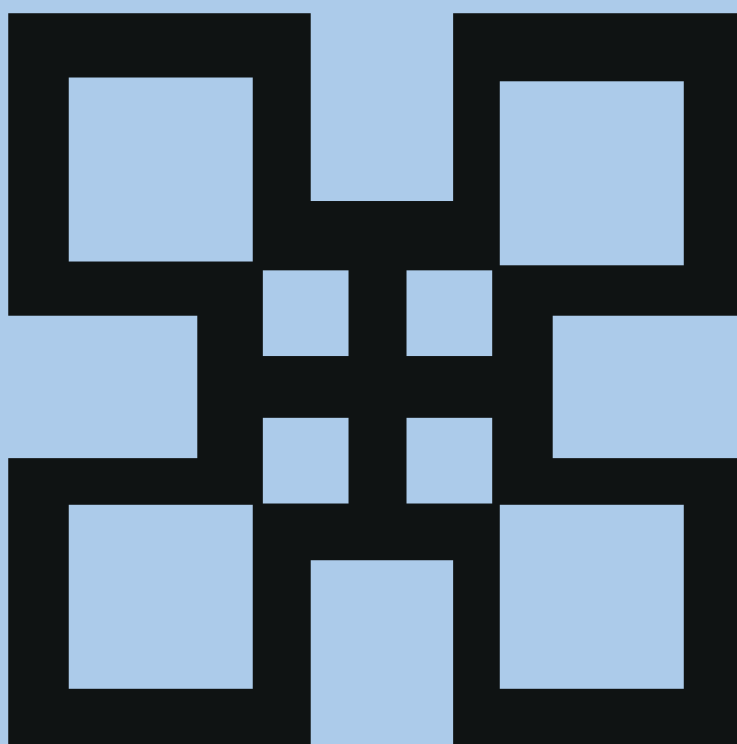


Professional Learning Community Handbook

Mathematics

Year One



Ghana Education
Service (GES)



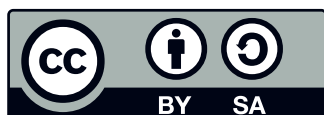
Professional Learning Community Handbook

Mathematics

Year One



REPUBLIC OF GHANA



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Contents

Introduction	1
PLC SESSION 0: Internal Assessment Structure and Transcript System for SHS/SHTS and STEM Schools	3
PLC SESSION 1: Real Number System	5
Appendix A: Sample Portfolio Assessment	8
PLC SESSION 2: Properties of Sets Operations	10
Appendix B: Sample Group Project	13
PLC SESSION 3: Properties of Subsets	16
Appendix C: Example of Case Study Assessment	20
PLC SESSION 4: Concepts and Operations of Fractions	22
PLC SESSION 5: Problem Solving on Common Fractions	25
Appendix D: Sample Guide on Submission and Discussion Case Study Report from Learner	28
PLC SESSION 6: Preparing for Mid–Semester Examination	29
Appendix E: Sample Principles to Consider when developing Multiple Choice and Essay–Type Questions	32
PLC SESSION 7: Application of Percentages	33
Appendix F: Sample Outline for Writing Report	36
PLC SESSION 8: Simple and Compound Interest	37
PLC SESSION 9: Number Patterns and Algebraic Expressions	40
PLC SESSION 10: Perfect Squares and Algebraic Fractions	44
PLC SESSION 11: Change of Subjects, Linear equations and Inequalities	47
PLC SESSION 12: Preparing for End of Semester Examination	50
Appendix G: Sample Table of Specification for End of Semester Examination	53
PLC SESSION 13: Gradient, Equations and Midpoint of Lines	55
Appendix H: Sample Individual Project Work	58
PLC SESSION 14: Angles	60
PLC SESSION 15: Exterior and Interior Angles of Polygons	63
PLC SESSION 16: Pythagorean Theorem	66
PLC SESSION 17: Vectors	69
PLC SESSION 18: Preparing for Mid–Semester Examination	72

APPENDIX I: : Sample table of test specifications for developing essay type questions	75
PLC SESSION 19: Perimeter and Area of Shapes	77
Appendix J: Sample guidelines for presentations and discussions of the case study report	81
PLC SESSION 20: Volume of Prisms	82
PLC SESSION 21: Data and Collection Methods	86
PLC SESSION 22: Data Organisation and Presentation.	89
PLC SESSION 23: Collection and Analysis of Data	93
PLC SESSION 24: Preparing for End of Semester Examination	96
Appendix K: Principle to Consider when Designing Multiple Choice Questions, Easy-type Questions and Sample Table of Test Specifications	99
Appendices	101
Appendix 1: Structure of The Senior High School Internal Assessment and Transcript System	101
Appendix 2: Excerpts from The Teacher Assessment Manual and Toolkit	109
Appendix 3: Teacher Lesson Observation Form	143
Appendix 4: How to Check CPD Points and Training Records on Teacher Portal Ghana	147
List of Contributors	150

Introduction

This Professional Learning Community (PLC) Handbook is designed to enable teachers to deliver effective lessons for Year One of the new 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 Materials which are available on the curriculum microsite;
- iii. Contains assessment strategies which are aligned with the Teacher Manual, Learner Materials 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) *Classwork/Homework*: This assessment can be conducted after week 2 in the first semester. For the second semester, it can be conducted from week 13. It is recommended to have at least 2 Individual Class Assessments in each semester. The best scored or average among the assessments per semester should be recorded in the transcript.
- b) *Individual Project*: It is recommended to be assigned by week 13 to be submitted latest by week 21 in the second semester. Sample has been provided in week 13 of the PLC Handbook. The scores should be recorded in the transcript.
- c) *Group Projects*: It is suggested to be done in the first semester. It has been recommended to be given in week 2 and submitted in week 9. An example of the guidelines has been laid out in week 2 of the PLC Handbook and scores should be entered into the transcript.

