rubrics for scoring the assessment task(s)/item(s) for the week's recommended assessment (NTS: 3k, 3p).

E.g.

Rubrics:

Problem Understanding and fieldwork:	$(\boldsymbol{M}_5)$
Clear definition of trigonometric ratios:	$(\boldsymbol{M}_2)$
Identification of relevant information:	$(\boldsymbol{M}_3)$
Application of Trigonometric Ratios:	$(\boldsymbol{A}_5)$

Total: 20 marks

Marking Scheme:

a) *The necessary trigonometric ratios:*

Sine, Cosine, and Tangent ratios will be used.

$$sin(\theta) = \frac{opposite}{hypotenuse},\ cos(\theta) = \frac{adjacent}{hypotenuse},\ tan(\theta) = \frac{opposite}{adjacent}$$

b) *The angle of elevation from the base of the ladder to the top of the pole:*

Using the sine function:

$sin(\theta) = \frac{10}{12} = 0.8333, \rightarrow \theta = sin^{-1}(0.8333) \approx 56.44°$

c) *The angle* $56.44°$ *is not a special angle like* $30°$, $45°$, *or* $60°$.

d) *Convert the calculated angle of elevation from degrees to radians*

Using the conversion factor π *radians* $= 180°$:

$\theta = 56.44° \times \frac{\pi}{180} \approx 0.985$ radians, *etc.*

Note

i. *The marking scheme and rubrics for scoring the assessment tasks/items should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities in the learning plan.*

ii. *Take into consideration different modes of responses provided by learners.*

iii. *Discuss how you will observe and integrate character qualities, national values and 21st century skills that align with the lesson for the week and include these in your scoring.*

2.5 Discuss how you will administer the assessment task(s)/item(s) as a subject group (NTS 3n, 3p).

E.g.

Provide learners with detailed instructions and relevant diagrams, etc.

Refer to the Teacher Assessment Manual and Toolkit pages 31 – 34 for guidelines on case study as an assessment strategy

2.6 Discuss how to provide feedback, and where appropriate, record and submit the assessment scores for each learner in the class (NTS 3n – 3p).

E.g.

a) *Provide written feedback on each report, highlighting strengths and areas for improvement, etc.*

Note

In giving feedback on assessment tasks/items, guide learners to make the necessary corrections that will improve learning.

3. Reflection (10 minutes)

3.1 Reflect and share your views on the session (NTS 1a, 1b).

3.2 Identify a critical friend to observe your lesson in relation to PLC Session 15 and provide feedback on your lesson (NTS 1f, 3g).

3.3 Remember to:

a) provide constructive feedback to learners and record their assessment scores in the required format and document where appropriate (NTS 3l – 3n).

b) read PLC Session 16 and related Learner Material (NTS 3a).

c) bring along your Teacher Manual, PLC Handbook and learning plan on *week 16* in preparation for the next session (NTS 3a).

PLC SESSION 16: Limits of Functions

1. Introduction (20 minutes)

1.1 Share one thing on the lesson for *week 15* delivered last week that:

a) went well (NTS 1a, 1b and 2a-2e)

b) you found challenging (NTS 1a, 1b and 2a-2e)

1.2 Share your experience in conducting and/or recording the assessment for the previous week.

1.3 Share your observation on what a colleague did by way of application of lessons learned from the previous session for *week 15* that supported learning (NTS 2e, 2f, and 3d–3j).

2. Review of Learning Plans (60 minutes)

2.1 Read the purpose, learning outcome and learning indicators for the session:

Purpose

The purpose of the session is to review the learning plan for *week 16* by aligning the learning plan with Learner Material and appropriate assessment strategies.

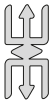
Learning Outcome

Review your learning plan for *week 16* considering the cross-cutting issues (NTS 2b, 2c, 2e, 2f, 3a, 3d, 3e, 3g-3k and 3o).

Learning Indicators

1. 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 for the week.
2. Discuss and develop assessment tasks and rubrics/marking scheme for the learning indicators for the week.

2.2 Review the pedagogical approaches proposed for teaching *week 16* in your learning plan, identify activities that align with these in the Learner Material. Indicate the activity(ies) in your learning plan (NTS 2e, 2f and 3d–3j).



Note

The selected activities should be included in the teacher/learner activity section of the learning plan.

2.3 Develop assessment tasks/items based on the learning indicator(s) on assessment for the week. This week's recommended mode of assessment is an **unannounced quiz** (NTS 3k, 3p).

E.g.

a) *What is the limit of* $f(x) = 3x + 2$ *as* x *approaches* 4?

b) *Determine the left-hand and right-hand limits of* $f(x) = \frac{1}{x}$ *as* x *approaches 0.*

c) *Given the piecewise function* $f(x) = \begin{cases} x^2 & \text{if } x < 1 \\ 3 & \text{if } x = 1 \\ 2x - 1 & \text{if } x > \end{cases}$

Determine if $f(x)$ *is continuous at* $x = 1$. *Justify your answer.*

Refer to Section 16 of LM and pages 44 – 58 of Year 1 Book 2 of TM for more quiz items

Note

i. *The assessment tasks/items may cover levels 1 to 4 where appropriate to ensure that assessment is differentiated for all.*

ii. *The selected activities should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities of the learning plan.*

2.4 Discuss (and agree as a subject group) how you will develop the marking scheme/rubrics for scoring the assessment task(s)/item(s) for the week's recommended assessment (NTS 3k, 3p).

E.g.

a) $\lim_{x \to 4} 3x + 2 = 3(4) + 2 = 12 + 2 = 14$ (A_1)

b) $\lim_{x \to 0^-} \frac{1}{x} = -\infty$ *and* $\lim_{x \to 0^+} \frac{1}{x} = +\infty$, *etc.* (A_2)

Note

i. *The marking scheme and rubrics for scoring the assessment tasks/items should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities in the learning plan.*

ii. *Take into consideration different modes of responses provided by learners.*

iii. *Discuss how you will observe and integrate character qualities, national values and 21st century skills that align with the lesson for the week and include these in your scoring.*

2.5 Discuss how you will administer the assessment task(s)/item(s) as a subject group (NTS 3n, 3p).

E.g.

Announce there will be an unannounced quiz at the beginning of the semester, etc.

Refer to the Teacher Assessment Manual and Toolkit pages 80 – 83 for more guidelines on class exercise as an assessment strategy

2.6 Discuss how to provide feedback, and where appropriate, record and submit the assessment scores for each learner in the class (NTS 3n – 3p).

E.g.

Review the answers and provide feedback in the next class session, highlighting common errors and explaining correct solutions, etc.

Note

In giving feedback on assessment tasks/items, guide learners to make the necessary corrections that will improve learning.

3. Reflection (10 minutes)

3.1 Reflect and share your views on the session (NTS 1a, 1b).

3.2 Identify a critical friend to observe your lesson in relation to PLC Session 16 and provide feedback on your lesson (NTS 1f, 3g).

3.3 Remember to:

a) provide constructive feedback to learners and record their assessment scores in the required format and document where appropriate (NTS 3l – 3n).

b) read PLC Session 17 and related Learner Material (NTS 3a).

c) bring along your Teacher Manual, PLC Handbook and learning plan on *week 17* in preparation for the next session (NTS 3a).

PLC SESSION 17: Differentiation, First Principle and Power Rule

1. Introduction (20 minutes)

1.1 Share one thing on the lesson for *week 16* delivered last week that:

a) went well (NTS 1a, 1b and 2a-2e)

b) you found challenging (NTS 1a, 1b and 2a-2e)

1.2 Share your experience in conducting and/or recording the assessment for the previous week.

1.3 Share your observation on what a colleague did by way of application of lessons learned from the previous session for *week 16* that supported learning (NTS 2e, 2f, 3d–3j).

2. Review of Learning Plans (60 minutes)

2.1 Read the purpose, learning outcome and learning indicators for the session:

Purpose

The purpose of the session is to review the learning plan for *week 17* by aligning the learning plan with Learner Material and appropriate assessment strategies.

Learning Outcome

Review your learning plan for *week 17* considering the cross-cutting issues (NTS 2b, 2c, 2e, 2f, 3a, 3d, 3e, 3g-3k and 3o).

Learning Indicators

1. 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 for the week.
2. Discuss and develop assessment tasks and rubrics/marking scheme for the learning indicators for the week.

2.2 Review the pedagogical approaches proposed for teaching *week 17* in your learning plan, identify activities that align with these in the Learner Material. Indicate the activity(ies) in your learning plan (NTS 2e, 2f and 3d–3j).

Note

The selected activities should be included in the teacher/learner activity section of the learning plan.

2.3 Develop assessment tasks/items based on the learning indicator(s) on assessment for the week. This week's recommended mode of assessment is **homework** (NTS 3k, 3p).

E.g.

a) *Differentiate the function* $f(x) = 3x^2 + 2x + 1$ *using the first principle of differentiation*

b) *Differentiate the following functions using the power rule:*

i. $g(x) = 4x^3 - 5x^2 + 6x - 7$

ii. $h(x) = 2x^4 + 3x^3 - x + 8$

Refer to Section 17 of LM and pages 59 – 66 of Year 1 Book 2 of TM for more homework items

Note

i. The assessment tasks/items may cover levels 1 to 4 where appropriate to ensure that assessment is differentiated for all.

ii. The selected activities should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities of the learning plan.

2.4 Discuss (and agree as a subject group) how you will develop the marking scheme/rubrics for scoring the assessment task(s)/item(s) for the week's recommended assessment (NTS 3k, 3p).

E.g.

c)

i. *For* $g(x) = 4x^3 - 5x^2 + 6x - 7$

$g'(x) = 12x^2 - 10x + 6$ (A_2)

ii. *For* $h(x) = 2x^4 + 3x^3 - x + 8$

$h'(x) = 8x^3 + 9x^2 - 1$ (A_2)

Note

i. *The marking scheme and rubrics for scoring the assessment tasks/items should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities in the learning plan.*

ii. *Take into consideration different modes of responses provided by learners.*

iii. *Discuss how you will observe and integrate character qualities, national values and 21st century skills that align with the lesson for the week and include these in your scoring.*

2.5 Discuss how you will administer the assessment task(s)/item(s) as a subject group (NTS 3n, 3p).

E.g.

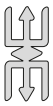
Alert learners to use their homework exercise books and any other materials they may need, such as calculators, etc.

Refer to the Teacher Assessment Manual and Toolkit pages 57 – 60 for more guidelines on homework as an assessment strategy

2.6 Discuss how to provide feedback, and where appropriate, record and submit the assessment scores for each learner in the class (NTS 3n – 3p).

E.g.

Explain the solutions to the class, addressing any misconceptions in the concepts of differentiation, etc.



Note

In giving feedback on assessment tasks/items, guide learners to make the necessary corrections that will improve learning.

3. Reflection (10 minutes)

3.1 Reflect and share your views on the session (NTS 1a, 1b).

3.2 Identify a critical friend to observe your lesson in relation to PLC Session 17 and provide feedback on your lesson (NTS 1f, 3g).

3.3 Remember to:

a) provide constructive feedback to learners and record their assessment scores in the required format and document where appropriate (NTS 3l – 3n).

b) read PLC Session 18 and related Learner Material (NTS 3a).

c) bring along your Teacher Manual, PLC Handbook and learning plan on *week 18* in preparation for the next session (NTS 3a).

PLC SESSION 18: Preparing for Mid-Semester Examination

1. Introduction (20 minutes)

1.1 Share one thing on the lesson for *week 17* delivered last week that:

a) went well (NTS 1a, 1b and 2a-2e)

b) you found challenging (NTS 1a, 1b and 2a-2e)

1.2 Share your experience in conducting and/or recording the assessment for the previous week.

1.3 Share your observation on what a colleague did by way of application of lessons learned from the previous session for *week 17* that supported learning (NTS 2e, 2f and 3d–3j).

2. Review of Learning Plans (60 minutes)

2.1 Read the purpose, learning outcome and learning indicators for the session:

Purpose

The purpose of the session is to review the learning plan for *week 18 lessons and mid-semester examination* by aligning the learning plan with Learner Material and appropriate assessment strategies.

Learning Outcome

Review your learning plan for *week 18 and prepare for mid-semester examination* considering the cross-cutting issues (NTS 2b, 2c, 2e, 2f, 3a, 3d, 3e, 3g-3k and 3o).

Learning Indicators

1. 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 for the week.
2. Discuss and develop assessment tasks and rubrics/marking scheme for the learning indicators for the week.

2.2 Review the pedagogical approaches proposed for teaching *week 18* in your learning plan, identify activities that align with these in the Learner Material. Indicate the activity(ies) in your learning plan (NTS 2e, 2f and 3d–3j).

Note

The selected activities should be included in the teacher/learner activity section of the learning plan.

2.3 Develop assessment tasks/items based on the learning indicator(s) on assessment for the week. This week's recommended mode of assessment is **mid-semester examination** (NTS 3k, 3p).

E.g.

Structure:

a) *Cover content from weeks 13-17*

b) *Take into consideration DoK levels*

i. *Section A- Multiple Choice (20 questions)*

ii. *Section B- (5 fill-in questions and short answers, all to be answered)*

iii. *Section C- Real-life Application (2 questions, 1 to be answered).*

c) *Time: 1 hour.*

d) *Total Score: 100 marks*

e) *Table of specifications (See **Appendix C** in PLC Session 6 for sample ToS.)*

a) Multiple Choice Questions:

i. *What is the gradient of the curve* $y = 3x^2 + 2x + 1$ *at* $x = 1$*?*

A. 3

B. 5

C. 8

D. 11

ii. The derivative of $f(x) = x^3 - 5x^2 + 4x - 2$ *is:*

A. $3x^2 - 10x + 4$

B. $3x^2 - 10x$

C. $x^3 - 10x + 4$

D. $3x - 5$

b) Fill-in-the-Blank Question

i. The equation of the tangent to the curve $y = x^2$ *at* $x = 2$ *is* $y = \ldots$

c) Real-life Application Question

A water tank has a volume of $V(t) = 4t^3 + 2t^2 - 5t + 10$ *cubic meters at time t hours.*

i. Calculate the rate of change of the volume of water in the tank at $t = 2$ *hours.*

ii. Interpret the result in the context of the problem.

iii. If the rate of change continues, what will the volume be at $t = 3$ *hours?*

Note

i. *The assessment tasks/items may cover levels 1 to 4 where appropriate to ensure that assessment is differentiated for all.*

ii. *The selected activities should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities of the learning plan.*

2.4 Discuss (and agree as a subject group) how you will develop the marking scheme/rubrics for scoring the assessment task(s)/item(s) for the week's recommended assessment (NTS 3k, 3p).

E.g.

Marking Scheme and Rubrics:

Multiple Choice Questions: (A_1) *each*

Short Answer Questions: (A_2) *each*

Real-life application questions: (A_{15}) *each*

a) Multiple choice

i. C

ii. A

b) Short Answer Questions

i. Correct Answer: $4x - 4$ (A_2)

ii. Correct Answer: $-\infty$ (A_2)

c) Real-life Application Question

i. $\frac{dV}{dt} = 12t^2 + 4t - 5.$ (M_2)

$At\ t = 2:\ 12(2^2) + 4(2) - 5 = 48 + 8 - 5 = 51\,m^3h^{-1}$ (A_3)

ii. The rate of change of the volume at $t = 2$ *hours is* 51 *cubic meters per hour, meaning the volume is increasing by 51 cubic meters each hour at* $t = 2$ (A_2)

iii. $V(3) = 4(3^3) + 2(3^2) - 5(3) + 10$ (A_2)

$= 4(27) + 2(9) - 15 + 10$

$= 108 + 18 - 15 + 10 = 121$ *cubic meters* (A_3)

Note

i. *The marking scheme and rubrics for scoring the assessment tasks/items should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities in the learning plan.*

ii. *Take into consideration different modes of responses provided by learners.*

iii. *Discuss how you will observe and integrate character qualities, national values and 21st century skills that align with the lesson for the week and include these in your scoring.*

2.5 Discuss how you will administer the assessment task(s)/item(s) as a subject group (NTS: 3n, 3p).

E.g.

During the Examination: Monitor the exam to ensure no malpractices occur, etc.

Refer to the Teacher Assessment Manual and Toolkit pages 83 – 85, 94 – 97 for more guidelines on examination assessment strategies

2.6 Discuss how to provide feedback, and where appropriate, record and submit the assessment scores for each learner in the class (NTS 3n – 3p).

E.g.

Discuss common errors and misconceptions in a follow-up class discussion, etc.

Note

In giving feedback on assessment tasks/items, guide learners to make the necessary corrections that will improve learning.

3. Reflection (10 minutes)

3.1 Reflect and share your views on the session (NTS 1a, 1b).

3.2 Identify a critical friend to observe your lesson in relation to PLC Session 18 and provide feedback on your lesson (NTS 1f, 3g).

3.3 Remember to:

a) provide constructive feedback to learners and record their assessment scores in the required format and document where appropriate (NTS 3l – 3n).

b) read PLC Session 19 and related Learner Material (NTS 3a).

c) bring along your Teacher Manual, PLC Handbook and learning plan on *week 19* in preparation for the next session (NTS 3a).

PLC SESSION 19: Data Collection, Representation and Categorisation

1. Introduction (20 minutes)

1.1 Share one thing on the lesson for *week 18 and mid-semester examination* that:

a) went well (NTS 1a, 1b and 2a-2e)

b) you found challenging (NTS 1a, 1b and 2a-2e)

1.2 Share your experience in conducting and/or recording the assessment for the previous week.

1.3 Share your observation on what a colleague did by way of application of lessons learned from the previous session for *week 18* that supported learning (NTS 2e, 2f and 3d–3j).

2. Review of Learning Plans (60 minutes)

2.1 Read the purpose, learning outcome and learning indicators for the session:

Purpose

The purpose of the session is to review the learning plan for *week 19* by aligning the learning plan with Learner Material and appropriate assessment strategies.

Learning Outcome

Review your learning plan for *week 19* considering the cross-cutting issues (NTS 2b, 2c, 2e, 2f, 3a, 3d, 3e, 3g-3k and 3o).

Learning Indicators

1. 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 for the week.
2. Discuss and develop assessment tasks and rubrics/marking scheme for the learning indicators for the week.

2.2 Review the pedagogical approaches proposed for teaching *week 19* in your learning plan, identify activities that align with these in the Learner Material. Indicate the activity(ies) in your learning plan (NTS 2e, 2f and 3d–3j).

Note

The selected activities should be included in the teacher/learner activity section of the learning plan.

2.3 Develop assessment tasks/items based on the learning indicator(s) on assessment for the week. This week's recommended mode of assessment is **practical assessment** (NTS: 3k, 3p).

E.g.

Learners will explore their neighbourhood to collect data on various aspects such as demographics, environmental factors, or local services. They will then categorise the collected data into the appropriate levels of measurement and provide a brief explanation for each categorisation.

Refer to Section 19 of LM and pages 76 – 82 of Year 1 Book 2 of TM for more items for practical homework

Hint

Alert learners to finalise and submit their practical portfolio in week 20

Note

i. *The assessment tasks/items may cover levels 1 to 4 where appropriate to ensure that assessment is differentiated for all.*

ii. *The selected activities should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities of the learning plan.*

2.4 Discuss (and agree as a subject group) how you will develop the marking scheme/rubrics for scoring the assessment task(s)/item(s) for the week's recommended assessment (NTS: 3k, 3p).

E.g.

Title: Neighbourhood Data Collection and Categorisation

Table 1: Collected data variables $(\boldsymbol{M}_4)$

Variable	*Data Collected*
Age of Residents	*25, 34, 45, 22, 30*
Types of shops	*Grocery, Pharmacy, Clothing*
Daily temperatures (°C)	*29, 30, 28, 27, 29*
Number of parks	*2, 1, 3, 2, 1*
Education level	*Primary, Secondary, Tertiary, etc*

Table 2: Data categorisation with explanations (**A** 6)

Variable	*Level of Measurement*	*Explanation*
Age of Residents	*Ratio*	*Age has a true zero and meaningful differences*
Types of shops	*Nominal*	*Types of shops are categories without order*
Daily temperatures (°C)	*Interval*	*Temperature has meaningful differences but no true zero.*

Note

i. *The marking scheme and rubrics for scoring the assessment tasks/items should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/ learner activities in the learning plan.*

ii. *Take into consideration different modes of responses provided by learners.*

iii. *Discuss how you will observe and integrate character qualities, national values and 21st century skills that align with the lesson for the week and include these in your scoring.*

2.5 Discuss how you will administer the assessment task(s)/item(s) as a subject group (NTS: 3n, 3p).

E.g.

Instruct learners to collect data from their neighbourhood over one week. Such as:

i. *Demographic data (age, gender, education level, etc.)*

ii. *Environmental data (temperature, air quality index, etc.)*

iii. *Local services data (number of parks, types of shops, etc.)*

Refer to the Teacher Assessment Manual and Toolkit pages 46 – 49 for more guidelines on practical assessment as an assessment strategy

2.6 Discuss how to provide feedback, and where appropriate, record and submit the assessment scores for each learner in the class (NTS 3n – 3p).

E.g.

Provide detailed feedback on the submitted reports, focusing on the accuracy of data categorisation and the quality of explanations, etc.

Note

In giving feedback on assessment tasks/items, guide learners to make the necessary corrections that will improve learning.

3. Reflection (10 minutes)

3.1 Reflect and share your views on the session (NTS 1a, 1b).

3.2 Identify a critical friend to observe your lesson in relation to PLC Session 19 and provide feedback on your lesson (NTS 1f, 3g).

3.3 Remember to:

a) provide constructive feedback to learners and record their assessment scores in the required format and document where appropriate (NTS 3l – 3n).

b) read PLC Session 20 and related Learner Material (NTS 3a).

c) bring along your Teacher Manual, PLC Handbook and learning plan on *week 20* in preparation for the next session (NTS 3a).

PLC SESSION 20: Graphical Representation of Data

1. Introduction (20 minutes)

1.1 Share one thing on the lesson for *week 19* delivered last week that:

a) went well (NTS 1a, 1b and 2a-2e)

b) you found challenging (NTS 1a, 1b and 2a-2e)

1.2 Share your experience in conducting and/or recording the assessment for the previous week.

1.3 Share your observation on what a colleague did by way of application of lessons learned from the previous session for *week 19* that supported learning (NTS 2e, 2f and 3d–3j).

2. Review of Learning Plans (60 minutes)

2.1 Read the purpose, learning outcome and learning indicators for the session:

Purpose

The purpose of the session is to review the learning plan for *week 20* by aligning the learning plan with Learner Material and appropriate assessment strategies.

Learning Outcome

Review your learning plan for *week 20* considering the cross-cutting issues (NTS 2b, 2c, 2e, 2f, 3a, 3d, 3e, 3g-3k and 3o).

Learning Indicators

1. 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 for the week.
2. Discuss and develop assessment tasks and rubrics/marking scheme for the learning indicators for the week.

2.2 Review the pedagogical approaches proposed for teaching *week 20* in your learning plan, identify activities that align with these in the Learner Material. Indicate the activity(ies) in your learning plan (NTS: 2e, 2f and 3d–3j).

Note

The selected activities should be included in the teacher/learner activity section of the learning plan.

2.3 Develop assessment tasks/items based on the learning indicator(s) on assessment for the week. This week's recommended mode of assessment is **practical group assessment and poster presentation** (NTS 3k, 3p).

E.g.

Collect data on the monthly expenses (in Ghana Cedi) of 5 households in your community. The expenses may include categories such as food, transportation, education, utilities, etc. Record the data in the table below:

Household	Food (GH¢)	Transport (GH¢)	Education (GH¢)	Utilities (GH¢)
1				
2				
3				
4				
5				

i. *Use the data from the table to create bar charts representing the monthly expenses of each household.*

ii. *Choose one household from the table and create a pie chart to represent the percentage distribution of expenses in different categories, etc.*

Refer to Section 20 of LM and pages 83 – 92 of Year 1 Book 2 of TM for more practical group assessment and poster presentation items

Hint

Schedule a period for learners to submit their practical portfolio this week

Note

i. *The assessment tasks/items may cover levels 1 to 4 where appropriate to ensure that assessment is differentiated for all.*

ii. *The selected activities should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities of the learning plan.*

2.4 Discuss (and agree as a subject group) how you will develop the marking scheme/rubrics for scoring the assessment task(s)/item(s) for the week's recommended assessment (NTS 3k, 3p).

E.g.

Marking Scheme and Rubrics:

Data Collection (M_4)

Poster Representation:

Bar Chart ((A_3) each)

Pie Chart (A_3)

Well-structured report with clear paragraphs, logical flow, and correct grammar (A_3), etc.

Household	Food (GH¢)	Transport (GH¢)	Education (GH¢)	Utilities (GH¢)
1	*350*	*412*	*780*	*560*
2	*290*	*380*	*890*	*370*
3	*210*	*290*	*950*	*590*
4	*200*	*321*	*1030*	*257*
5	*315*	*345*	*1200*	*190*

(M_4)

Note

i. *The marking scheme and rubrics for scoring the assessment tasks/items should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/ learner activities in the learning plan.*

ii. *Take into consideration different modes of responses provided by learners.*

iii. *Discuss how you will observe and integrate character qualities, national values and 21st century skills that align with the lesson for the week and include these in your scoring.*

2.5 Discuss how you will administer the assessment task(s)/item(s) as a subject group (NTS 3n, 3p).

E.g.

Each group will collect data on the monthly expenses (in Ghana cedis) of 5 households in their community e.g. food, transportation, education, etc.

Refer to the Teacher Assessment Manual and Toolkit pages 46 – 49 and 97 - 99 for more guidelines on practical assessment and poster presentations as an assessment strategy respectively

2.6 Discuss how to provide feedback, and where appropriate, record and submit the assessment scores for each learner in the class (NTS 3n – 3p).

E.g.

Provide feedback on the accuracy and clarity of the graphical representations, etc.

Note

In giving feedback on assessment tasks/items, guide learners to make the necessary corrections that will improve learning.

3. Reflection (10 minutes)

3.1 Reflect and share your views on the session (NTS 1a, 1b).

3.2 Identify a critical friend to observe your lesson in relation to PLC Session 20 and provide feedback on your lesson (NTS 1f, 3g).

3.3 Remember to:

a) provide constructive feedback to learners and record their assessment scores in the required format and document where appropriate (NTS 3l – 3n).

b) read PLC Session 21 and related Learner Material (NTS 3a).

c) bring along your Teacher Manual, PLC Handbook and learning plan on *week 21* in preparation for the next session (NTS 3a).

PLC SESSION 21: Measures of Central Tendencies and Dispersions

1. Introduction (20 minutes)

1.1 Share one thing on the lesson for *week 20* delivered last week that:

a) went well (NTS 1a, 1b and 2a-2e)

b) you found challenging (NTS 1a, 1b and 2a-2e)

1.2 Share your experience in conducting and/or recording the assessment for the previous week.

1.3 Share your observation on what a colleague did by way of application of lessons learned from the previous session for *week 20* that supported learning (NTS 2e, 2f and 3d–3j).

2. Review of Learning Plans (60 minutes)

2.1 Read the purpose, learning outcome and learning indicators for the session:

Purpose

The purpose of the session is to review the learning plan for *week 21* by aligning the learning plan with Learner Material and appropriate assessment strategies.

Learning Outcome

Review your learning plan for *week 21* considering the cross-cutting issues (NTS 2b, 2c, 2e, 2f, 3a, 3d, 3e, 3g-3k and 3o).

Learning Indicators

1. 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 for the week.
2. Discuss and develop assessment tasks and rubrics/marking scheme for the learning indicators for the week.

2.2 Review the pedagogical approaches proposed for teaching *week 21* in your learning plan, identify activities that align with these in the Learner Material. Indicate the activity(ies) in your learning plan (NTS 2e, 2f and 3d–3j).

Note

The selected activities should be included in the teacher/learner activity section of the learning plan.

2.3 Develop assessment tasks/items based on the learning indicator(s) on assessment for the week. This week's recommended mode of assessment is **practical group and computational assessment** (NTS 3k, 3p).

E.g.

Collect data on the weekly allowances (in Ghana Cedi) of 10 learners in your class and record the data in the table below

Learner	*Weekly Allowance (GH¢)*
1	
2	
3	
4	
5, etc	

i. *Calculate the mean, median, and mode of the weekly allowances.*

ii. *Calculate the range, variance, and standard deviation of the weekly allowances.*

iii. *Prepare a presentation of your findings and be ready to discuss the significance of each measure.*

Refer to Section 21 of LM and pages 93 – 105 of Year 1 Book 2 of TM for more items for practical group and computational assessment

Hint

Alert learners that they are to finalise and submit their individual projects in week 22

Note

i. *The assessment tasks/items may cover levels 1 to 4 where appropriate to ensure that assessment is differentiated for all.*

ii. *The selected activities should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities of the learning plan.*

2.4 Discuss (and agree as a subject group) how you will develop the marking scheme/rubrics for scoring the assessment task(s)/item(s) for the week's recommended assessment (NTS: 3k, 3p).

E.g.

Data collected (M_3)

Learner	*Weekly Allowance (GH¢)*
1	*10*
2	*15*
3	*20*
4	*25*
5	*30, etc.*

Measures of Central Tendencies:

$$Mean = \frac{10 + 15 + 20 + 25 + 30 + 35 + 40 + 45 + 50 + 55}{10} \qquad (M_1)$$

$$Mean = 325/10 \qquad (M_1)$$

$$Mean = 32.5, \text{ etc.} \qquad (A_2)$$

Note

i. *The marking scheme and rubrics for scoring the assessment tasks/items should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/ learner activities in the learning plan.*

ii. *Take into consideration different modes of responses provided by learners.*

iii. *Discuss how you will observe and integrate character qualities, national values and 21st century skills that align with the lesson for the week and include these in your scoring.*

2.5 Discuss how you will administer the assessment task(s)/item(s) as a subject group (NTS 3n, 3p).

E.g.

Each group computes the measures of central tendencies and of dispersion in their collected data, etc.

Refer to the Teacher Assessment Manual and Toolkit pages 46 – 49 and 49 - 51 for more guidelines on practical group and computational assessment *as an assessment strategy*

2.6 Discuss how to provide feedback, and where appropriate, record and submit the assessment scores for each learner in the class (NTS 3n – 3p).

E.g.

After the presentations, provide feedback on the accuracy of the calculations and the clarity of the presentation, etc.

Note

In giving feedback on assessment tasks/items, guide learners to make the necessary corrections that will improve learning.

3. Reflection (10 minutes)

3.1 Reflect and share your views on the session (NTS 1a, 1b).

3.2 Identify a critical friend to observe your lesson in relation to PLC Session 21 and provide feedback on your lesson (NTS 1f, 3g).

3.3 Remember to:

a) provide constructive feedback to learners and record their assessment scores in the required format and document where appropriate (NTS 3l – 3n).

b) read PLC Session 22 and related Learner Material (NTS 3a).

c) bring along your Teacher Manual, PLC Handbook and learning plan on *week 22* in preparation for the next session (NTS 3a).