- d) *Portfolio Assessments (Individual)*: This is a year-long activity where learners gather pieces of work over the entire academic year. It has been recommended to be given in week 1 and submitted in the second semester by week 23. Sample portfolio assessment has been provided in week 1 of the PLC Handbook.
- e) *Mid-semester-examination*: This Assessment is proposed to be conducted in week 6 for first semester and week 18 for the second semester. It is mandatory to have the scores of this examination recorded in the transcript.
- f) *End of semester examination*: This is the final assessment of each semester. It is suggested to be conducted at the end of the first and second semesters. It is recommended to be discussed in PLC sessions 12 and 24. The scores for these assessments are to be recorded in the transcript.
- g) *Unannounced quizzes*: It can be conducted after week 4 of the first semester, following the guidelines and examples provided in week 3 of the PLC Handbook. In the second semester, these quizzes can be introduced starting from week 15. It is recommended to administer at least two unannounced quizzes per semester.
- h) *Critiquing and peer assessments*: It should be introduced as ongoing assessment activity throughout the semester, beginning after week 2 in the first semester, with reference to the framework provided in week 5 of the PLC Handbook. In the second semester, these activities should be incorporated starting from week 15. It is suggested to conduct at least one peer assessment sessions each semester.
- i) *Questioning*: It must be integrated into the assessment course after week 2 of the first semester, guided by the example provided in week 10 of the PLC Handbook. In the second semester, this strategy can be employed beginning from week 14. It is advisable to include at least two formal questioning sessions each semester.
- j) *Research projects and presentations*: It should be assigned after week 7 in the first semester, in alignment with the guidelines presented in week 7 of the PLC Handbook. For the second semester, it's advisable to initiate these projects starting from week 13. Each semester should include at least one research-based assessments, where learners explore topics in depth to reflect their analytical and research skills.
- k) *Poster presentations*: It should be scheduled from week 5 in the first semester, following the structure outlined in week 11 of the PLC Handbook. For the second semester, these presentations can be initiated from week 14 onward. It is recommended to have learner's complete at least two poster presentations each semester.

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

PLC SESSION 1: Real Number System

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, 2a and 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, 2a and 2e).

2. Review of learning plans (60 minutes)

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

Purpose

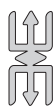
The purpose of the session is to review the learning plan for *week 1* by aligning the plan with the Learner Material and appropriate assessment strategies.

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 scheme for the learning indicators for the week.
- 2.2 Review the pedagogical approaches proposed for teaching *week 1* in your learning plan, identify activities that align with those in the Learner Material. Indicate the activity(ies) in your learning plan (NTS 2a, 2f, 3a and 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 **classwork (group)** (NTS 3k–3p).

E.g.

1. Investigate and classify each of the following as either a rational or an irrational number.
 - a. 75%
 - b. 0.7142857142857143.

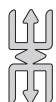
Refer to Session 1 of the Learner Material (LM), Teacher Manual (TM) Year 1 Book 1 pages 19–20 for more assessment tasks.

Hint



Portfolio assessment for the academic year commences in week 1 and to be submitted in week 23.

Refer to **Appendix A** of this Session and Teacher Assessment Manual and Toolkit pages 27–31 for more information on how to organise a 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.

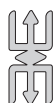
- a) To know whether 75% is a rational number or not,

Start by writing 75% as a fraction: $75\% = \frac{75}{100}$ (**Method: 1 mark**)

Then, simplify the fraction of both numerator and the denominator by their greatest common divisor: $\frac{75 \div 25}{100 \div 25} = \frac{3}{4}$ (**Accuracy: 1 mark**)

So, 75% as a simplified fraction is $75\% = \frac{75}{100} = \frac{3}{4}$

Therefore, 75% is a rational number because it can be expressed as a fraction.



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) Give prior information to learners about the class work before the start of the lesson.

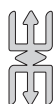
- b) Ask learners to remain in their groups from the class activities and provide each group with a task sheet containing set of operations to investigate etc.

Refer to the Teacher Assessment Manual and Toolkit (TAMT) pages 80–83 for more data on classwork assessment.

- 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.

Provide learners with the scoring rubrics and distribute the scripts for peer assessments and facilitate discussion on them, 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 and record their assessment scores in the required format and document where appropriate (NTS 3l–3n).
 - b) read PLC Session 2 and related Learner Materials (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 Portfolio Assessment

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

1. **Task:** Ask learners to put together their works for the academic year i.e. from the beginning of the first semester and be submitted at the end of the academic year and submit for portfolio assessment. Pieces of work learner must put together includes assignments, projects, quizzes, tests, reflective pieces, and mid and end of semester papers. The portfolio will be assessed to gauge the overall understanding and development of each student throughout the academic year.
2. **Example of structure and organisation of the Portfolio Assessment**
As part of the structure of the portfolio assessment, make sure the following information has been provided:
 - a) Cover Page which entails the learner's name, class, subject and period/date.
 - b) Table of Contents which has the list of items included with page numbers.
 - c) Brief description/background of items such as short description of the significance of sports certificates and awards, background information for each included artefact etc.
3. **Example of learners' works to be included in the Portfolio Assessment**
 - a) Assignments
 - b) Projects
 - c) Quizzes and Tests
 - d) Reflective Pieces
 - e) Mid-semester and end of semester papers
4. **Sample mode of administration**
 - a. Explain the purpose and components of the portfolio to the learners and provide examples and templates for each section.
 - b. Schedule periodic reviews (e.g., every 3–4 weeks) to ensure learners are keeping up with their portfolios and provide feedback and guidance during these checkpoints.
 - c. Provide learners with the scoring rubrics and provide detailed explanation on the rubrics.
 - d. Final portfolios are due in week 22 of the academic calendar. Allow a grace period for revisions based on final feedback.
5. **Sample mode of submission/presentation**
 - a. Communicate the final deadline for portfolio submission to all students to ensure timely and complete submissions.

- b. Learners will submit their completed portfolios either as a physical or through the school's online submission system.
- c. Ensure the portfolio includes all required elements: assignments, projects, quizzes, tests, reflective pieces, class participation records, and a final reflection.
- d. Learners should organise their portfolios clearly and logically, with each component clearly labelled and easy to access.
- e. For digital submissions, learners should upload their portfolios as a single file or in clearly marked folders within the online portal.

6. Sample feedback strategy

- a) Schedule periodic check-ins to discuss progress, set goals, and adjust strategies as needed.
- b) Utilise both formative and summative feedback to guide students' development and ensure they understand how to enhance their work continuously.

7. Sample Portfolio Assessment Marking scheme

Learner's works	Score
Assignments/Exercises	10 marks
Projects/Case studies	10 marks
Quizzes and Tests	10 marks
Reflective Pieces	5 marks
Mid-semester and End of semester Papers	5 marks
Total marks	40 marks

PLC SESSION 2: Properties of Sets Operations

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, 1f, 2a, 2e, 3e, 3j, 3k and 3p).
- b) you found challenging (NTS 1a, 1b, 2a, 2e, 3e, 3j, 3k and 3p).

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 and 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.

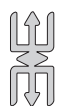
Learning Outcome

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 activity(ies) in your learning plan (NTS 2a, 2f, 3a, and 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 presentations** (NTS 3k–3p).

E.g.

Mr. Donkoh surveyed the favourite breakfast of SHS 1 Science Class. It showed that 40 learners liked tea, 30 liked rice porridge and 20 liked both. How many people liked tea and rice porridge but not both? Explain your process using the properties of subsets etc.