PLC SESSION 22: Multiplication Rule, Permutation and Combination

1. Introduction (20 minutes)

1.1 Share one thing on the lesson for *week 21* delivered last week that:

a) went well (NTS 1a, 1b and 2a-2e)

b) you found challenging (NTS 1a, 1b and 2a-2e)

1.2 Share your experience in conducting and/or recording the assessment for the previous week.

1.3 Share your observation on what a colleague did by way of application of lessons learned from the previous session for *week 21* that supported learning (NTS 2e, 2f and 3d–3j).

2. Review of Learning Plans (60 minutes)

2.1 Read the purpose, learning outcome and learning indicators for the session:

Purpose

The purpose of the session is to review the learning plan for *week 22* by aligning the learning plan with Learner Material and appropriate assessment strategies.

Learning Outcome

Review your learning plan for *week 22* considering the cross-cutting issues (NTS 2b, 2c, 2e, 2f, 3a, 3d, 3e, 3g-3k and 3o).

Learning Indicators

1. 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 for the week.
2. Discuss and develop assessment tasks and rubrics/marking scheme for the learning indicators for the week.

2.2 Review the pedagogical approaches proposed for teaching *week 22* in your learning plan, identify activities that align with these in the Learner Material. Indicate the activity(ies) in your learning plan (NTS 2e, 2f and 3d–3j).

Note

The selected activities should be included in the teacher/learner activity section of the learning plan.

2.3 Develop assessment tasks/items based on the learning indicator(s) on assessment for the week. This week's recommended mode of assessment is **computational tasks** (NTS: 3k, 3p).

E.g.

a) *In how many ways can the letters of the word **SWALLOW** be arranged if*

i. *there are no restrictions*

ii. *the L's must be together*

iii. *the L's must not be together*

b) *There are three (3) bus lines between towns A and B and three (3) bus lines between towns B and C.*

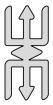
i. *In how many ways can a person travel from town A to town C by way of town B?*

ii. *In how many ways can a person travel by bus on a return trip by bus from town A to town C by way of town B? etc.*

Refer to Section 22 of LM and pages 107 – 115 of Year 1 Book 2 of TM for more assessment keys for computational tasks

Hint

Schedule a period for learners to submit their individual projects this week



Note

i. *The assessment tasks/items may cover levels 1 to 4 where appropriate to ensure that assessment is differentiated for all.*

ii. *The selected activities should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities of the learning plan.*

2.4 Discuss (and agree as a subject group) how you will develop the marking scheme/rubrics for scoring the assessment task(s)/item(s) for the week's recommended assessment (NTS 3k, 3p).

E.g.

b)

i. *The number of ways to travel from town A to town B:* 3 *ways*

The number of ways to travel from town B to town C: 3 *ways*

Total ways $= 3 \times 3 = 9 \qquad (A_1)$

ii. The number of ways to travel from town A to town C: 9 *ways*

The number of ways to return from town C to town A: 9 *ways*

Total ways for a round-trip $= 9 \times 9 = 81$ (A_2)

iii. *Total ways from A to C* $= 3 \times 3 = 9$

On the return trip:

Only 2 bus lines are available for the return trip for each segment since one bus line is used in the forward trip.

Ways to return from C to B: 2 *ways*

Ways to return from B to A: 2 *ways*

Total ways for the return trip $= 2 \times 2 = 4$

Total ways for a round trip without reusing lines $= 9 \times 4 = 36$ (A_2)

Note

i. *The marking scheme and rubrics for scoring the assessment tasks/items should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities in the learning plan.*

ii. *Take into consideration different modes of responses provided by learners.*

iii. *Discuss how you will observe and integrate character qualities, national values and 21st century skills that align with the lesson for the week and include these in your scoring.*

2.5 Discuss how you will administer the assessment task(s)/item(s) as a subject group (NTS 3n, 3p).

E.g.

Inform learners to use their Add Maths Class Exercise books and any other material they may need (Calculators, etc) for the class exercise, etc.

Refer to the Teacher Assessment Manual and Toolkit pages 49 – 51 for more guidelines on computational tasks as an assessment strategy

2.6 Discuss how to provide feedback, and where appropriate, record and submit the assessment scores for each learner in the class (NTS 3n – 3p).

E.g.

Review common errors and misconceptions in a follow-up class discussion, etc.

Refer to the Teacher Assessment Manual and Toolkit pages 49 – 51 for more guidelines on computational tasks as an assessment strategy

Note

In giving feedback on assessment tasks/items, guide learners to make the necessary corrections that will improve learning.

3. Reflection (10 minutes)

3.1 Reflect and share your views on the session (NTS 1a, 1b).

3.2 Identify a critical friend to observe your lesson in relation to PLC Session 22 and provide feedback on your lesson (NTS 1f, 3g).

3.3 Remember to:

a) provide constructive feedback to learners and record their assessment scores in the required format and document where appropriate (NTS 3l – 3n).

b) read PLC Session 23 and related Learner Material (NTS 3a).

c) bring along your Teacher Manual, PLC Handbook and learning plan on *week 23* in preparation for the next session (NTS 3a).

PLC SESSION 23: Application of Permutation and Combination

1. Introduction (20 minutes)

1.1 Share one thing on the lesson for *week 22* delivered last week that:

a) went well (NTS 1a, 1b and 2a-2e)

b) you found challenging (NTS 1a, 1b and 2a-2e)

1.2 Share your experience in conducting and/or recording the assessment for the previous week.

1.3 Share your observation on what a colleague did by way of application of lessons learned from the previous session for *week 22* that supported learning (NTS 2e, 2f and 3d–3j).

2. Review of Learning Plans (60 minutes)

2.1 Read the purpose, learning outcome and learning indicators for the session:

Purpose

The purpose of the session is to review the learning plan for *week 23* by aligning the learning plan with Learner Material and appropriate assessment strategies.

Learning Outcome

Review your learning plan for *week 23* considering the cross-cutting issues (NTS 2b, 2c, 2e, 2f, 3a, 3d, 3e, 3g-3k and 3o).

Learning Indicators

1. 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 for the week.
2. Discuss and develop assessment tasks and rubrics/marking scheme for the learning indicators for the week.

2.2 Review the pedagogical approaches proposed for teaching *week 23* in your learning plan, identify activities that align with these in the Learner Material. Indicate the activity(ies) in your learning plan (NTS 2e, 2f and 3d–3j).

Note

The selected activities should be included in the teacher/learner activity section of the learning plan.

2.3 Develop assessment tasks/items based on the learning indicator(s) on assessment for the week. This week's recommended mode of assessment is **group discussion** (NTS 3k, 3p).

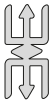
E.g.

a) *Discuss the difference between permutations and combinations using the example of arranging learners in a line versus selecting learners for a team*

b) *In a classroom, if the teacher wants to randomly select 3 learners from a class of 10 to answer questions, how many different groups of learners can be selected?*

c) *If learners are playing "Pilolo" and there are 4 hiding spots and 6 players, how many different ways can the players hide if each spot can only have one player? Etc.*

Refer to Section 23 of LM and pages 116 – 119 of Year 1 Book 2 of TM for more assessment keys for class group discussions



Note

i. *The assessment tasks/items may cover levels 1 to 4 where appropriate to ensure that assessment is differentiated for all.*

ii. *The selected activities should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities of the learning plan.*

2.4 Discuss (and agree as a subject group) how you will develop the marking scheme/rubrics for scoring the assessment task(s)/item(s) for the week's recommended assessment (NTS 3k, 3p).

E.g.

Permutations and combinations are both methods for counting the ways to select items from a group, but they differ based on whether order matters. (M_1)

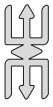
Permutations: Order Matters (M_1)

Example: Arranging learners in a line (M_1)

If you have 3 learners (A, B, and C), the arrangements ABC, ACB, BAC, BCA, CAB, and CBA are all considered different (M_1)

Formula: $P(n,k) = \frac{n!}{(n-k!)}$ (M_1)

Use permutations when the sequence or order is important, etc. (A_2)



Note

i. *The marking scheme and rubrics for scoring the assessment tasks/items should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities in the learning plan.*

ii. *Take into consideration different modes of responses provided by learners.*

iii. *Discuss how you will observe and integrate character qualities, national values and 21st century skills that align with the lesson for the week and include these in your scoring.*

2.5 Discuss how you will administer the assessment task(s)/item(s) as a subject group (NTS: 3n, 3p).

E.g.

a) *Divide the class into small groups and assign the questions*

b) *Facilitate the discussion, ensuring all learners participate and understand the concepts, etc.*

Refer to the Teacher Assessment Manual and Toolkit pages 80 – 83 for more guidelines on group discussion class exercise as an assessment strategy

2.6 Discuss how to provide feedback, and where appropriate, record and submit the assessment scores for each learner in the class (NTS 3n – 3p).

E.g.

Provide feedback during the group presentations, highlighting strong points and areas for improvement, etc.

Note

In giving feedback on assessment tasks/items, guide learners to make the necessary corrections that will improve learning.

3. Reflection (10 minutes)

3.1 Reflect and share your views on the session (NTS 1a, 1b).

3.2 Identify a critical friend to observe your lesson in relation to PLC Session 23 and provide feedback on your lesson (NTS 1f, 3g).

3.3 Remember to:

a) provide constructive feedback to learners and record their assessment scores in the required format and document where appropriate (NTS 3l – 3n).

b) read PLC Session 24 and related Learner Material (NTS 3a).

c) bring along your Teacher Manual, PLC Handbook and learning plan on *week 24* in preparation for the next session (NTS 3a).

PLC SESSION 24: Preparing for End of Semester Examination

1. Introduction (20 minutes)

1.1 Share one thing on the lesson for *week 23* delivered last week that:

a) went well (NTS 1a, 1b and 2a-2e)

b) you found challenging (NTS 1a, 1b and 2a-2e)

1.2 Share your experience in conducting and/or recording the assessment for the previous week.

1.3 Share your observation on what a colleague did by way of application of lessons learned from the previous session for *week 23* that supported learning (NTS 2e, 2f and 3d–3j).

2. Review of Learning Plans (60 minutes)

2.1 Read the purpose, learning outcome and learning indicators for the session:

Purpose

The purpose of the session is to review the learning plan for *week 24 lessons and end of semester examination* by aligning the learning plan with Learner Material and appropriate assessment strategies.

Learning Outcome

Review your learning plan for *week 24 and prepare for end of semester examination* considering the cross-cutting issues (NTS 2b, 2c, 2e, 2f, 3a, 3d, 3e, 3g-3k and 3o).

Learning Indicators

1. 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 for the week.
2. Discuss and develop assessment tasks and rubrics/marking scheme for the learning indicators for the week.

2.2 Review the pedagogical approaches proposed for teaching *week 24* in your learning plan, identify activities that align with these in the Learner Material. Indicate the activity(ies) in your learning plan (NTS 2e, 2f, 3d–3j).

Note

The selected activities should be included in the teacher/learner activity section of the learning plan.

2.3 Develop assessment tasks/items based on the learning indicator(s) on assessment for the week. This week's recommended mode of assessment is **end of semester examination** (NTS 3k, 3p).

E.g.

Structure:

a) *Cover content from weeks 13 – 24*

b) *Take into consideration DoK levels*

i. *Section A- Multiple Choice (30 questions)*

ii. *Section B- (5 fill-in questions and short answers, all to be answered)*

iii. *Section C- Real-life Application (4 questions, 2 to be selected).*

c) *Time: 1 hour, 30 minutes to 2 hours.*

d) *Total Score: 100 marks to be scaled down to 70 marks for submission.*

e) *Table of specifications (See **Appendix D** in PLC Session 12 for sample table of specification)*

a) ***Section A: Multiple Choice Questions***

i. The equation of a line that passes through the point $(1, 2)$ *and has a slope of* 3 *is …*

A. $y = 3x + 2.$

B. $y = 3x + 1.$

C. $y = 3x - 1.$

D. $y = 3x - 2.$

ii. If $\sin\theta = \frac{3}{5}$, *what is* $\cos\theta$ *when* θ *is in the first quadrant?*

A. $\frac{4}{5}$

B. $\frac{3}{5}$

C. $\frac{1}{5}$

D. $\frac{2}{5}$

b) ***Section B: Short Answer Questions***

i. Write the equation of the line parallel to $y = 2x + 3$ *that passes through the point* $(4, 1)$

ii. Find the limit: $lim_{x\to 2}\left(3x^2 - 4\right)$

c) ***Section C: Real-life Application Question***

A projectile is launched from the ground with an initial velocity of $20ms^{-1}$ *at an angle of* 45° *to the horizontal. The height h of the projectile at time t is given by the equation* $h(t) = 20t\ sin(45^{\circ}) - 1\frac{}{2}gt^2$, *where g is the acceleration due to gravity* $9.8ms^{-2}$.

i. *Determine the time t when the projectile reaches its maximum height.*

ii. *Calculate the maximum height reached by the projectile.*

iii. *How long is the projectile in the air before it hits the ground?*

Note

i. *The assessment tasks/items may cover levels 1 to 4 where appropriate to ensure that assessment is differentiated for all.*

ii. *The selected activities should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities of the learning plan.*

2.4 Discuss (and agree as a subject group) how you will develop the marking scheme/rubrics for scoring the assessment task(s)/item(s) for the week's recommended assessment (NTS: 3k, 3p).

E.g.

Multiple Choice Questions: $(\boldsymbol{A}_1)$ *each (total 40 marks)*

Fill-in Questions: $(\boldsymbol{A}_2)$ *each (total 20 marks)*

Real-life application questions: $(\boldsymbol{A}_{15})$ *each (total 30 marks)*

a) *Multiple Choice Questions* $((\boldsymbol{A}_1)$ *each)*

i. *C*

ii. *A*

b) *Short Answer Questions* $((\boldsymbol{A}_2)$ *each)*

i. *The slope of the given line is 2 (same as the parallel line).*

Using point-slope form: $y - 1 = 2(x - 4)$

Simplified: $y = 2x - 7$

ii. $lim_{x \to 2}\left(3x^2 - 4\right)$

Substitute $x = 2$: $3(2)^2 - 4 = 12 - 4 = 8$

Note

i. *The marking scheme and rubrics for scoring the assessment tasks/items should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities in the learning plan.*

ii. *Take into consideration different modes of responses provided by learners.*

iii. *Discuss how you will observe and integrate character qualities, national values and 21st century skills that align with the lesson for the week and include these in your scoring.*

2.5 Discuss how you will administer the assessment task(s)/item(s) as a subject group (NTS 3n, 3p).

E.g.

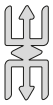
During the Examination: Monitor the exam to ensure no malpractices occur, etc.

Refer to the Teacher Assessment Manual and Toolkit pages 83 – 85 and 94 – 97 for more guidelines on examination assessment strategies

2.6 Discuss how to provide feedback, and where appropriate, record and submit the assessment scores for each learner in the class (NTS 3n – 3p).

E.g.

Provide detailed feedback on each learner's performance, highlighting strengths and areas for improvement, etc.



Note

In giving feedback on assessment tasks/items, guide learners to make the necessary corrections that will improve learning.

3. Reflection (10 minutes)

3.1 Reflect and share your views on the session (NTS 1a, 1b).

3.2 Identify a critical friend to observe your lesson in relation to PLC Session 24 and provide feedback on your lesson (NTS 1f, 3g).

3.3 Remember to provide constructive feedback to learners and record their assessment scores in the required format and document where appropriate (NTS 3l – 3n).