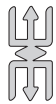
Refer to Section 2 of the Learner Material (LM), Teacher Manual (TM) Year 1 Book 1 page 25 for more assessment tasks.

Hint



Group project for the semester commences in the week 2 and must be submitted by week 9

*(Refer to the Teacher Assessment Manual and Toolkit–Page 34–36 and **Appendix B** of the PLC Handbook for further information).*



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.

Let T be the set of learners who liked tea and R be the learners who liked rice porridge.

$$T = 40$$

$$R = 30$$

$$(T \cap R) = 20 \quad \text{(Method: 1 mark)}$$

Using the principle of inclusion–exclusion:

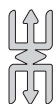
$$(T \cup R) = T + R - (T \cap R)$$

$$= 40 + 30 - 20$$

$$= 50 \quad \text{(Method: 1 mark)}$$

The number of learner's liked either tea or rice porridge but not both:

$$(T \cup R) - (T \cap R) = 50 - 20 = 30 \quad \text{(Accuracy: 1 mark)}$$

**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 3l – 3p).

E.g.

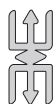
Inform learners about the upcoming group presentations at the beginning of the day's lesson to ensure they are prepared and focused on the lesson and with learners in their pre-existing groups, hand out a worksheet containing questions/write the questions on the whiteboard about 60 minutes into the lesson etc.

Refer to Teacher Assessment Manual and Toolkit, pages 80–83 for more information.

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.

Whole Class Review: Go over the answers in class by writing/projecting on the board/projector, discussing each question and explaining the correct reasoning and methods 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 and record their assessment scores in the required format and document 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: Sample Group Project

1. Sample Group Project Work

Task: Investigate the connections between fractions and decimal numbers and establish additive and multiplicative inverses of fractions using multi-purpose model charts.

2. Sample mode of administration

- a) Put learners into small and convenient ability/gender groups.
- b) Task each group to conduct a well research group project on the topic, make a written report for presentation and award marks.
- c) Inform learners of the length of the project E.g.2–3 pages long.
- d) The content of the project should have in detail the following:
 - i. Clear and concise introduction to the concepts of fractions and decimal numbers.
 - i. Detailed explanations of how fractions and decimal numbers are related, including conversions and comparisons.
 - ii. Demonstrate the concept of additive and multiplicative inverses of fractions using multi-purpose model charts.
 - iii. Summarise the key points and findings of the project.
- e) Set interim deadlines for various stages of the project to monitor progress. For example, require learners to submit a project proposal by week 3, a draft of their model charts by week 6 and the final project by week 9.

3. Sample detailed guidelines for project work

Guideline	Description
a) Project Topic	Choose a relevant and interesting topic that fits the curriculum.
b) Research and Planning	Do thorough research. Make a plan with steps, resources, and timelines.
c) Objectives	Clearly state what you aim to achieve and the questions you want to answer.
d) Methodology	Describe the methods for collecting and analysing data. Ensure they fit your goals.
e) Resources	List all needed books, articles, tools, and materials.
f) Time Management	Create a timeline with deadlines to stay on track.
g) Collaboration	If in a group, assign clear roles and communicate effectively.
h) Documentation	Keep detailed records of your research and processes.

Guideline	Description
i) Presentation	Plan how to present your project clearly and engagingly.
j) Review and Feedback	Get feedback from teachers and peers and use it to improve your work.
k) Reflection	Think about what went well, what was challenging, and how you can improve next time.

4. Sample presentation guide

- Each group should be given 10–15 minutes to present.
- Groups must clearly explain the connections between fractions and decimal numbers.
- Groups must also demonstrate the concept of additive and multiplicative inverses of fractions using multi-purpose model charts.
- Each group must use visual aids such as charts, graphs, and slides to illustrate points.
- The groups must include an interactive element, such as a short quiz or a question-and-answer session, to engage peers.

5. Sample feedback strategy

During and After Presentations

- Provide learners with the scoring rubrics.
- Distribute the results to learners and facilitate a discussion on them.
- Provide immediate feedback, highlighting strengths, areas for improvement, and commend creativity and understanding.
- After the presentations, encourage peer feedback to foster a collaborative learning environment.

Written Reports

- Provide detailed comments on the written reports, focusing on content, clarity, and organisation.
- Suggest additional resources or exercises to help reinforce concepts if needed.

6. Sample scoring guide for the project work

Scoring Criteria	Score
a) Clear and in-depth explanation of fractions and decimal numbers.	5 marks
b) Effectiveness in showing how fractions and decimal numbers are connected.	5 marks
c) Appropriateness and variety of examples provided.	3 marks
d) Clarity in explaining additive and multiplicative inverses.	6 marks
e) Effectiveness in using multi-purpose model charts to demonstrate concepts.	6 marks
f) Clarity and Organisation During Presentations.	5 marks
g) Level of engagement and interaction with the audience/peers.	5 marks
h) Quality of the written report in terms of content, clarity, and organisation	5 marks
Total marks	40 marks

PLC SESSION 3: Properties of Subsets

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, 2a and 2e).
- b) you found challenging (NTS 1a, 1b, 2a and 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, 3d and 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.

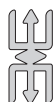
Learning Outcome

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 activity(ies) in your learning plan (NTS 2a, 2f, 3a and 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 **unannounced quiz (Individual)** (NTS 3k- 3p).

E.g.

Mr. Sey, the Mathematics Teacher surveyed 50 learners in the Home Economics Class on the number of quizzes they wrote in the first semester. He found that 20 learners wrote the first quiz, 15 wrote the second quiz, and 10 wrote the third. Also, 5 learners wrote the first and second quizzes, 3 wrote the second and third quizzes, and 2 wrote the first and third quizzes. If 1 learner wrote all three quizzes, determine the number of learner's who write exactly one quiz, exactly two quizzes, and all three quizzes. Show your reasoning using a Venn diagram.

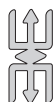
Refer to Section 3 of the Learner Material (LM) and Teacher Manual (TM) Year 1 Book 1 pages 30 for more assessment tasks.

Hint



Case Study assessment for the semester should be given to learners in week 3 and submitted in week 5.

Refer to pages 31–34 of the TAMT and **Appendix C** of this session for detailed data on case study guidelines.



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.

Number of learners who wrote the first quiz (A): $n(A) = 20$

Number of learners who wrote the second quiz (B): $n(B) = 15$

Number of learners who wrote the third quiz (C): $n(C) = 10$

Number of learners who wrote both the first and second quizzes ($A \cap B$): $n(A \cap B) = 5$

Number of learners who wrote both the second and third quizzes ($B \cap C$): $n(B \cap C) = 3$

Number of learners who wrote both the first and third quizzes ($A \cap C$): $n(A \cap C) = 2$

Number of learners who wrote all three quizzes ($A \cap B \cap C$): $n(A \cap B \cap C) = 1$ (**Method: 2marks**)

Therefore,

$$n(A \cap B \cap C) = 1$$

$$n(A \cap B) - n(A \cap B \cap C) = 5 - 1 = 4$$

$$n(B \cap C) - n(A \cap B \cap C) = 3 - 1 = 2$$

$$n(A \cap C) - n(A \cap B \cap C) = 2 - 1 = 1$$

(Method: 2 marks)*Learners who wrote only the first quiz:*

$$n(A) - (n(A \cap B) + n(A \cap C) - n(A \cap B \cap C)) = 20 - (4 + 1) = 15$$

(Accuracy: 1 mark)*Learners who wrote only the second quiz:*

$$n(B) - (n(A \cap B) + n(B \cap C) - n(A \cap B \cap C)) = 15 - (4 + 2) = 9$$

(Accuracy: 1 mark)*Learners who wrote only the third quiz:*

$$n(C) - (n(A \cap C) + n(B \cap C) - n(A \cap B \cap C)) = 10 - (1 + 2) = 7$$

(Accuracy: 1 mark)*Now,**The number of students:*

$$\text{who wrote exactly one quiz: } 15 + 9 + 7 = 31$$

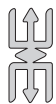
$$\text{who wrote exactly two quizzes: } 4 + 2 + 1 = 7$$

$$\text{who wrote all three quizzes: } 1$$

(Accuracy: 1 mark each)*Check for Consistency:*

$$\text{Total number of students who wrote the quizzes} = 31 + 7 + 1 = 39$$

Since there are 50 learners in the class, it means 11 did not take part in the three quizzes because $50 - 39 = 11$.

**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.

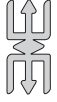
Inform learners 30 minutes to the end of the class that an unannounced (pop) quiz will be conducted and distribute the quiz papers to individual learners immediately after the announcement, etc.

Refer to Teacher Assessment Manual and Toolkit pages 80–83 for more information on how to administer class quiz.

- 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.

After collecting the quiz papers, review the answers with the class, 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 and record their assessment scores in the required format and document 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).



Appendix C: Example of Case Study Assessment

1. Task

You are part of a data analysis team at Queen's ventures. Queen's ventures want to analyse customer purchasing patterns to improve marketing strategies. You have access to three distinct datasets:

Dataset A: Customers who purchased electronics in the past year.

Dataset B: Customers who purchased clothing in the past year.

Dataset C: Customers who purchased groceries in the past year.

- a) Explain the intersection and union of Sets A, B, and C.
- b) Explain the concept of the union of sets A, B, and C. Provide a real-life example involving the datasets.
- c) Discuss the importance of understanding set operations in the context of data management.
- d) Discuss why it is important for the data analysis team to understand set operations when managing and analysing customer data.

2. Mode of Administration

- a) Begin the lesson with a brief explanation on sets, set operations, and De Morgan's law.
- b) Use interactive examples to illustrate the concepts.
- c) Divide learners into small and convenient gender/ability groups.
- d) Assign each group a specific set operation to explore and present their findings using Venn diagrams.
- e) Provide each group with a worksheet containing problems related to set equations and De Morgan's law and allow time for groups to solve the problems.

3. Feedback

a. Oral Feedback

- i. Review the set operations and De Morgan's law in class.
- ii. Provide immediate oral feedback on the group presentations.
- iii. Highlight correct reasoning and address misconceptions.

b. Written Feedback

- i. Grade the individual worksheets and quiz.
- ii. Provide written feedback on specific strengths and areas for improvement.

c. Follow-Up Activity

Assign homework that reinforces the set operations and De Morgan's law.

4. Sample guide for scoring the case study assessment

Criteria	Excellent (5)	Good (3)	Needs Improvement (1)
Understanding Set Operations and De Morgan's Laws	Demonstrates a thorough understanding with no errors.	Demonstrates a good understanding with minor errors.	Demonstrates limited understanding with major errors.
Venn Diagrams	Diagrams are accurate and well-labelled.	Diagrams are mostly accurate with minor labelling issues.	Diagrams are inaccurate or poorly labelled.
Real-World Application	Application is highly relevant and detailed.	Application is mostly relevant with minor gaps.	Application is irrelevant or lacks detail.
Group Presentation	The presentation is well-organised, clear, and engaging.	The presentation is mostly organised and clear with minor engagement issues.	The presentation is disorganised and unclear with little engagement.
Written Report	The report is comprehensive, well-organised, and error-free.	The report is mostly comprehensive and well-organised with minor errors.	The report is incomplete, disorganised, and contains major errors.

PLC SESSION 4: Concepts and Operations of Fractions

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, 2a and 2e).
- b) you found challenging (NTS 1a, 1b, 2a and 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 2a, 2f, 3a and 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.

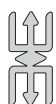
Learning Outcome

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 activity(ies) in your learning plan (NTS 2a, 2f, 3a and 3j).



Note

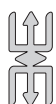
The selected activities should be included in the teacher/learner activity section of the learning plan.

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 (individual)** (NTS 3k–3p).

E.g.

- Ameen divided his piece of pizza is divided into 8 equal slices. If he eats 3 slices, what fraction of the pizza did he eat? Convert this fraction to a decimal.
- Alberta has a piece of ribbon that is 3.75 meters long. She cut it into pieces that are each $\frac{3}{4}$ meter long. How many pieces of ribbon does she have?
- A recipe calls for $\frac{2}{3}$ cup of sugar. If you want to make half of the recipe, how much sugar do you need in decimal form?

Refer to Section 4 of the Learner Material (LM) and Year 1 Book 1 page 42 of the Teacher Manual (TM) for more assessment tasks.

**Note**

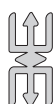
- The assessment tasks/items may cover levels 1 to 4 where appropriate to ensure that assessment is differentiated for all.
- The selected activities should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities of the learning plan.

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.

- $\frac{3}{8}$ of the pizza. Decimal: 0.375
- $3.75 \div \frac{3}{4} = 3.75 \times \frac{4}{3} = 5$ piece

(Award 1 mark each for method and accuracy).

**Note**

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

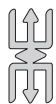
Project or print or write the assignment on the board at the end of the lesson and give clear written instructions on what is expected, including fraction-to-decimal conversion, etc.

Refer to pages 57-60 of the Teacher Assessment Manual and Toolkit for more information on administration of homework.

- 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.

Use a scoring rubric to ensure consistency in marking and feedback and provide personalised feedback on each assignment, 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 4 and provide feedback on your lesson (NTS 1f, 3g).
- 3.4** 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: Problem Solving on Common Fractions

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, 2a and 2e).
- b) you found challenging (NTS 1a, 1b, 2a and 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, 3d and 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.