Appendix 1: Structure of the Senior High School Internal Assessment and Transcript System

Introduction

This document provides details on the structure of the internal assessment and transcript system for effective implementation of the standards-based curriculum at the SHS level. The structure of the internal assessment involves a comprehensive and systematic approach to evaluating learners' performance and learning progress. The frequency of assessment is carefully planned to ensure regular and consistent monitoring, typically occurring at multiple points throughout the academic term. It is crucial to capture learner assessment scores promptly and accurately for the transcript. Therefore, guidance has been provided to ensure that each assessment is recorded in a timely manner. Effective management of the transcript system requires meticulous organisation and updated technology to handle and store data efficiently. Capacity building and training on effective internal assessment are essential for teachers, heads, assessments officers, providing them with the skills and knowledge to conduct assessments that are fair, ethical and align with learning outcomes for valid results. Engaging learners in internal school assessments fosters a sense of responsibility and self-awareness, encouraging them to take an active role in their educational journey through prompt and effective feedback.

A. Structure

Formative Assessment

This assessment may be conducted during a class period, after completing or during a practical activity, or after a teacher completes a sub-strand, strand, or a learning indicator(s). Distinct types of assessment tools can be used for Formative Assessment. These include:

- Observation during in-class activities
- Standard homework exercise for class discussion
- Question and answer sessions (formal and informal)
- Quizzes (e.g. class pop-ups)
- In-class activities and presentations (individuals and groups)
- Project work (individuals and groups)
- Practical assessments
- Field trips/Presentation of Reports

- Class assignments/Self/Peer Assessments
- Class tests
- Portfolios
- Performance assessments (roleplay, demonstration oral/aural)

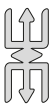
Summative Assessment

Summative Assessment is conducted at the end of the learning sequence (end of semester). It records the learners' overall achievement/performance at the end of the learning sequence. The type of tools used may include:

- Mid-Semester examination
- End of Semester examination
- Project work/Portfolio/Research/Practical assessments

TABLE 1: *Proposed Structure, assessment activities and marks distribution*

	Mode of Assessment	Contribution/ Weight	Submission per Year
1	Class Assessments (e.g., Classwork, Quizzes, Homework, Debate, Presentation, Drama & Roleplay, Case Study)	10 %	2
2	Mid-Semester Examination (Assessment/Project/ Research)	10%	2
3	Practical or Portfolio or Performance Assessment (Individual)	10 %	1
4	Group Projects, Research, or Case Studies, Practical/Lab work, Workshops, Performances, Presentations (Out of Class)	10 %	1
5	Individual Projects, Research, or Case Studies, Practical/Lab work, Workshops, Performances, Presentations (Out of Class)	20%	1
6	Supervised Individual Semester Assessment/ Project/Research/End of Semester Exam	40 %	2
	Total	100 %	9



Note

Character Qualities/National, Values, 21st Century Skills: Teachers should make a conscious effort to observe these soft skills as learners go about their activities in the class, take notes, and award marks appropriately. Assessment of these skills should be deliberately embedded in the various modes of assessment outlined in the table above.

B. Frequency of Assessment

Table 2 provides a suggested schedule of internal assessment for SHS. It is important to note that whilst assessments should comply with the specific learning outcomes of the subject area, they should cover the 21st century skills and competencies, GESI, SEL and National values as espoused in the TAMT using diversity in assessment modes as suggested in Table 1. Teachers may increase the frequency of assessments using other assessment strategies. The schedules presented should serve as **milestones** for schools to comply with.

Table 2: *Suggested schedules of internal assessment for SHS*

	Semester One													
SN	**Modes of Assessment**	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**	**13**	**14**
1	Individual Class Assessment(s)														
2	Practical or Portfolio** or Performance Assessments (Individual)														
3	Group Projects, Research or Case Studies (out of class)														
4	Supervised Individual Semester Assessment														

	Semester Two													
SN	**Modes of Assessment**	**15**	**16**	**17**	**18**	**19**	**20**	**21**	**22**	**23**	**24**	**25**	**26**	**27**	**28**
5	Individual Class Assessment(s)														
6	Group work or Exercises														
7	Practical or Portfolio or Performance Assessments (Individual)														
8	Individual Project work or Research or Case Study														
9	Supervised Individual Semester Assessment														

Notes: How and when to capture learner assessment scores for the Transcript.

1. **Individual Class Assessment:** This can include individual classwork. This assessment can begin before week 4, but the evaluation scores should be ready by weeks 4 and 18.
2. **Individual Practical/Performance Assessment:** This form of assessment should include orientation of learners at the beginning to provide enough information concerning the deliverables, progress review, and feedback processes. The

assessment score should be ready by the end of weeks 5 through 10, and 15 through 22.

3. **Group Projects/ Research/Case Studies:** Learners should be grouped to work on a common project, case study or research-based problem. The learners should be given orientation concerning the rubrics and ethical or professional conduct concerning the assessment. The problems, projects, research assignments, or case studies should be related to the learners' environment. The assessment score should be ready by week 10.
4. **Supervised Individual Semester Assessment:** This may be a written examination or project work. It must be noted that regardless of the mode of assessment, there should be supervision throughout. This assessment should be completed by weeks 13/14 and 27/28.
5. **Individual Project Work/Research/Case Study:** This can include mini-design assignments, investigative or case studies or research-based assignments. The assessment score should be ready by week 24.

Assessments should cover the scope of the 21st century skills and competencies, GESI, SEL and national values espoused in the TAMT. Table 3 gives examples of the scope. Refer to the TAMT for a comprehensive list of the scope.

Table 3: *Examples of 21st Century skills and competencies, GESI, SEL and National Values to be covered by scope of assessment*

21st Century Skills & Competencies	GESI & SEL	National Values
• Critical Thinking and Problem Solving • Creativity • Innovation • Collaboration • Communication • Global and Local Citizenship • Learning for life • Leadership • Analytic skills • Digital Literacy	• Gender Equality and Social Inclusion • Self-Awareness • Self-Management • Social Awareness • Relationship Skills • Responsible Decision Making • Tolerance	• Respect • Truth and Integrity • Tolerance • Respect • Equity • Communality • Appreciation • Stewardship • Time Management

Table 4 shows the recommended assessment strategies for the scope in Table 3.

Table 4: *Recommended assessment strategies for 21st century skills and competencies*

21st Century Skills & Competencies	Assessment Strategies
Critical Thinking, Problem Solving, Analytical skills	• Debates • Analysis of Case Studies based on learners' environment. • Research & Project work. • Objective and Essay type questions/items
Creativity and Innovation	• Individual and group projects • Analysis of Case Studies based on learners' environment. • Design & product creation to solve societal problems
Communication and Collaboration	• Debates • Group projects. • Presentations • Drama & Role play
Global and Local Citizenship	• Research & Project work. • Analysis of Case Studies based on cultural and global issues
Leadership and learning for life	• Individual and Group projects • Presentations
Digital Literacy	• Research & Project work. • Presentations using ICT tools. • Individual and group projects

The TAMT details the rubrics for the assessment strategies suggested in Table 3. A combination of the assessment strategies could provide diversity and ensure that the assessment scope is effectively covered during formative and summative assessments. It is important to note that the GESI, SEL and National values espoused in the TAMT should be incorporated into the assessment strategies.

C. Learner Involvement

What should learners contribute?

Learners' involvement in the internal assessment processes in schools offers valuable insights into how the learner perceives and experiences of the assessment process. This engagement process grants learners the opportunity to explain areas of confusion, frustration, or unfairness, and these help teachers refine their assessment approaches.

Again, learner involvement fosters communication between teachers and students. This can help clarify expectations, address concerns, and create a more positive learning environment.

When to involve learners

As part of the initial needs assessment for teacher training, gather learner input on areas needing improvement in the Internal Assessment Score (IAS) process. This helps to incorporate learner feedback in developing appropriate teacher training materials.

How should learners be involved?

Teachers should organise focus group sessions, to gather learner feedback on past assessments. This feedback can be used to inform future training sessions for teachers. e.g., Mock assessments and Co-creation of rubric.

Guide learners on the learning outcome expected. Involve them in the development of the assessment rubrics, and checklists to evaluate their progress and identify areas for improvement. Learners would demonstrate respect for diverse perspectives and the ability to work cooperatively with others.

Reflection

Integrate reflective activities such as journaling or discussions where students can analyse their learning experiences and identify areas for growth.

By actively involving teachers and learners in the SBA process, we create a dynamic learning environment. This empowers students to take ownership of their learning journey while equipping teachers with the tools to effectively guide and assess student progress.

Transparency and Setting Goals

At the beginning of a lesson, communicate clearly, the assessment criteria to the learners using appropriate language and structure. Present the information in an organised and coherent manner.

Self-assessment

Incorporate opportunities for self-assessment throughout the learning process. Learners can use rubrics or checklists to evaluate their progress and identify areas for improvement. Learners would demonstrate respect for diverse perspectives and the ability to work cooperatively with others.

Goal Setting

Encourage learners to set achievable learning goals aligned with the assessment criteria. This empowers them to take ownership of their learning journey.

Peer Assessment

Strategically incorporate peer assessment activities where students evaluate each other's work based on established criteria. This fosters critical thinking and collaboration skills.

Student-led presentations or projects

Provide opportunities for students to display their learning through presentations or projects. This allows them to develop communication and presentation skills.

By actively involving teachers and learners in the SBA process, we create a dynamic learning environment. This empowers students to take ownership of their learning journey while equipping teachers with the tools to effectively guide and assess student progress.

D. Feedback Mechanism

A feedback mechanism is a systematic approach for providing learners with information about their performance. This information helps them understand their strengths, identify areas for improvement, and achieve their learning goals. In the multi-subject environment of senior high school, timely and constructive feedback is crucial.

Timely means that feedback is provided soon enough for learners to act upon it after each assessment. Here are suggested general timelines to consider for the following types of assessments:

Type of Assessment	Expected Timeline for Feedback
Individual class assessments (mostly written)	1–3 days
Group assignments	1 week, with interim check-ins for assignments over extended periods of time.
Project work/Semester paper/End of Semester examinations	After key milestones and a final comprehensive review upon completion

For feedback to be constructive, it should focus on the task and not the learner's personality. It should be specific, actionable, and delivered in a way that motivates improvement.

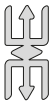
In providing feedback, use the sandwich method (CCC), which starts with a positive aspect of the work (***compliment***), followed by constructive criticism (***correction***), and concludes with another positive note (***compliment***). To set the stage for effective feedback, clearly communicate the learning objectives, expectations, and scoring rubrics before any assessment.

Learners must maintain an "assessment portfolio" where they compile all their assignments, reports, and feedback. Parents and other stakeholders review this portfolio during open days, parent-teacher meetings, or monitoring activities.

Feedback can be delivered using different methods after the assessment is done and marked. The choice of delivery should be guided by best practices and constraints that may exist, such as available time and class sizes. The following are some delivery methods to consider:

- **Whole Class Feedback:** The teacher facilitates a discussion about the assessment with all the learners. During the discussion, the teacher should highlight common strengths and weaknesses, provide clarifications, and share best practices.

- **Individual Feedback:** The teacher gives learners personalised (one-on-one) guidance or written comments. Provide ***prompts to guide learners*** to self-correct their wrong responses.



Note

Provide checklists or rubrics that learners can use to assess their own work before submitting it. This helps them independently identify errors and make the necessary adjustments.

- **Group Feedback:** The teacher groups learners facing similar challenges for targeted instruction and provides them with feedback.
- **Peer Review Feedback:** The teacher allows learners to learn from one another by giving constructive feedback to peers.
- **Self-Reflection:** After receiving feedback, the teacher should encourage learners to analyse their work, identify areas for improvement, and set goals using rubrics as a guide.
- **External Feedback:** In specific cases, the teacher should consider feedback from subject experts, teachers from other institutions, parents, and other stakeholders.

Regardless of the chosen feedback mechanism, note that self-reflection is essential. This allows learners to internalise feedback, set personal targets for improvement, and develop a growth mindset. Following the feedback, teachers are to provide opportunities for learners to correct mistakes through targeted exercises and reassessments.

By implementing these feedback strategies, teachers can empower senior high school learners to become active participants in their learning journey.

E. Transcript System

Effective data management is crucial for informed decision-making in today's dynamic educational landscape. The computerised transcript system achieves this purpose by offering second-cycle institutions with a comprehensive record of learner performance. The transcript system is a centralised repository for learner information. It gathers key details such as learner profiles, semester information, subjects taken with their respective scores (including continuous assessments and end-of-semester exams), credits, grades, semester, and overall Grade Point Averages (GPAs). Additionally, a dedicated section captures brief descriptions of learners' character qualities at the end of each semester.

There should be at least three individual class assessments, at least one group work and at least one project work.

Appendix 2: Excerpts from The Teacher Assessment Manual and Toolkit

A. Principles of Effective Assessment

As a process of determining the nature and extent of learning and development among learners, it is important to ensure that the assessment process meets the following principles:

1. Validity
2. Reliability
3. Fairness and ethics
4. Transparency
5. Inclusivity
6. Practicability
7. Assessment utility

Developing a valid assessment (Validity of Assessment Results)

To ensure that assessment scores or results are useful and interpreted appropriately, the teacher should:

i. Clearly state the purpose of the assessment (e.g., what the test will be used for).
ii. Create a learning and assessment plan (i.e., table of test specification tots)
iii. Write assessment items or tasks that measure important learning outcomes of the curriculum (e.g., Skills, competencies, collaborative efforts, and lifelong learning).
iv. Clearly define the performance criteria or standards/schemes/rubrics (i.e., define the specific knowledge, skill or behaviour that learners should demonstrate
v. Score or grade assessment task based on the performance criteria to avoid biases, stereotyping, among others.
vi. Ensure that the content of the assessment aligns closely with the defined criteria (thus, the assessment questions, tasks, or activities should directly measure what they want to assess).
vii. Interpret the assessment results based on the purpose and the performance criteria.

Reliability (Consistency of Assessment Results)

In assessment, consistent standards of teacher assessment and fairness are important goals to aim for. The 'connoisseur' approach to assessment; that is, 'I know it when I see it, but I can't put it into words' is not acceptable. Reliable results must be dependable for decision making.

For an Assessment result to be reliable, the teacher should:

i. Clearly identify the learning outcomes to be assessed.

ii. Give learners work or completed assessment tasks and activities to other teacher(s) to review.

iii. Use multiple assessment strategies to measure the same or similar learning outcomes (e.g., giving the tasks or items of a class exercise as another class exercise or homework or group project) or using different item formats to assess learning outcomes.

iv. Prepare scoring rubrics or marking schemes with specific weighting (marks)

v. allocated to the items and use it consistently.

vi. Give rubrics of tasks/activities in the case of performance or practical assessment ahead of time.

vii. Ensure that the load or the length of the tasks are appropriate to the level of the learner (e.g., 25 minutes for 20 items; a project for a week or the term/ semester).

viii. Administer assessment in a conducive environment that minimise disruption (e.g., noise, lightening, ventilation, among others) and devoid of any cheating.

Fairness and Ethics

Assessment strategies should give learners equitable opportunity to demonstrate what they know and can do taking into consideration their ability, learning styles, gender, special educational needs (SEN), among others. The teacher should:

i. Ensure that the assessment tasks/activities align with the learning outcomes and content covered in class.

ii. Use different forms of assessment tasks to assess learning outcomes (e.g., oral assessment, class exercises, class tests, homework, assignments, written tests, projects, and practical demonstrations as well as the end-of-term/ semester assessment).

iii. Provide clear and detailed instructions to learners about the assessment's format, expectations, and criteria for evaluation.

iv. Identify learners with SEN and make the necessary adaptation by providing extra time, alternative formats and other necessary accommodations.

v. Avoid using culturally biased or discriminatory content, unfamiliar words, questioning, or examples in assessments.

vi. Communicate the assessment plan in advance. For example, date, time, location, and any other relevant logistics.

Transparency

Transparency in assessment refers to making the assessment process and criteria clear and understandable to learners. The teacher should:

i. Make learners aware of the demand of the assessment tasks.
ii. Share performance criteria and indicate what will constitute the pass mark.
iii. Readily share assessment results with the appropriate stakeholders (learners, parents/guidance, teachers).
iv. Provide opportunity for leaners to seek review and redress.
v. Share the learning outcomes the assessment is designed to measure with learners.
vi. be ready to share assessment criteria or rubrics when the need arises.

Inclusivity

Inclusivity in assessment will allow teachers to create assessment practices that are fair and accessible to ALL learners (GESI, SEL and SEN).

The teacher should:

i. Familiarise with the section of inclusivity on the national pre-tertiary learning and assessment framework (NPLAF, page 32).
ii. Select assessment strategies that are appropriate for different learning needs.
iii. Assign workload in connection with the developmental and learning needs of learners.
iv. Work with special education experts in the school system to adapt and accommodate assessment to the needs of all learners (i.e., extra time, alternative formats, or other necessary accommodations should be available).
v. Make use of different formats (braille, oral translation, text-to-speech, ai, sign language interpretation and other assistive technology forms).
vi. Develop rubrics that are inclusive (taking into consideration grammar, vocabulary, handwriting, presentation of ideas).

Practicability

For assessment strategies or processes to be feasible, convenient, efficient and successful. The teacher should:

i. Ensure that appropriate and adequate assessment materials, resources and security are available.
ii. Consider appropriate assessment format to match the learning outcome(s), class size, age and ability levels.
iii. Consider the time available to develop, administer, score and give constructive feedback.

Assessment Utility (utilisation and benefits)

To enhance the usefulness and practical value of assessment tasks/activities, the teacher should:

i. Clearly state the intended use of the assessment results.
ii. Identify the essential learning outcome(s) to be covered in the assessment.
iii. Construct assessment tasks/activities that are well aligned to real-life situations.
iv. Select and allocate the appropriate resources for the assessment activities.
v. Provide constructive feedback to learners on their performances.
vi. Provide credible information that are useful to learners and other stakeholders (teachers, parent/guardians).
vii. Weigh and indicate the benefits and the cost of the assessment strategies
viii. to be used.
ix. Justify the selection of a particular assessment format over the others (objective-type, essay, project, portfolio, demonstration, etc.).

B. Ethical considerations in Assessment

1. Designing and Developing the Assessment

i. Identify the specific learning outcome(s) to be assessed.
ii. State clearly the purpose of the assessment(s).
iii. Specify the content area (i.e. Content Standards and/or Indicators) to be assessed and align them to the learning outcome(s).
iv. Select appropriate format or strategy that should be in line with the learner's characteristics, learning outcome(s) and resources.
v. Design different versions (differentiated assessment) of the assessment including the use of alternative strategies of assessment.
vi. Avoid biassed assessment tasks (e.g., task favouring a group of learners such as males among others).
vii. Avoid using unfamiliar language and materials in writing the assessment tasks.
viii. Adapt different versions to suit the needs of all learners. For example, make provision for learners with visual impairment by enlarging the font sizes of the assessment instrument and providing braille versions.
ix. Develop the marking scheme/ scoring rubrics when developing the assessment task.
x. Include mark allocation on the individual questions that are given when necessary.
xi. Ensure that the assessment task is stored securely.
xii. Provide clear direction for administration of the assessments.
xiii. Consider logistics.

2. Administering the Assessment

i. Communicate the assessment nature/structure/format, time, content coverage and location of the assessment tasks clearly to learners.

ii. Ensure the setting is suitable and conducive for the assessment (e.g., lighting, ventilation, less noise among others).

iii. For learners with SEN establish rapport and communicate in simple and clear language. Provide alternative settings for learners with SEN to meet their specific needs. (e.g., providing individualised accommodations such as writing the assessment in a separate room).

iv. Provide needed logistics (e.g., answer booklets, first aid, pens and pencils among others) for the assessment task.

v. For learners with SEN make room for the use of translators, assistive devices such as hearing aids, braille, computers, recorders, and other technologies that are relevant to their needs.

vi. Administer assessments within appropriate time limits to enhance validity and to minimise the chance for cheating. Provide additional time for learners with SEN.

vii. For learners with SEN, make room for varied modes such as oral, written, the use of a computer (text-to-speech and speech-to-text) among others.

viii. Avoid anxiety, intimidating language, and unnecessary announcements.

ix. Provide learners with anonymous identifiers and codes instead of names to enhance reliability and validity.

x. In the case of practical/performance assessments, share rubrics and marking schemes with learners.

xi. Ensure controlled and supervised distribution of assessment materials to avoid leaks or unauthorised sharing.

3. Scoring the Assessment

i. Consistently make use of the marking scheme/ scoring rubrics.

ii. Ensure multiple ratings or scoring/grading are done where necessary (e.g., for essay-type questions, practical/performance assessment).

iii. Focus on the content (i.e., what is being assessed) instead of handwriting, spelling, punctuations, concord, and vocabulary when scoring.

iv. For learners with SEN considerations should be made for vocabulary, spelling, and grammar especially in the English language.

v. Provide opportunity for remarking, review, or redress where necessary.

vi. Record the actual scores/grades of learners as a reflection of their performance. Do not add or subtract marks based on personal influences.

vii. Keep assessment results of the learners safe (either manually or digitally).

viii. Consider the use of professional scorers, judges, or raters in the case of External Assessments.

4. Reporting and Feedback in Assessment

i. Ensure that the learner is aware of those who will be receiving the report.

ii. Communicate results to authorised persons such as parents/guardians and other teachers.

iii. Seek permission (informed consent) from the learner or parent/guardian if a third party may be involved.

iv. Ensure that the true performance of the learner is reported (do not manipulate or distort the results).

v. Present assessment results without stereotyping or biases.

vi. Use language and terminology that is respectful and GESI responsive when reporting reports.

vii. Provide clear and meaningful interpretation of the assessment results.

viii. Adhere to legal requirements, ethical guidelines and institutional policies governing the reporting of assessment results.

5. Feedback

i. Provide constructive feedback timely and promptly.

ii. Emphasise the learner's strengths and opportunities for improvement rather than focusing solely on weaknesses.

iii. Ensure that the feedback given to the learner, parents/guardians and other teachers reflects the performance of the learner.

iv. Consider and adjust the mode of providing feedback to suit the needs of learners (consider GESI and SEN issues).

v. Provide feedback based on the assessment criteria and not on personal influence.

vi. Avoid displaying and announcing learners' performance unofficially.

vii. Create opportunities for learners to readily access their results through creation of portals, portfolios and files for individual learners and other stakeholders.

viii. Ensure collaborative assessment by sharing and taking the learner's information.

ix. Create opportunities for learners to reflect on their own assessment results and learning.

x. Give written comments to learners in formative assessment to help the learner track their errors and make the necessary corrections.

6. Interpreting and Using the Assessment Results

i. Provide clear and detailed criteria including criterion/pass mark for interpreting the assessment results.

ii. Avoid biases in interpreting the assessment results. Ensure result interpretation is not influenced by gender, religion, ethnicity, personal liking among others.

iii. Use simple and clear language in the interpretation of the assessment results.

iv. Interpret assessment results based on evidence and sound assessment practices.

v. Ensure that the interpretation of the results accurately reflects the learner's ability, skills, competencies and knowledge.

vi. Ensure the learner is aware of the assessment process and the consequence of the results.

vii. Ensure assessment results are used for their INTENDED PURPOSE, aligning with the learning outcomes.

viii. Seek the consent of the learner and parents/guardians before using the assessment results for any purpose.

ix. Ensure that assessment informs the teaching and learning process in a fair and unbiased manner and provide remediation where necessary.

x. Ensure that assessment results are confidentially kept and only shared with relevant stakeholders, such as the learner, parents/guardians, and school administrators.

xi. Avoid using assessment results to label (name-calling), stereotype and discriminate among learners.

xii. Ensure that results are stored and used in a secured manner.

xiii. Avoid discussing the learner's results and performance unofficially with others (e.g., with other teachers, staff, learners and among others).

C. Differentiated Assessment

Differentiated assessment adapts strategies to diverse learning needs, strengths, and interests of all learners. Teachers tailor assessments to accommodate varying levels of readiness, learning styles, and preferences that ensure that all learners have equitable opportunities to demonstrate their understanding and skills.

To implement differentiated assessment, teachers should consider the following:

i. *Varied assessment formats:* provide a range of assessment options, such as written assignments, oral presentations, projects, or multimedia presentations. This allows learners to exhibit their knowledge and skills using formats that align with their abilities and strengths.

ii. *Flexible deadlines:* give learners the opportunity to complete assessments within a flexible timeframe. This considers different learning paces and allows learners to manage their time appropriately.

iii. *Varying tasks:* Vary levels of difficulty for assessment tasks, allowing learners to choose the one that best suits their needs and challenges them appropriately.

iv. *Accommodations:* Provide necessary accommodations for learners with unique learning needs, such as extended time, modified formats, or additional resources to support their assessment process.

v. *Individualised feedback:* Provide individualised and constructive feedback that addresses the learner-specific needs and areas for improvement. Tailoring feedback to specific standards and learning outcomes can help learners understand their strengths and areas for improvement.

vi. *Learner involvement:* Involve learners in the assessment process by encouraging self-reflection, self-assessment, and goal setting. Engaging learners in dialogue about their learning and assessment promotes

D. Guidelines on how to Construct Multiple Choice Questions (attachment)

1. Clearly define the purpose of the test/assessment
2. Define the learning outcome (i.e. knowledge, comprehension, skills, or competencies) you want learners to demonstrate through MCQs.
3. Prepare a table of test specifications or blueprints.
    i. List topics and subtopics covered during the instructional period
    ii. Distribute the number of test items among course content and instructional objectives or behaviours.
4. Write the test items (note: it should match the content and DoK levels stated in the table of test specification).
    i. The central issue of the items should be in the question statement (stem).
    ii. The options should be plausible and homogeneous in content.
    iii. All options must follow syntax and punctuation rules.
    iv. Repetition of words in the options should be avoided.
    v. Vary the placement of the correct option (appropriately, arrange options in alphabetical order, ascending or descending or in order of magnitude if using numbers or dates).
    vi. Stems and options should be stated positively. However, a negative stem could be used sparingly, and the word should be emphasized either by underlining it or writing it in capital form (e.g. **not,** NOT, not**; except**, EXCEPT, except).
5. Write clear directions/instructions. (e.g. Answer All Questions. All questions carry equal marks, Select/Choose from the alternative lettered A-D the correct answer).
6. Review the test items (go through items again after construction i.e. after a few days to week).
7. Prepare scoring key (scoring keys should be prepared concurrently with item construction).

E. Common Assessment Used in the Classroom

Class Exercise As An Assessment Strategy

Description: Class exercise as an assessment strategy are tasks designed to evaluate learner's understanding, knowledge, and skills related to a particular subject to gauge how well learners are grasping a content being taught.

Teachers should mainly use class exercises for formative purposes to assess learners across all subject areas, which can take various forms, such as quizzes, problem-solving tasks, group discussions, reflective questions, case studies, question and answer and practical activities, performance, observation, checklist/rubrics and demonstration providing valuable insights into the learning process.

Purpose: Class exercises can be used to:

i. Help identify learning gaps in comprehension, retention, application of knowledge, values and attitudes.
ii. Allow for immediate feedback and clarification of concepts.
iii. Encourage active participation of learners for deeper understanding.
iv. Modify teaching and learning techniques, strategies, and resources based on learning outcomes.
v. Gradually build learners performance in a lesson over time to reduce summative test anxiety.
vi. Help identify learners who may require special educational support.
vii. Accommodate different learning styles and abilities, including group work and multiple representations for learners with special educational needs.

Settings

i. Classroom
ii. Laboratory/Workshops/Resource Centres/Libraries
iii. Studios
iv. Field (school park/garden or community spaces)
v. Online learning platforms/Virtual classrooms e.g. Zoom, Class WhatsApp pages, Google classrooms.

Time frame: Class exercises often take place in a lesson and may be conducted before, during and after a lesson depending on the learning outcome and the duration of the lesson.

Class size: Class exercises may be conducted for learners either individually, as a group or whole class.

Steps

Before

The teacher should:

i. Define the learning outcomes.

ii. Design exercises using simple and clear language.

iii. Select relevant exercises based on nature of the class exercise and desired skills/ knowledge to be attained. E.g. quizzes, case studies etc.

iv. Develop and discuss assessment criteria with learners.

v. Set a reasonable time frame for completion of exercises to maintain focus and efficiency.

vi. Clearly communicate instructions, including format, length, and resources.

The learner should:

i. Read and understand instructions to ensure a thorough understanding of the exercise provided.

ii. Collect all available required resources and tools for the task/exercise.

During

The teacher should:

i. Assign task/exercise based on the learning outcome as well as learners with special needs.

ii. Walk around the classroom and observe learners as they work on the exercise.

The learner should:

i. Organise and set up their work area to facilitate a smooth workflow.

ii. Plan how to approach the exercise, considering instructions and steps or techniques to employ.

iii. Commence class exercise timely and promptly to work within the given time for completion of the task.

After

The teacher should:

i. Evaluate the assessment outcome based on the assessment criteria with the learners.

ii. Provide constructive feedback for learners' performance for discussions.

NB: Teachers should pay attention to learners with special educational needs.

Reflect and modify teaching and learning strategies and resources based on feedback received.

The learner should:

i. Reflect, self and peer assess their exercises and provide constructive feedback.
ii. Use the feedback to improve on their work/exercises.

Homework As An Assessment Strategy

Description: Homework or assignments as an assessment strategy involve the use of structured tasks or projects that learners complete outside of regular class time to evaluate their understanding, knowledge and skills gained in a specific learning outcome. This assessment strategy can take various forms, such as written assignments, projects, research papers, problem sets, essays, or creative tasks.

Some concepts that can be assessed using homework/ assignments include menu planning and recipe development, problem solving exercises in mathematics, hands-on experiments and observations, creative writing assignments and art projects, map development and application of GIS in locating places.

Purpose: The key purposes of using homework/assignment as an assessment strategy by the teacher include:

i. Assessment of Understanding
ii. Application of Knowledge
iii. Reinforcement of Learning
iv. Independent Study
v. Provision of valuable feedback
vi. Skill Development
vii. Assessment of Diverse Abilities

Settings

i. Classroom
ii. Field work
iii. Online platforms
iv. Home

Class Size: Depending on the intended learning outcomes, assignments/ homework can be structured for either:

i. Small class sizes
ii. Large class sizes

Time Frame: The time frame for conducting assignments can be adjusted based on the desired learning outcomes and the complexity of the task.

i. Short-term Assignments (Daily or nightly homework and weekly assignments)
ii. Medium-term Assignments (Bi-weekly or monthly assignments)

iii. Long-term Assignments (Semester/ term-long assignments)

Steps

Before

The teachers should:

i. Clearly define the learning outcomes intended to be achieved
ii. Design/ Create a well-structured assignment with clear instructions and expectations.
iii. Adapt to the needs of diverse learners especially those with special needs
iv. Provide Resources such as textbooks, online materials, or reference materials, to support learners in completing the assignment successfully.

During

The teachers should:

i. Keep track of learners' progress on the assignment.
ii. Be available to answer questions and provide clarification during the assignment phase.
iii. Provide formative feedback and guidance to help students improve their work.
iv. Teach learners how to properly cite sources and use information ethically/ avoid plagiarism.

The learner should:

i. Seek clarification about the task from teachers or peers where necessary
ii. Actively work on the homework, focusing on comprehension
iii. Manage their time effectively
iv. Learners can reach out to their parents/guardians, peers, or online resources for guidance and clarification in responding to the tasks

After

The teacher should:

i. Evaluate the completed assignments using clear and consistent grading criteria
ii. Analyse student performance to identify common strengths and areas for improvement.
iii. Discuss feedback with learners
iv. Reflect on the outcomes of the assignment.
v. Share the results of the assignment with learners
vi. Acknowledge and celebrate learners' achievements to boost motivation and self-esteem.