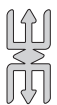
Learning Outcome

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 activity(ies) in your learning plan (NTS 2a, 2f, 3a and 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 **critiquing and peer assessment** (NTS 3k–3p).

E.g.

- Convert $12\frac{1}{2}\%$ into a fraction.
- Mr. Kofi Abekah, the farm manager is calculating the percentage of progress for a school project, and has completed 5 out of the 8 planned tasks. How will you help him to represent the completion rate as a decimal rounded to two decimal places?

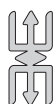
Refer to Section 5 of the Learner Material (LM) and Year 1 Book 1 page 46 of the Teacher Manual (TM) for more assessment tasks.

Hint



Submission and discussion of case study assignment/report from week 3.

Refer to the TAMT pages 80–83 and **Appendix D** of this session for more data on case study and discussion assessments.



Note

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

Step 1: Convert $12\frac{1}{2}\%$ into an improper fraction.

$$\text{Thus, } 12\frac{1}{2}\% = \frac{25}{2}\%$$

(Method: 1 mark)

Step 2: Replace the percent symbol (%) with $\frac{1}{100}$.

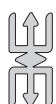
$$\text{So, } 12\frac{1}{2}\% = \frac{25}{2} \times \frac{1}{100} = \frac{25}{200}$$

(Method: 1 mark)

Step 3: Reduce it to the lowest form, to get $12\frac{1}{2}\% = \frac{1}{8}$.

$$\text{Conclude that } 12\frac{1}{2}\% = \frac{1}{8}$$

(Accuracy: 1 mark)



Note

- 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.
- 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.

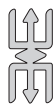
- a) *Inform the class about the mode of assessment in your introduction and the form it will take i.e. individual learners will be invited to the board to make submissions whiles their make mates/colleagues critique them.*
- b) *About 45 minutes to the end of the lesson, hand out a worksheet containing questions or write the questions on the board, etc.*

Refer to the Teacher Assessment Manual Toolkit, pages 74–77 (critiquing assessment) and 91–94 (peer assessment) for more information.

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.

Begin by pointing out what the person did well and acknowledge their effort before providing constructive criticism, 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).



Appendix D: Sample Guide on Submission and Discussion Case Study Report from Learner

1. Once case reports are collected either by soft/hard copy, check that all required parts are included.
2. Grade each work using the provided marking scheme. Write specific comments about what was done well and what could be improved.
3. After grading, have a class discussion to talk about scoring rubrics, common issues and misunderstandings. Offer detailed feedback, noting correct calculations and explanations. Identify and address any errors, provide suggestions for improvement and highlight some good examples.
4. Offer one-on-one meetings for learners who need extra help. Discuss their work and suggest ways they can improve.
5. Assign extra practice or a small project on common problem areas to help learners improve their understanding.

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, 2a and 2e).
- b) you found challenging (NTS 1a, 1b, 2a and 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, 3d and 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.

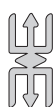
Learning Outcomes

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 Materials 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 activity(ies) in your learning plan (NTS 2a, 2f, 3a and 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.

Multiple choice question

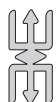
What is the result of $(A \cap B)'$ using DeMorgan's law?

- A) $A' \cup B'$
- B) $A' \cap B'$
- C) $(A \cup B)'$
- D) $(A \cup B)'$

Essay type question

- a) Using sets $A = \{1, 2, 3\}$, $B = \{2, 3, 4\}$, and $C = \{3, 4, 5\}$, find the
- (i) union,
 - (ii) intersection,
 - (iii) difference of these sets.
 - (iv) explain each operation.

Refer to Section 1 of the Learner Material (LM) and Year 1 Book 1 Sessions 1–5 of the Teacher Manual (TM) for more assessment 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.

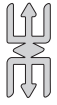
MCQ

Correct answer: A

Essay type question

- a) i. Union $(A \cup B \cup C): \{1, 2, 3, 4, 5\}$ Because union includes all elements from all sets.
- ii. Intersection $(A \cap B \cap C): \{3\}$ Because intersection includes only the common elements from all sets.

- iii. Difference $(A - B): \{1\}$ Because difference $(A - B)$ includes elements in A that are not in B. **(Award 1 mark each for correct method and accuracy)**



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.

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

E.g.

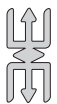
- a) Give prior announcement on the review session at least one week before the Test.
Supply a detailed syllabus of topics to be covered to learners.
- b) The examination should comprise at least twenty multiple-choice questions and at least four essay-type questions and must be scored out of 40 marks, etc.

Refer to **Appendix E** of this session for more information on the mid-semester examination.

- 2.5** 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.

Share the scoring guide with the class and conduct a review session to discuss common errors and misconceptions, 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).
- 2.3** 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 E: Sample Principles to Consider when developing Multiple Choice and Essay-Type Questions

1. Sample of principles to consider when designing effective multiple-choice questions (MCQ's)

- Write clear and concise questions (stems) that are easy to understand.
- Ensure that each question aligns with the learning objectives and the material covered in the course.
- Include distractors (incorrect options) that are plausible and closely related to the correct answer.
- Ensure there is only one unambiguously correct answer for each question. Avoid “all of the above” or “none of the above” options, which can sometimes confuse or mislead students.
- Design questions with varying levels of difficulty to differentiate between different levels of students understanding.
- Ensure that questions are free from cultural, linguistic, or gender bias. Use language and contexts that are accessible and fair to all learners, regardless of their background.

2. Sample of principles to consider in developing essay-type questions

- Avoid vague or complex wording that might confuse learners.
- The question should be relevant to the learning objectives and the material covered in the course.
- Design questions that allow for a comprehensive exploration of the topic.
- Formulate questions that require analysis, synthesis, and evaluation rather than mere recall of facts.
- Ensure the question is fair to all learners, considering their diverse backgrounds and abilities.
- Clearly define and communicate the criteria for grading the essay.

3. Sample Table of Test Specifications for developing Multiple Choice Questions

Learning Indicators	Level 1	Level 2	Total
a) Develop the real number system using the closure property.	2	1	3
b) Distinguish between rational and irrational numbers.	1	1	2
c) Establish properties of operations of real numbers.	1	3	4
d) Review the properties of subsets (two and three).	3	1	4
e) Organise information visually to establish the relationship between and among sets of items.	2	2	4
f) Establish the relationship between and among three sets, including de Morgan's law.		3	3
Total	9	11	20

PLC SESSION 7: Application of Percentages

1. Introduction (20 minutes)

- 1.1** Share one thing on the lesson for week 6 and mid-semester examination that:
 - a. went well (NTS 1a, 1b, 2a and 2e).
 - b. you found challenging (NTS 1a, 1b, 2a and 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, 3d and 3j).