The learner should:

i. Review their work to identify errors or areas for improvement.
ii. Reflect on what they have learned
iii. Bring up questions that were confusing for class discussion.
iv. Use feedback to learn from their mistakes and improve performance.

Discussion As An Assessment Strategy

Description: Discussion is a formative assessment strategy that involves using verbal communication and group interaction to assess learners' understanding, knowledge, and skills. The teacher is to observe and assess learners' contributions, ability to analyse and synthesise information, and provide feedback based on their performance. It can be used for both formative and summative assessments.

Discussion can be used in all subject areas of the secondary education curriculum depending on the purpose of the assessment and learning outcomes under consideration.

Purpose: The following are the purposes of discussion as an assessment strategy:

i. Build knowledge and develop a learner's critical and creative thinking.
ii. Develop learners' communication skills.
iii. Increase the depth of the learner's understanding and eliminate misconceptions.
iv. Engage learners in active participation in the lesson.

Setting

i. A classroom
ii. Small groups
iii. Seminars
iv. Online learning platforms (virtual classroom and discussion forum)
v. Fieldwork

Time frame: Appropriately, discussion as an assessment strategy can last for a lesson depending on the learning outcomes and learning indicator.

Class size: The class sizes appropriate for discussion as an assessment strategy can vary from small class to large/whole class.

Steps

Before

The teacher should:

i. Determine the learning outcomes to be assessed.
ii. Specify the content to be learnt that aligns with the learning outcome.
iii. Give prepared questions to guide the discussion (i.e., make use of open- ended questions, adaptive to the diverse/abilities of learners)

iv. Establish discussion guidelines or rules (let learners know what is expected of them, the content of the discussion and the format of the discussion i.e., individual, small or whole class)

The learner should:

i. Read any assigned readings, watch videos, or engage with other course materials related to the discussion topic.

ii. Take notes while reviewing the materials on important concepts, arguments, or evidence.

iii. Reflect on their own experiences, prior knowledge, or relevant examples that relate to the discussion topic.

iv. Seek clarification if needed.

During

The teacher should:

i. Start and facilitate the discussion (ensure that all learners could participate and encourage learners to engage in critical thinking and reflective thinking).

ii. Monitor and assess learner's participation (encourage self and peer assessment).

iii. Provide constructive feedback on learners' responses and contributions. NB. Teachers are advised to manage all learners' responses and accommodate them but must be fair and ethical.

The learner should:

i. Pay attention, maintain eye contact, and be open to different viewpoints and contributions from mates.

ii. Share their own unique perspectives, insights, and experiences related to the discussion topic.

iii. Take notes during the discussion to capture key points, new understanding, or questions that arise.

iv. Ask follow-up questions, seek clarification, or offer alternatives or suggestions respectfully.

After

The teacher and the learners reflect on the discussion in relationship to the expected learning outcomes to check whether the learning outcomes have been achieved.

Case Study As An Assessment Strategy

Description: A case study can be used as an assessment and or pedagogical strategy. Usually, it is used as an assessment strategy to examine a learner's ability to apply acquired knowledge, skills and experiences by carefully investigating a particular circumstance or scenario to provide solutions to real-life situations. Usually, it will have the following components:

1. Theme
2. Case description
3. Study of the case
4. Class Discussions
5. Conclusion and reflection

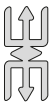
Types of case studies

i. Descriptive case studies: The teacher should ask learners to analyse and explain the key features and characteristics of the case.

ii. Explanatory case studies: The teacher should ask learners to give detailed information on the case by identifying and explaining the factors that contributed to the situation.

iii. Exploratory case reports: The teacher should ask learners to gather information, analyse data, and draw conclusions about a topic where limited information is available

iv. Cumulative case studies: The teacher should encourage learners to synthesise and integrate their learning across different subjects



Note

Any of these can be done individually or as a group depending on the class size. For large class sizes, a group of 3 to 5 members should be used.

Purpose: The purpose of a case study is for learners to apply acquired knowledge, concepts and theories to solve real-life situations. What should the teacher consider before using a case study as an assessment strategy?

i. The complexity of the content standard

ii. The availability of resources

iii. Ability level of learners

iv. Time

v. Class size

Steps: To ensure a well-structured and quality case study, it is important for the teacher to consider the following:

Before

The teacher should:

i. Clearly define the learning outcomes to be assessed.

ii. Identify appropriate issues or cases to be investigated.

iii. Determine the format of the case study (e.g., written document, a multimedia presentation, a video, or a combination of these), depending on the resources available.

iv. In form the learner on what to do, time frame, and expectations.
v. Provide materials (i.e., text, videos, pictures etc.) for the case study discussion.
vi. Develop and provide a clear scoring rubric that outlines or defines quality
vii. work to learners.

During

The teacher should:

i. Create and maintain a sound environment for the case study discussion.
ii. Bring the whole class together and invite each group to share their findings,
iii. solutions, or recommendations.
iv. Ask open-ended questions on the issue of discussion to clarify any misconception.
v. Incorporate peer assessment or peer grading as part of the process.

After

The teacher should:

i. Provide constructive feedback on learners' responses.
ii. Ask the learners to reflect on their learning process, such as what they learned, what they found difficult, or what they would do differently.
iii. Summarise the main points and lessons learned from the case study and link them to the learning outcomes and content.

Ethical Considerations: In the use of case study as an assessment strategy, the teacher should:

i. Discuss ethical considerations with learners, especially in cases that involve sensitive or potentially controversial topics (e.g., gender, cultural, social, emotional, political and religious issues) when selecting and discussing a case.

Documentation and Record-Keeping: The teacher should keep records of assessments and learners' submissions to maintain transparency and fairness (e.g., portfolio)

Portfolio Assessment- General

Description: A portfolio assessment is an evaluative tool to measure learners' understanding in a comprehensive manner, looking at the overall progress instead of individual marks from tests and quizzes.

Purpose: Portfolio assessment is used to establish various cognitive achievements as well as practical competencies. Portfolio assessment could be used for the different levels of Depth of Knowledge (Levels 1 – 4). It helps teachers identify areas where the learner may need additional support or resources to improve learning and provide a wide variety of learners' mastery of a particular standard and growth over a defined time.

Types of Portfolio Assessments: A portfolio is a systematic collection of learners' work that represents learner's activities, actions, and achievements over a specific period in one or more areas of the curriculum. There are three main types of portfolios:

1. Assessment Portfolios
2. Teaching and Learning or Working portfolios
3. Showcase portfolios

Assessment Portfolios

Assessment portfolios, also known as evaluative portfolios, contain work that has been evaluated according to set standards or criteria. These portfolios demonstrate a learner's ability to meet specific learning standards. They often contain rubrics, test results, learner reflections, teacher's notes, and graded assignments. For instance, in a science class, an assessment portfolio may contain lab reports, results from class tests, assessed projects, and the learner's reflection on their learning throughout the term/semester/year.

Teaching and Learning or Working Portfolios

Teaching and learning or working portfolios are formative in nature. They allow a learner to demonstrate his or her ability to perform a particular skill. For example, a working portfolio may include a collection of lab reports during a semester (term) that highlight a learner's improving ability to create hypotheses.

Showcase Portfolios

Showcase portfolios are summative in nature. They include samples of a learner's best work to demonstrate mastery at the end of a unit of study, semester or school year. The showcase portfolio allows the learner to select their most outstanding work, hence demonstrating their highest level of learning and achievement. It can contain final drafts of assignments, projects, or any piece of work that the learner is particularly proud of, demonstrating the learner's mastery of the relevant skills.

What is in a Portfolio?

A portfolio contains the following:

1. Completed assignments and evaluations (e.g., Self-Assessment, Peer- Assessment)
2. Journal writings (daily report – Date, Time and Activities)
3. Reflections on discussions
4. Photos, sketches, and other visuals
5. A summary statement made at different points regarding what has been learned/ achieved.

Setting: The portfolio assessment strategy can be used in the following settings:

1. Project-Based Learning
2. Independent Study and Research Projects
3. Classroom-based assessment
4. Field Work

5. Exhibitions/ Fairs
6. Problem-based Learning
7. Laboratory environment
8. Studio
9. Resource Centres

For all approaches, the portfolio must demonstrate clear and close adherence to specific learning outcomes in the curriculum.

Steps

Before

The Teacher should:

i. Determine the purpose of the portfolio. Decide how the results of a portfolio evaluation will be used to inform the subject.

ii. Identify the learning outcomes the portfolio will address.

iii. Decide what learners will include in their portfolio. Portfolios can contain a range of items–plans, reports, essays, resumes, checklists, self-assessments, references from employers or supervisors, and audio and video clips. Limit the portfolio to 3-4 pieces of learner's work and one reflective essay/memo.

iv. Identify or develop the scoring criteria (e.g., a rubric) to judge the quality of the portfolio.

v. Establish standards of performance and examples (e.g., examples of a high, medium, and low-scoring portfolio).

vi. Create learner instructions that specify how learners collect, select, reflect, format, and submit.

vii. It is the teacher's responsibility to help learners by explicitly tying subject assignments to portfolio requirements.

During

The learner should:

i. Collect evidence related to the outcomes being assessed.

ii. Select the best and appropriate evidence and label each piece of evidence according to the learning outcome being demonstrated.

iii. Be guided on how to write a one or two-page reflective essay/memo that explains why they selected the particular examples, how the pieces demonstrate their achievement of the program outcomes, and/or how their knowledge/ability/attitude changed.

iv. Be guided on how to format requirements (e.g., type of binder, font and style guide requirements, online submission requirements).

v. Be given submission (and pickup) dates and instructions.

After

The teacher should:

i. Clearly establish the criteria for evaluating/scoring in a consistent manner
ii. Mark and record learners' performances
iii. Reflect on the activity and learner performances
iv. Provide constructive feedback to the learner
v. Identify learners with SEN who may need extra support

The learner should:

i. Reflect on the feedback received
ii. Revise their work for final submission

Time Frame: Deciding on a time frame for Portfolio assessment depends on and includes the following:

i. Nature of project/problem or assignment
ii. Class size
iii. Resources

However, based on the learning outcome(s) the appropriate time frame for this portfolio is a week for minor activity and a term for extended projects, especially in Art and Design or Performing Arts.

Form

i. Individual learner's portfolios when the class size is relatively small.
ii. Group portfolio when the size is relatively large.
iii. Whole class/ school

Research As An Assessment Strategy

Description: Research as an assessment strategy is a systematic process of inquiry and investigation that aligns with a particular learning outcome to develop knowledge and understand a phenomenon. It involves identifying an issue in need of investigation, collecting and analysing data, conducting experiments, and drawing conclusions based on the findings. Once learners have completed their research work, they will write a report and do a presentation on their findings.

Purpose: Research as an assessment strategy is used to assess learner's ability to:

i. Identify a problem and gather information (data) from a variety of sources.
ii. Evaluate the credibility and accuracy of information.
iii. Analyse and synthesise information from multiple sources.
iv. Communicate their findings clearly and concisely.

Setting

i. Classrooms
ii. Factories/ Industries
iii. School farms
iv. School communities
v. Libraries
vi. Homes.
vii. Fieldwork
viii. Workshops

Class Size: As a teacher, depending on the number of learners in your class, individual or group research-based assessment can be used. However, teachers can create large groups for complex research, where different members can focus on specific aspects of the research.

Time Frame: The time frame for conducting a research-based assessment can vary depending on the complexity of the learning outcomes (skill to be achieved) may be:

i. Short-term
ii. Medium-term
iii. Long term

Steps

Before

The teacher should:

i. Define the learning outcomes.
ii. Develop a theme in line with learning outcomes.
iii. Design the research work and provide a description that is in line with learning outcomes.
iv. Define specific tasks to be undertaken in developing the research.
v. create a timeline.
vi. Select resources and materials needed.
vii. Provide guidance and support for learners.
viii. Develop clear assessment rubrics.
ix. Provide feedback and revisions.

During

The teacher should:

i. Provide clear guidelines for developing the research and how to assess it.
ii. Design and plan the research work to align with the learning outcomes.

iii. Provide necessary resources, materials, and support to help learners succeed in their research work.

iv. Guide learners in reflecting on their research-based assessments and help them develop metacognitive skills.

After

The teacher should:

i. *Alignment with learning outcomes*: The research work should be aligned with the learning outcomes of the content standards. This means that the research work should allow learners to demonstrate their understanding of the course material and to develop the skills that are being taught.

ii. *Originality*: The research work should be original and not simply a rehash of existing information. Learners should be encouraged to develop their ideas and to come up with their conclusions.

iii. *Critical thinking:* The research work should demonstrate that learners can conceptualise, apply, analyse, synthesise and evaluate the information they have gathered and come out with an action plan.

iv. *Communication skills:* The research work should be well-written and well- organised. Learners should be able to communicate their findings clearly and concisely.

Practical Assessments

Description: Practical assessment gauges a student's capacity to use their knowledge and abilities in practical and hands-on settings. It involves evaluating learners' ability to perform specific tasks and demonstrate practical skills. It includes laboratory experiments, simulations, demonstrations or projects.

The exact nature of the assessment will depend on the subject or area a teacher is interested in.

Purpose: The purpose of conducting a practical assessment is to:

i. Evaluate learners' proficiency, problem-solving capacity, and aptitude for carrying out tasks.

ii. Create and deliver tests that ask learners to complete real-world assignments, experiments, or demonstrations.

Setting: Teachers can use practical assessment in the following settings:

i. Classroom

ii. Laboratory

iii. Field

iv. School farms/gardens/community

v. Technical workshops

vi. Science fair

vii. Virtual/Digital/Remote
viii. Co-curricular activities and clubs
ix. Outdoor spaces
x. Workplace
xi. Team project

Time Frame: Based on the learning outcome and the skills to be acquired, a Practical assessment can be done in a week, at the end of a term or year depending on the project.

Class size: Class size suitable for practical assessment can be individual, group or whole class

Steps

Before

Learners can understand the content and theory being used by;

i. Reviewing the theoretical concept
ii. Familiarising themselves with the concept under assessment

Choosing experimental design, learners are required to;

i. Design an experiment using the theoretical concept.
ii. Outline the stages/process for the experiment and formulate hypotheses.

Gathering materials

i. Make a list of the tools and supplies you will need.
ii. Ensure that the necessary materials are available

During

Choosing experimental procedure:

i. Learners are required describe the step-by-step process in detail including how to control extraneous factors, along with any safety precautions.

Gathering and analysing data

With support from teachers, learners are required to:

i. Measure the dependent variable appropriately at various factor values to collect data.
ii. Analyse the data meaningfully.
iii. Sort, examine, and derive conclusions from the data analysis

After

Display of findings

i. Give a concise visual summary of the results.

ii. Address any restrictions or mistakes.

Reflection and improvement

i. Consider your advantages and disadvantages.

ii. Improve the design of upcoming experiments.

iii. Throughout the process, place a strong emphasis on ethics, integrity, and seeking advice as appropriate.

iv. Encourage a critical and inquisitive outlook on learning.

Debate As An Assessment Strategy

Description: Debate as an assessment strategy involves structured arguments and discussions to evaluate learners' knowledge and understanding of issues/ideas. It encourages research and articulation of views; it can be used for formative or summative assessments. Types of debates include formal debates with rules and roles and informal debates, which are more flexible.

Purpose: Using debate as an assessment strategy offers a comprehensive evaluation of learners' ability to generate ideas based on their knowledge and understanding of concepts and confidence in supporting their own ideas.

Settings

i. Classroom

ii. Performance spaces (e.g. dining hall, assembly hall, laboratory)

iii. Electronic platforms

iv. Music and drama theatre

Class Size: Depending on the learning outcomes to be achieved debates can be organised in:

i. Small classes

ii. Large classes

Time frame: The teacher can conduct a debate within a single class session, it can also span over several class sessions or weeks.

Steps

Before

The teacher should:

i. Select appropriate motion/ topic, ensuring it is relevant to the learning outcome

ii. Offer resources and materials to support learners

iii. Assign roles /create teams or pairings

iv. Establish rules and procedures

The learner should:

i. Undertake research regarding the debate's topic or motion
ii. Play an active role as a team member (in team-based debates)

During

The teacher should:

i. Host the debate
ii. Ensure effective time management
iii. Monitor and take notes

The learner should:

i. Participate in the debate
ii. Listen and take notes
iii. Counter argue when necessary

After

The teacher should:

i. Facilitate a debriefing session (Teachers should utilise the debriefing sessions to address any misunderstandings or questions that come up from the debate. They should also highlight the key concepts and important lessons based on the learning outcome)
ii. Implement peer assessments.
iii. Organise follow-up activities as necessary.

The learners should:

i. Reflect on their performance and the debate as a whole.
ii. Assess their peers' performances based on established criteria.

The Test of Practical Knowledge (TPK) Assessment Strategy

Description: This assessment is tailored to evaluate a learner's capacity to apply acquired knowledge in real-life situations by engaging in hands-on tasks or simulations that mirror real-world scenarios, assessing practical skills, problem-solving abilities, and the application of practical knowledge theoretically. It aims to gauge how effectively learners can employ their knowledge to solve problems or accomplish tasks.

Purposes: The general purpose of the test of practical knowledge is to assess learners' ability to apply practical knowledge in theory to:

i. Evaluate their application-based understanding.
ii. Assess their problem-solving skills.
iii. Measure the learner's practical knowledge and its use in real-life situations.
iv. Provide insights into a learner's ability to transfer practical knowledge into theoretical actions.

Setting: The Test of Practical Knowledge is conducted in environments that simulate real-life situations relevant to the learning outcome and the context being assessed. This could be a

i. Classroom
ii. Laboratory
iii. Field
iv. School farms/gardens/community
v. Technical workshops
vi. Science fair
vii. Virtual/Digital/Remote
viii. Outdoor spaces
ix. Workplace
x. Team Project

Class Size: The size of the class can vary based on resources and the nature of the practical tasks. It could be individual, smaller groups, or whole class.

Time Frame: The timing for assessing the Test of Practical Knowledge can range from a single session to multiple sessions, depending on the complexity of tasks and skills being assessed.

Steps

Before

The teacher should:

Provide clear instructions and resources needed for the tasks.

Clarify any doubts about the assessment task.

The learner should:

i. Seek clarification from the teacher or other relevant persons before starting the assessment.
ii. Familiarise themselves with theoretical concepts beforehand.

During

The teacher should encourage teamwork and effective communication if tasks involve group work.

The learner should

i. Focus on applying learned concepts to solve problems or complete tasks accurately within the given context.
ii. Manage time efficiently to complete tasks within allocated timeframes.

After

The teacher should encourage learners to reflect on their performance, review their work, and identify areas for improvement.

Performance Assessment Strategy

Description: In its simplest terms, a performance assessment is one which requires learners to demonstrate that they have mastered specific skills and competencies by performing or producing something. It is important that the task be meaningful and engaging to learners. When learners perform tasks that are meaningful and engaging to them, they can take ownership of their learning and effectively work, either independently or in collaboration, depending on the requirement of the task. Performance assessment can be used as either formative or summative tool.

Purpose: The main purpose of this assessment strategy is to provide learners with the opportunity to demonstrate their knowledge and understanding about a concept and communicate that understanding through a performance task.

Setting: Performance assessment can be used in the following settings:

i. Classroom
ii. Laboratory/workshops
iii. Field
iv. Theatre

Time Frame: Teachers should note that the learning outcome and learners' achievement expectations may inform the appropriate time frame for the use of performance assessment. However, the designated time of completion of the assessment task should not be too short or two long.

Class Size: Performance assessment works best for all forms of class size. Teachers should, however, be strategic in making learners work individually or in moderate/large groups depending on the unique situation.

Steps: To develop and implement performance assessment, teachers should:

Before

The teacher should:

i. State the purpose of the assessment.
ii. Specify the learning outcome to be assessed using the performance assessment strategy.
iii. Make learners aware whether they will work individually or as groups (e.g., group of 2-5).
iv. Design a performance task which requires the learners to demonstrate the intended skills and knowledge required of them.
v. Discuss with learners the rules of engagement which includes the performance criteria that specifies the extent to which learners have mastered the skills and knowledge.

vi. Discuss with learners the available resources to be used.

The learner should:

i. Make ready the available resources that will help them perform the assessment task.

ii. Seek for clarification on the performance task to be performed when necessary.

During:

The teacher should:

i. Monitor and ensure serenity of the environment for learners to work effectively as individuals or groups as in the case of a laboratory/field/workshop exercise.

ii. Guide learners to complete the assigned task(s) within the stipulated time.

The learner should:

i. Design the artifact or the idea using the available resources.

ii. Should submit the performance product to class at the stimulated time for evaluation.

After:

The teacher should:

i. Collaborate with learners to evaluate the performance task(s) outcome.

ii. Communicate constructive feedback of the assessment to the learners.

iii. Provide information on how the assessment feedback would be used.

The learner(s) should:

i. Offer constructive feedback on their colleague's work.

ii. Self-reflect and make use of constructive feedback to shape his/her work.

Demonstration As An Assessment Strategy

Description: Demonstration as an assessment strategy offers a practical and effective way to evaluate learners' knowledge, skills, and abilities by observing their performance in a real or simulated context. This may include a presentation, a practical experiment, a role-play, a performance, or a project.

Purpose: The main purpose of using demonstration as an assessment strategy is to allow learners to showcase their skills and competencies through practical application. Some of the areas in which learners can demonstrate their proficiencies are:

i. Problem-solving skills

ii. Critical thinking abilities

iii. Communication

Settings

i. Classroom
ii. Laboratory/ Workshop /Studio
iii. Simulation studio/environment
iv. Field or real-world settings (e.g., field trips, community projects, or internships)
v. Performance spaces (e.g., theatre, music room, or sports field/studio/rooms)
vi. Online/remote/virtual platform

Time Frame: The time frame for conducting demonstration as an assessment strategy depends on the following:

i. Learning outcome(s)
ii. Complexity of the task to be performed
iii. Resources

NB: The teacher should provide the learner enough time to demonstrate their abilities and ensure the assessment process is managed within the constraints of the learning environment.

Class size: Demonstration can be used for individuals or groups (large or small groups) for the reasons of attention, support, and prompt feedback on factors such as assessors, resources and equipment, learning outcome and the assessment environment.

Steps

Before

The teacher should

i. Set clear expectations of the learning outcomes, specific skills, knowledge and competencies.
ii. Provide instructions for the demonstration to include safety precautions, criteria for assessment and time.
iii. Provide learners the opportunity to rehearse the task or the activity to be demonstrated.
iv. Provide the needed materials and resources to be used for the demonstration.
v. Address the concerns of the learners raised after the rehearsals.
vi. Distribute the task to the learner(s) considering Special Education Needs - SEN)

The learner should:

i. Understand the learning outcomes, specific skills, knowledge, and competencies expected of them.
ii. Take the necessary steps to prepare for the demonstration by reviewing the instructions and rehearsing the expected knowledge, skills, and competencies.

iii. Seek clarification about the instructions and materials to be used for the demonstration.

iv. Take the opportunity to practice and refine their skills or knowledge before the demonstration.

v. Reflect on their previous learning and experiences related to the skills or knowledge being assessed.

During

The teacher should:

i. Observe the learner's performance of the task demonstrated.

ii. Provide continuous guidance to learner(s) on the task especially when they are working with or in hazardous situations.

iii. Monitor the progress of the learner(s) on the task.

iv. Pace the timing of the demonstration such that differentiation is considered.

v. Assess the performance of the learners on the task.

vi. Take notes of critical issues such as learners' strengths and areas for improvement

The learner should:

i. Focus on the demonstration and actively listen to the instructions and explanations provided.

ii. Carefully watch the demonstration, noting the steps, techniques, and key details being shown.

iii. Take notes of important points, steps, or tips during the demonstration to refer to later.

iv. Request feedback from the demonstrator or peers to ensure they are on the right track and identify areas for improvement.

After

The teacher should:

i. Provide constructive feedback to the learners based on observations. highlighting areas of improvement, reinforcing correct techniques, and encouraging further practice.

ii. Review notes to consider where learners have performed well and areas that need improvement

iii. Provide support to learners who may be struggling with the demonstrated skills. This can involve additional explanations, demonstrations, or one-on- one assistance.

The learner should:

i. Reflect on their own performance during the demonstration and assess their understanding and execution of the demonstrated skills or techniques.

ii. Share their performance and ask for feedback to improve their learning.

iii. Identify specific areas where they need further assistance or practice; they can seek out additional resources such as tutorials, online courses, or books to support their learning and assessment.

Questioning As An Assessment Strategy

Description: Questioning as an assessment strategy is the practice of engaging learners in an interactive dialogue or a series of carefully crafted questions to evaluate their understanding, knowledge, skills, and critical thinking abilities. Teachers can use questioning as an assessment strategy in all learning areas or subjects.

Purpose: Questioning as an assessment strategy can be used by the teacher to:

1. Identify learning gaps through the assessment of the level of comprehension, retention and application of knowledge, and skills gained by learners in achieving a learning outcome of a given content.
2. Actively engage leaners in the teaching and learning process.
3. Assess if a concept taught has been well grasped as learners' feedback provides valuable feedback to them and the teacher.
4. Clarify concepts leading to deeper understanding or seek additional information in solving real-world or imaginary issues.
5. Promote the acquisition of critical thinking and problem-solving skills.
6. Encourage immediate or real-time feedback from leaners leading to deeper thinking.
7. Investigate misconceptions for clarification.
8. Accommodate diverse learning styles to achieve a specific learning outcome.

Types: The following are various types of questioning techniques based on the Depth of Knowledge (DoK) levels that the teacher can use in assessment:

i. Closed-ended questions – DoK 1: have a limited number of predetermined answers and are designed to gather specific information requiring "yes" or "no", "True or False"

ii. Open-ended Questions - DoK 2 and 3: allow for a more detailed and

iii. comprehensive response, which begins with words like "what," "why," or "how."

iv. Funnel Questions- DoK 2 and 3: used to gradually narrow down a topic, starting with broader questions and proceeding to more specific ones. This technique helps gather information in a logical and structured manner.

v. Probing Questions - DoK 2 and 3: used to explore a topic in more detail or to gain deeper insights. They are often used to dig deeper into a previous response or to uncover hidden information,

vi. Leading Questions - DoK 2 and 3: used to steer learners towards a particular answer or viewpoint. They may imply an expected or desired response.

vii. Hypothetical Questions- DoK 3 and 4: These questions often involve speculative or creative thinking. They require learners to make connections, apply knowledge, and think beyond the immediate context.

Settings

i. Classroom

ii. Co-curricular activities, e.g. School Clubs and Games

iii. Field trips/work, e.g., Factories/industries, school farms/gardens/ pantries(kitchen)

iv. Laboratory/Resource Centre

v. Workshops/studios/theatres

Time Frame: Teachers can use questioning in their daily teaching and learning activities. However, it should be used based on the learning outcome of the subject matter under consideration. It can specifically be used:

i. Throughout the teaching and learning process (Formative Assessment): before, during and after the teaching of a lesson.

ii. In summative assessment, questioning can be used together with other forms of assessment such as oral/aural(listening) assessment at the end of a unit or content and programme.

Class size: Individual, small group or whole class

Steps: In using questioning as an assessment strategy, the teacher and learner can employ the following steps:

Before

The teacher should:

i. Define the Learning Outcomes to be achieved and develop key questions

ii. before class based on the outcomes.

iii. Select appropriate question type(s) that align with the content standard/ indicators to be taught and the DoK levels to be achieved. The questions to be asked should be clear, relevant, concise, and free from ambiguity and biases.

iv. Design valid questions that will suit the type of questioning strategy to be used to achieve the learning outcomes.

NB: Avoid or minimise the use of questions that will yield Yes/No or True/False responses but make more use of questions that allow for explanatory responses.

Plan question sequence and adapt questioning techniques to meet the diverse learning needs and abilities of their learners to promote active participation.

During

The Teacher should:

i. Select the context and provide relevant information to give learners the basis for the questions.

ii. Vary the form of questions: those that gauge knowledge, require diagnosis, or challenge conclusions considering the learner's background characteristics to promote inclusivity.

iii. Ask one question at a time and wait for responses from learners to allow time to think through responses critically.

iv. Encourage active engagement of all learners.

v. Monitor learners' performance and learning process to identify areas where learners may need additional support or clarification or to plan appropriate remediation where appropriate.

vi. Acknowledge all responses/answers- repeat so the class can hear and/or write them on the board.

vii. Provide constructive and timely feedback; teachers are advised to accommodate learners' varied responses as well as be fair and ethical.

viii. Use assessment data to modify their teaching techniques, strategies and resources.

ix. Move around the classroom or learning centre

The learner should:

i. Ensure they gain an understanding of the learning outcomes and work towards achieving them through self and peer assessment.

ii. Actively participate in the questioning process by listening carefully to the questions, thinking critically about their responses, and providing thoughtful answers.

iii. Self and peer assess themselves using a questioning assessment strategy when learning to enable them to reflect on their learning.

iv. Own their learning by adapting strategies to improve their learning outcomes, skills and competencies.

After

The teacher should:

i. Analyse responses

ii. Provide constructive feedback

iii. Modify teaching and learning processes

iv. Document assessment data

v. Reflect and adapt questioning techniques, strategies and resources to check if expected learning outcomes have been achieved.

vi. Teachers and learners reflect on responses to check if expected learning

vii. outcomes have been achieved.

Peer/Self Assessment Strategy

Description: Peer/self-assessment is a type of performance monitoring and evaluation related to a learning outcome done by or among learners under the supervision of a teacher to track their learning progress. It can be used as both formative and summative assessment. However, it is predominately used for formative assessment purposes.

Purpose: Peer/self-assessment provides an opportunity for learners to reflect and provides insight, leading to meaningful feedback on their or other learners' work (behaviours, competencies and experiences). Peer/self-assessment enhances deep learning and understanding among learners and trains learners to track their progress and areas for improvement.

Setting

i. Classroom-based environment
ii. Fieldwork
iii. Laboratory i.e., Science Resources Centres
iv. Studio
v. Workshop

Class size: Peer assessment strategy can be done in small groups or whole class.

Time Frame: The time frame depends on the complexity of the assignment, the estimated period of the lesson stated in the curriculum and how learners have been adequately prepared. However, the time should neither be too short nor too long.

Steps

Before

The teacher should:

i. Set clear expectations of the learning outcome, skills and competencies
ii. Decide the structure and format of the assessment e.g.: written or oral
iii. Introduce the learners to the assignment to be assessed
iv. Develop the assessment criteria and scoring rubrics with learners.

During

The teacher should

i. Model peer/self-assessment by letting learners assess or review what he has taught to open them up to the assessment to be conducted.
ii. For peer assessment, lead the pairing or grouping for the assessment. in doing this, the teacher should consider mixed groupings, and avoid inter- pairing and pairing amongst friends. (fairness and transparency)
iii. In self-assessment, the teacher should guide learners with special educational needs in their assessment through questioning
iv. Provide constructive feedback to learners after the assessment

The learner should:

i. Work and submit assignments
ii. Assess their assignments or that of other learners and give constructive feedback
iii. Reflect on the feedback received and revise the work for final submission

After

The teacher should:

i. Grade the assignments (summative)
ii. Reflect on the activity with learners
iii. Offer help or intervention in areas learners need help
iv. Work on areas that need improvement

NB: The teacher should be a mediator between arguing learners and should also consider and guide learners in their approach to providing feedback. (Be conscious of gender, cultural, social and religious sensitive comments and issues)

Teacher should also provide multiple opportunities or formats for learners to assess to accommodate all learn.