2. Review of Learning Plans (60 minutes)

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

Purpose

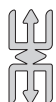
The purpose of the session is to review the learning plan for week 7 by aligning the learning plan with Learner Material and appropriate assessment strategies.

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 2a, 2f, 3a and 3j).



Note

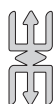
The selected activities should be included in the teacher/learner activity section of the learning plan.

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 **research work** (NTS 3k–3p).

E.g.

In a two-page report, research into the applications of fractions, percentages, and decimals in real-life scenarios, particularly in personal or household finance (such as utility bills, exchange rates, project budgeting, school fees, shopping, etc.

*Refer to Section 7 of the Learner Material (LM) and Year 1 Book 1 page 56 of the Teacher Manual (TM) for more assessment tasks. See **Appendix F** for more information on the outline for writing reports.*



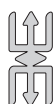
Note

- 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.

Criteria	Scores
a) Clarity in explaining how fractions, percentages, and decimals are applied with regards to relevance and variety of examples used.	5 marks
b) Effectiveness and appropriateness and accuracy of applying fractions, percentages, and decimals in real-world scenarios in personal or household finance.	5 marks
c) Proper formatting and organisation of the report.	4 marks
d) Effectiveness and quality of visual aids (charts, graphs, diagrams) in enhancing understanding.	3 marks
e) Clear summary of key points and reflection on the importance of the concepts analysed and applied.	3 marks
Total marks	20 marks



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.

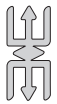
Give out task sheets to convenient groups to research and make presentations on the applications of fractions and decimals to various household finances such as utility bill, school fees, etc.

Refer to Teacher Assessment Manual and Toolkit, pages 107–110 for more on administration procedures.

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.

Provide clear instructions and examples during the assignment briefing and schedule a mid-point check (early part of week 8) where learners submit a brief outline or draft of their assignment, 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:

- provide constructive feedback to learners and record their assessment scores in the required format and document where appropriate (NTS 3l–3n).
- read PLC Session 8 and related Learner Material (NTS 3a).
- bring along your Teacher Manual, PLC Handbook and learning plan on week 8 in preparation for the next session (NTS 3a).



Appendix F: Sample Outline for Writing Report

- a. **Introduction:** Overview of the importance of fractions, percentages, and decimals in daily activities and personal finance.
- b. **Analysis of Daily Activities/Issues/Businesses**
Example 1: Analysis of a specific business scenario involving percentages (e.g., calculating discounts during sales).
Example 2: Analysis of a daily activity involving fractions (e.g., cooking recipes).
Example 3: Analysis of an issue involving decimals (e.g. measuring, converting units).
- c. **Application to Personal/Household Finance**
 - i. Explanation of the chosen area (e.g., budgeting for a household project).
 - ii. Step-by-step demonstration of how fractions, percentages, and decimals are used to manage or solve problems in this area.
- d. **Conclusion**
 - i. Summary of key points from the analysis and application.
 - ii. Reflection on the significance of understanding these mathematical concepts in daily life.

PLC SESSION 8: Simple and Compound Interest

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, 2a and 2e).
- b. you found challenging (NTS 1a, 1b, 2a and 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, 3d and 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.

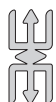
Learning Outcomes

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 2a, 2f, 3a and 3j).



Note

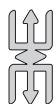
The selected activities should be included in the teacher/learner activity section of the learning plan.

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 **discussion** (NTS 3k-3p).

E.g.

Factorise the quadratic equation $x^2 - 5x + 6 = 0$ using the quadratic formula.

Refer to Section 8 of the Learner Material (LM) and Year 1 Book 1 page 61 of the Teacher Manual (TM) for more assessment 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.

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

(Method: 1 mark)

For $x^2 - 5x + 6 = 0$, $a = 1$, $b = -5$ and $c = 6$

$$x = \frac{-(-5) \pm \sqrt{5^2 - 4(1)(6)}}{2(1)}$$

(Method: 1 mark)

$$x = \frac{5 \pm \sqrt{25 - 24}}{2}$$

(Method: 1 mark)

$$x = \frac{5 \pm 1}{2}$$

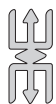
(Method: 1 mark)

$$x = 3 \text{ or } x = 2$$

(Method: 1 mark)

So the quadratic equations can be factored as $(x - 3)(x - 2) = 0$.

Thus, $x^2 - 5x + 6$ factorises to $(x - 3)(x - 2)$. (Accuracy: 1mark)



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.

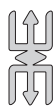
- a) *Inform learners about the upcoming discussion assessment at the beginning of the lesson.*
- b) *Before the end of the lesson (i.e. 40 minutes), hand out a worksheet containing questions or write the questions on the board, etc.*

Refer to the Teacher Assessment Manual and Toolkit pages 66–69, for more information on discussion 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.

Share the scoring rubric with the learners and provide immediate feedback during class discussion by highlighting good strategies and clear 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 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: Number Patterns and Algebraic Expressions

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, 2a and 2e).
- b) you found challenging (NTS 1a, 1b, 2a and 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, 3d and 3j).

2. Review of Learning Plans (60 minutes)

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

Purpose

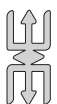
The purpose of the session is to review the learning plan for week 9 by aligning the learning plan with Learner Material and appropriate assessment strategies.

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/marketing 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 2a, 2f, 3a and 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 **presentation and discussion of project work from the Case Study in week 3** (NTS 3k–3p).

E.g.

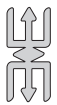
You are part of a data analysis team at Queen's ventures. Queen's ventures want to analyse customer purchasing patterns to improve marketing strategies. You have access to three distinct datasets:

Dataset A: Customers who purchased electronics in the past year.

Dataset B: Customers who purchased clothing in the past year.

Dataset C: Customers who purchased groceries in the past year.

- Explain the intersection and union of Sets A, B, and C.*
- Explain the concept of the union of sets A, B, and C. Provide a real-life example involving the datasets.*
- Discuss the importance of understanding set operations in the context of data management.*
- Discuss why it is important for the data analysis team to understand set operations when managing and analysing customer data.*



Note

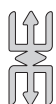
- The assessment tasks/items may cover levels 1 to 4 where appropriate to ensure that assessment is differentiated for all.*
- The selected activities should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities of the learning plan.*

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.