Appendix 3: Teacher Lesson Observation Form

Name of School: .....

Subject being observed: .....

Class

Year 1 ☐ Year 2 ☐ Year 3 ☐

Sex of the teacher

Male ☐ Female ☐

1. Is the purpose of the lesson clearly stated in the lesson plan and focused on learners achieving the lesson learning outcomes?

Yes ☐ In Part ☐ No ☐ NA ☐

1b. Please provide an explanation to your answer in Q1 above

.....

2. Are the unique needs of female learners, male learners, and learners with special education needs adequately catered for in the lesson plan? For example, the choice of teaching methods and learning activities reflects/does not reflect the learning needs of all learners.

For example, the choice of teaching methods, and learning activities.

Yes ☐ In Part ☐ No ☐ NA ☐

2b. Please provide an explanation to your answer in Q2 above

.....

3. Does the teacher manage behaviour well, maintaining a positive and non-threatening learning environment throughout the lesson?

Yes ☐ In Part ☐ No ☐ NA ☐

3b. Please provide an explanation to your answer in Q3 above

.....

4. Are appropriate teaching and learning materials and other resources (including ICT, books, desks) available, accessible and being used to support learning of all females, males and learners with special education needs?

Yes ☐ In Part ☐ No ☐ NA ☐

4b. Please provide an explanation to your answer in Q4 above

.....

5. Are learners engaged on tasks that challenge them in line with the content standards?
Does the teacher take into consideration the uniqueness of learners?

Yes ☐ In Part ☐ No ☐ NA ☐

5b. Please provide an explanation to your answer in Q5 above

6. Is there evidence that students are learning?

Yes ☐ In Part ☐ No ☐ NA ☐

6b. Please provide an explanation to your answer in Q6 above

7. Is teaching differentiated to cater for the varied needs of all learners (i.e., male learners, female learners, learners with special education needs) and those with poor literacy and/ or numeracy proficiency?

Yes ☐ In Part ☐ No ☐ NA ☐

7b. Please provide an explanation to your answer in Q7 above

.....

8. Does the teacher use real life examples which are familiar to learners to explain concepts?

Yes ☐ In Part ☐ No ☐ NA ☐

8b. Please provide an explanation to your answer in Q8 above

.....

9. Does the teacher point out or question traditional gender roles when they come up during the lessons as appropriate?

Yes ☐ In Part ☐ No ☐ NA ☐

9b. Please provide an explanation to your answer in Q9 above

.....

10. Does the lesson include appropriate interactive and creative approaches e.g., group work, role play, storytelling to support learners achieving the learning outcomes?

If yes, give examples of the issues and skills that have been so integrated.

Yes ☐ In Part ☐ No ☐ NA ☐

10b. Please provide an explanation to your answer in Q10 above

.....

11. Have cross-cutting issues and /or 21st century skills been integrated into the lesson to support learners in achieving the learning outcomes e.g., problem-solving, critical thinking, communication? If yes, give examples of the issues and skills that have been so integrated.

Yes ☐ In Part ☐ No ☐ NA ☐

11b. If yes, give examples of the issues and skills that have been so integrated.

.....

12. Does the teacher incorporate ICT into their practice to support learning?

Yes ☐ In Part ☐ No ☐ NA ☐

12b. Please provide an explanation to your answer in Q12 above

.....

13. Does the teacher encourage all female male and male learners (including those who may be shy or afraid to speak) to ask questions, answer questions, participate in group work, etc. during the lesson?

Yes ☐ In Part ☐ No ☐ NA ☐

13b. Please provide an explanation to your answer in Q13 above

.....

14. Is assessment evident in the lesson? If yes, does it include assessment as, for or of learning and go beyond recall?

If yes, did it include assessment of, for or as learning and go beyond recall?

Yes ☐ In Part ☐ No ☐ NA ☐

14b. Please provide an explanation to your answer in Q14 above

.....

15. Do learners make use of feedback from teacher and peers?

Yes ☐ In Part ☐ No ☐ NA ☐

15b. Please provide an explanation to your answer in Q15 above

.....

16. Does the teacher sum up the lesson and evaluate the lesson against the learning outcomes with the learners?

Yes ☐ In Part ☐ No ☐ NA ☐

16b. Please provide an explanation to your answer in Q16 above

.....

17. Does the teachers' planning of lessons taught before the one observed show how they plan for learning over time, considering individual and group needs?

Yes ☐ In Part ☐ No ☐ NA ☐

17b. Please provide an explanation to your answer in Q17 above

.....

18. Does the teacher pay attention to the composition of females and males during group work and assigns females leadership roles.

Yes ☐ In Part ☐ No ☐ NA ☐

18b. Please provide an explanation to your answer in Q18 above

.....

19. Does the teacher provide constructive verbal feedback to both females and males and learners with special education needs?

Yes ☐ In Part ☐ No ☐ NA ☐

19b. Please provide an explanation to your answer in Q19 above

.....

20. Does the teacher provide constructive written feedback to both females and males and learners with special education needs in their exercise book?

Yes ☐ In Part ☐ No ☐ NA ☐

20b. Please provide an explanation to your answer in Q20 above

.....

21. Key strengths in the lesson

.....

22. Areas for development

.....

23. Next steps for teacher

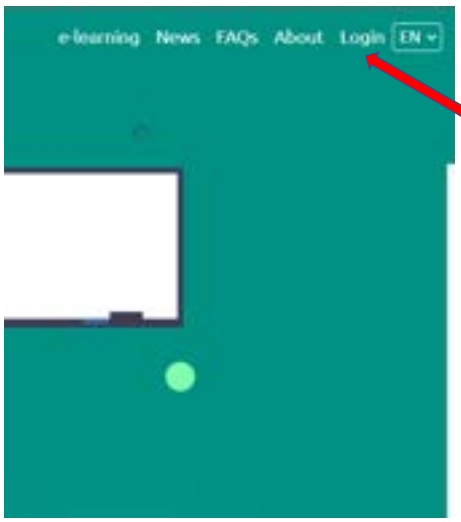
.....

24. Additional Notes (on teacher's actions, the flow of activities, etc.)

.....

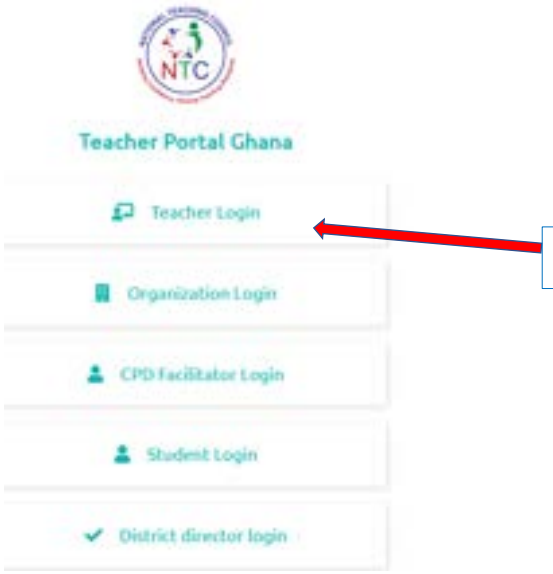
Appendix 4: How to Check CPD Points and Training Records on Teacher Portal Ghana

1. Visit *tpg.ntc.gov.gh* and click Login



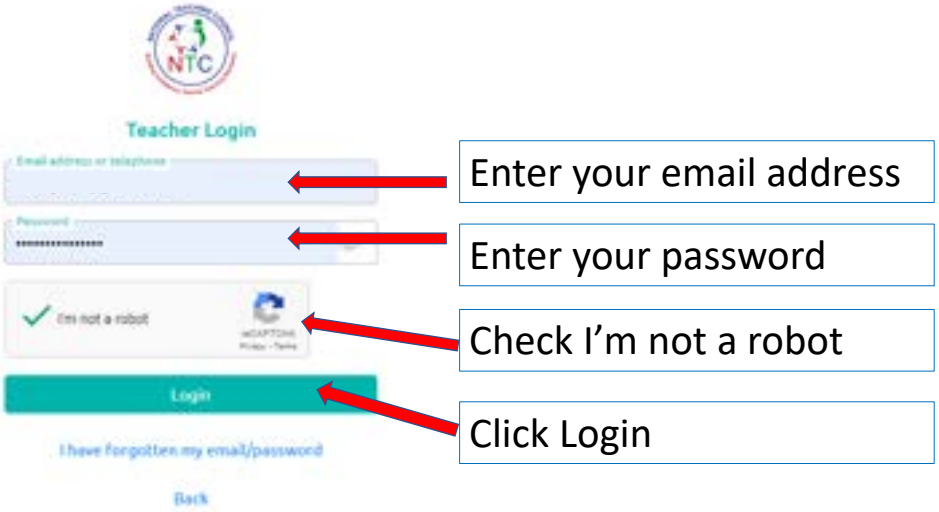
Click Login on the TPG homepage

2. On the Login page, click Teacher Login

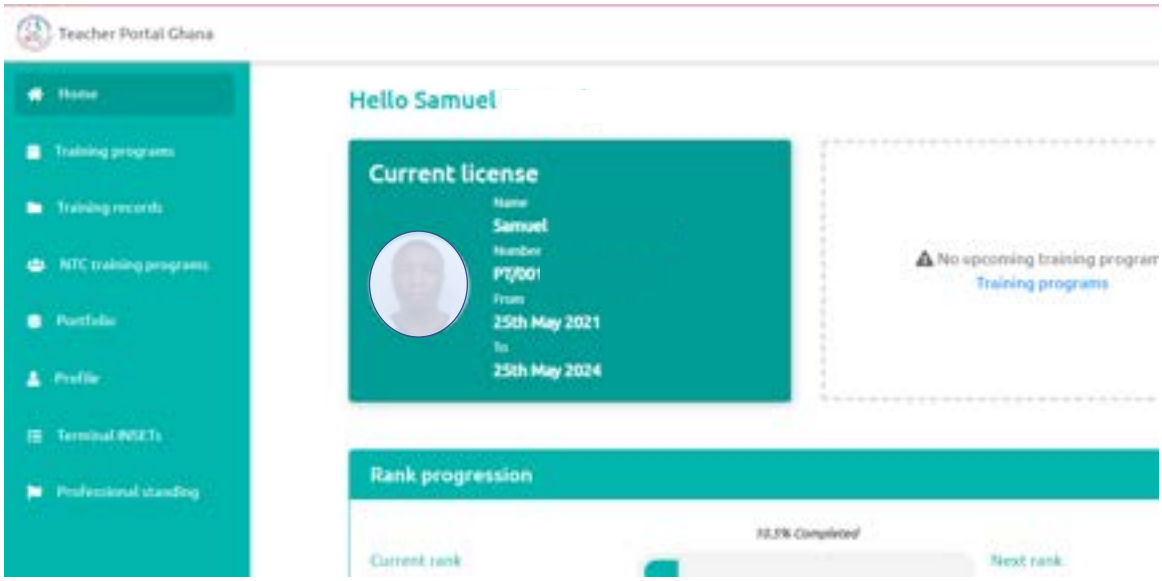


Click Teacher Login

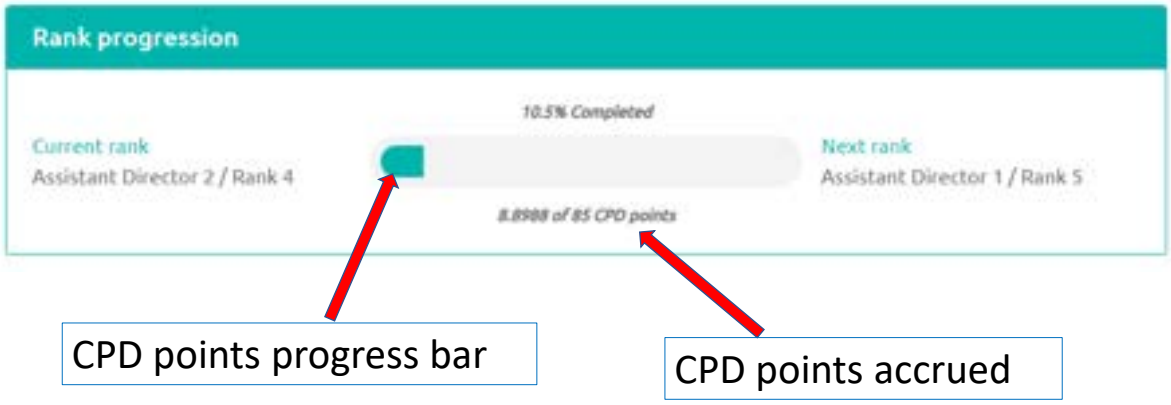
3. On the Teacher Login page enter your email address and password and then click Login



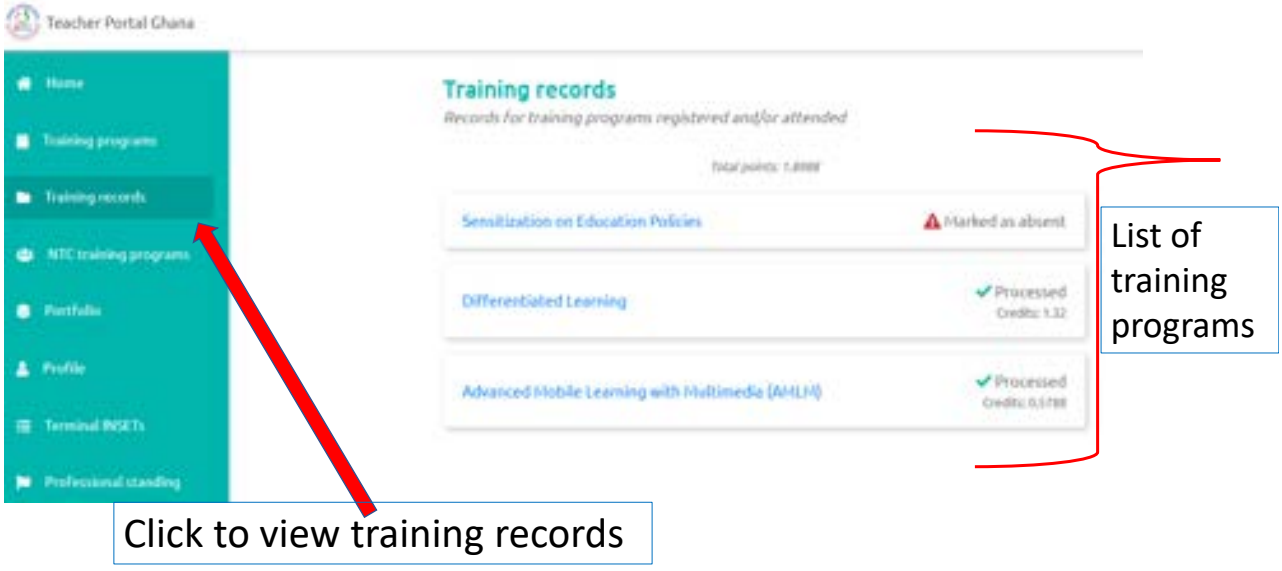
4. After a successful login you will get access to your TPG account (Check image below)



5. To check CPD points, scroll down to Rank progression. You will see the CPD points progress bar and actual points accrued (Check image below)



6. To view training records, from the side menu tap on Training records (Check image below)



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