Criteria	Excellent (3)	Good (2)	Needs Improvement (1)
Understanding Set Operations and De Morgan's Laws	<i>Demonstrates a thorough understanding with no errors.</i>	<i>Demonstrates a good understanding with minor errors.</i>	<i>Demonstrates limited understanding with major errors.</i>
Venn Diagrams	<i>Diagrams are accurate and well-labelled.</i>	<i>Diagrams are mostly accurate with minor labelling issues.</i>	<i>Diagrams are inaccurate or poorly labelled.</i>
Real-World Application	<i>Application is highly relevant and detailed.</i>	<i>Application is mostly relevant with minor gaps.</i>	<i>Application is irrelevant or lacks detail.</i>

Criteria	Excellent (3)	Good (2)	Needs Improvement (1)
Group Presentation	<i>The presentation is well-organised, clear, and engaging.</i>	<i>The presentation is mostly organised and clear with minor engagement issues.</i>	<i>The presentation is disorganised and unclear with little engagement.</i>
Written Report	<i>The report is comprehensive, well-organised, and error-free.</i>	<i>The report is mostly comprehensive and well-organised with minor errors.</i>	<i>The report is incomplete, disorganised, and contains major errors.</i>

**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.

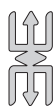
- a) *Grant each group about 10 minutes to make their presentations. However, this can be modified depending on the class sizes and number of groups.*
- b) *Ensure that groups clearly explain the connections between fractions and decimal numbers, etc.*

Refer to Teacher Assessment Manual and Toolkit pages 80–83 and Session 3 of this PLC Handbook for more information.

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.

- a) *Provide detailed written feedback on each learner's performance, highlighting strengths and areas for improvement.*
- b) *Conduct a review session (using the scoring guide) to discuss common errors and misconceptions, 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 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: Perfect Squares and Algebraic Fractions

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, 2a and 2e).
- b. you found challenging (NTS 1a, 1b, 2a and 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, 3d and 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.

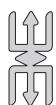
Learning Outcome

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 2a, 2f, 3a and 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** (NTS 3k– 3p).

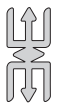
E.g.

1. Find the value of x which makes the expressions undefined.

a) $\frac{(2x-1)(x-4)}{4x^2-1}$

b) $\frac{3}{x-1}$

Refer to Section 10 of the Learner Material (LM) and Year 1 Book 1 pages 79–81–of the Teacher Manual (TM) for more assessment 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.

a) For the expression $\frac{(2x-1)(x-4)}{4x^2-1}$ to be undefined, the denominator

$4x^2 - 1$ must be equal to zero:

$$4x^2 - 1 = 0$$

(Method: 1 mark)

This can be factored as a difference of squares:

$$(2x+1)(2x-1) = 0$$

(Method: 1 mark)

Setting each factor to zero:

$$2x+1 = 0 \text{ or } 2x-1 = 0$$

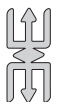
(Method: 1 mark)

Solving for x in each case:

$$x = -\frac{1}{2} \text{ or } x = \frac{1}{2}$$

(Accuracy: 1 mark)

Therefore, the expression is undefined at $x = -\frac{1}{2}$ and $x = \frac{1}{2}$.



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) *Encourage individual learners to present their answers(step-by-step) to the class while their mates ask probing questions for insight to each step for explanations, etc.*

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

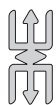
2.6 Discuss how to provide feedback, and where appropriate, record and submit the assessment scores for each learner in the class (NTS 3l–3n).

E.g.

After the results from the questioning, provide constructive criticisms through the review of the keys and concepts with the class and address common mistakes, etc.

Follow-Up Activity

You can also assign a few additional practice problems based on the common errors observed and encourage peer review sessions where learners can discuss their solutions and learn from 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 10 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).
- read PLC Session 11 and related Learner Material (NTS 3a).
- bring along your Teacher Manual, PLC Handbook and learning plan on week 11 in preparation for the next session (NTS 3a).

PLC SESSION 11: Change of Subjects, Linear equations and Inequalities

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, 2a and 2e).
- b. you found challenging (NTS 1a, 1b, 2a and 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, 3d and 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.

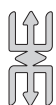
Learning Outcomes

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/markingscheme 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 2a, 2f, 3a and 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.

Solve for the variable indicated in the following equations.

a) $3x - 12 = 21$

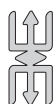
b) $5 - 3y = 3y + 7$

Refer to Section 11 of the Learner Material (LM) and Year 1 Book 1 page 90 of the Teacher Manual (TM) for more assessment tasks.

Hint



Inform learners of the upcoming end of semester examination in week 12 and provide the necessary and detailed guidelines such as the modalities, topics, etc.



Note

- The assessment tasks/items may cover levels 1 to 4 where appropriate to ensure that assessment is differentiated for all.
- 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) To solve $3x - 12 = 21$,

Add 12 to both sides of the equation, $3x = 33$ (Method: 1 mark)

Then divide both sides of the equation by 3, to make x the subject

$$x = \frac{33}{3} = 11 \quad \text{(Accuracy: 1 mark)}$$

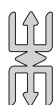
(b) To solve $5 - 3y = 3y + 7$

First group the like terms $5 - 7 = 3y + 3y$ (Method: 1 mark)

Simplify the terms $-2 = 6y$ (Method: 1 mark)

Make y the subject by dividing both sides by coefficient of y .

$$\text{Therefore } y = -\frac{1}{3} \quad \text{(Accuracy: 1 mark)}$$



Note

- 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.

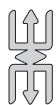
- a) *Inform learners about the upcoming class exercise and the mode of presentation, i.e. poster presentation, at the beginning of the day's lesson.*
- b) *Before the end of the lesson (i.e. 45 minutes), hand out a worksheet containing questions and give clear instructions i.e. write their answers on a big hard cardboard to be posted on the walls of the classroom, etc.*

Refer to Teacher Assessment Manual and Toolkit, pages 97–99 for further details on poster 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.

Review the answers in class by writing/projecting on the board/projector, discussing the answers to each question and explaining the correct reasoning and methods, 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, 2a and 2e).
- b. you found challenging (NTS 1a, 1b, 2a and 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, 3d and 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 term examination by aligning the learning plan with Learner Materials and appropriate assessment strategies.

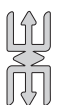
Learning Outcome

Review your learning plan for *week 12 and prepare for end of term 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 Materials 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 Materials. Indicate the activity(ies) in your learning plan (NTS 2a, 2f, 3a and 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).

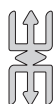
E.g.

If $A = \{1, 2, 3\}$ and $B = \{3, 4, 5\}$, what is $A \cap B$?

- A) $\{3\}$
- B) $\{3, 4\}$
- C) $\{3, 4, 5\}$
- D) $\{1, 2, 3, 4, 5\}$

Essay Type Question

Ms. Salomey has 20 items on her shopping list. At the market, she realised from her list that she had completed 40% of her shopping. Determine how many more items she has to buy?



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.

MCQ

Correct answer: B

Essay type question

She bought 40% of 20 = $\frac{40}{100} \times 20 = 8$,

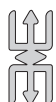
(Method: 1 mark)

She now has 60% of 20 = $\frac{60}{100} \times 20 = 12$ times to buy.

(Method: 1 mark)

Alternatively, she is left with $(20 - 8) = 12$ items to buy.

(Accuracy: 1 mark)



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.

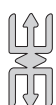
Provide a detailed syllabus outlining the topics to be covered in the test, etc.

*Refer to the TAMT pages 83–86 and pages 94–97 and **Appendix G** for more information.*

- 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.

Make the scoring rubrics available to the learners and encourage them to go through vis-à-vis their question papers during the vacation period, 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:
- provide constructive feedback to learners and record their assessment scores in the required format and document where appropriate (NTS 3l–3n).
 - read PLC Session 13 and related Learner Material (NTS 3a).
 - bring along your Teacher Manual, PLC Handbook and learning plan on week 13 in preparation for the next session (NTS 3a).



Appendix G: Sample Table of Specification for End of Semester Examination

1. Sample of principles to consider when designing effective multiple-choice questions (MCQ's)

- Write clear and concise questions (stems) that are easy to understand.
- Ensure that each question aligns with the learning objectives and the material covered in the course.
- Include distractors (incorrect options) that are plausible and closely related to the correct answer.
- Ensure there is only one unambiguously correct answer for each question. Avoid “all of the above” or “none of the above” options, which can sometimes confuse or mislead students.
- Design questions with varying levels of difficulty to differentiate between different levels of students understanding.
- Ensure that questions are free from cultural, linguistic, or gender bias. Use language and contexts that are accessible and fair to all learners, regardless of their background.

2. Sample of principles to consider in developing essay-type questions

- Avoid vague or complex wording that might confuse learners.
- The question should be relevant to the learning objectives and the material covered in the course.
- Design questions that allow for a comprehensive exploration of the topic.
- Formulate questions that require analysis, synthesis, and evaluation rather than mere recall of facts.
- Ensure the question is fair to all learners, considering their diverse backgrounds and abilities.
- Clearly define and communicate the criteria for grading the essay.

3. Sample Table of Specifications for developing Multiple Choice Questions

Learning Indicators	Level 1	Level 2	Level 3	Total
a. Analyse daily activities/issues/businesses involving fractions, percentages and decimals.	2	2		4
b. Establish appropriate procedures solving problems involving simple and compound interests.		4	2	6

Learning Indicators	Level 1	Level 2	Level 3	Total
c. Use numbers, patterns, and variables to formulate mathematical expressions and apply the algebraic order of the four operations to solve problems.	1	5	2	8
d. Factorisation of algebraic expressions.	3	3	1	7
e. Recognize perfect squares and apply the idea to solve problems including the difference of two squares of binomials.	2	3	1	6
f. Construct and interpret formulae for a given task and apply to problems involving a change of subjects.	2	5	2	9
Total	10	22	8	40

PLC SESSION 13: Gradient, Equations and Midpoint of 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, 2a and 2e).
 - b. you found challenging (NTS 1a, 1b, 2a and 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, 3d and 3j).

2. Review of Learning Plans (60 minutes)

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

Purpose

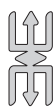
The purpose of the session is to review the learning plan for week 13 by aligning the learning plan with Learner Material and appropriate assessment strategies.

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 2a, 2f, 3a and 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 **classwork(group)** (NTS 3k-3p).

E.g.

- a) Determine the distance between the points.
 - (i) $P(2, 1)$ and $Q(5, 1)$
 - (ii) $A(7, -3)$ and $B(-1, 5)$
- b. Are the lines L_1 through $(2, 3)$ and $(4, 6)$ and L_2 through $(-4, 2)$ and $(0, 8)$ parallel, or do they intersect? Give reason for your answer.

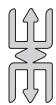
Refer to Section 13 of the Learner Material (LM) and Year 1-Book 1-page 106 of the Teacher Manual (TM) for more assessment tasks.

Hint



Individual project assessment for the semester commences in week 13 and must be submitted by week 22.

Refer to the Teacher Assessment Manual and Toolkit-Pages 80-83 and **Appendix B** 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.

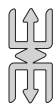
2.4 Discuss (and agree as a subject group) how you will develop the marking scheme/rubrics for scoring the assessment task(s)/item(s) for the week's recommended assessment (NTS 3k-3p).

E.g.

- (a) $P(2, 1)$ and $Q(5, 5)$

$$|PQ| = \sqrt{(5-2)^2 + (5-1)^2} = \sqrt{3^2 + 4^2} \quad \text{(Method: 2 marks)}$$

$$\therefore |PQ| = \sqrt{25} = 5 \text{ units.} \quad \text{(Accuracy: 1 mark)}$$



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).

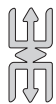
E.g.

- a) *Inform learners about the classwork at least one week before the lesson.*
- b) *Provide each pre-assigned group with a task sheet containing operations to investigate related to finding gradients, equations of straight lines, and distances between points, etc.*

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.

Collect group reports at the end of the class exercise for detailed review and provide written feedback on each work, focusing on the clarity, accuracy, and depth of the analysis, 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 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 14 in preparation for the next session (NTS 3a).



Appendix H: Sample Individual Project Work

1. Sample Individual Project Work

Task: Conduct a detailed investigation into the properties of straight lines in a coordinate plane. Your project should include the following:

- Determine the gradient and equation of straight lines based on given pairs of coordinates.
- Calculate the distance between two points on each straight line.
- Present your findings in a comprehensive report, supported by visual aids such as graphs and diagrams.

2. Sample mode of administration

- Provide students with a detailed project brief, including objectives, tasks, and submission requirements, and distribute it in both digital and print formats. Clearly outline the grading criteria and include the scoring rubric.
- Assign the project at least four weeks before the deadline and provide a timeline with key milestones, such as data collection completion, first draft of calculations, and final report preparation.
- Offer classroom sessions or workshops to explain key concepts, provide access to resources like textbooks and graphing software, and schedule regular check-ins to address questions and offer guidance.
- Set a clear submission deadline, specify the format (digital or physical), and ensure students understand the importance of meeting the deadline and submitting all required components.

3. Sample strategy for providing feedback

During and After Presentations

- Provide learners with the scoring rubrics.
- Distribute the results to learners and facilitate a discussion on them.
- Provide immediate feedback, highlighting strengths, areas for improvement, and commend creativity and understanding.
- After the presentations, encourage peer feedback to foster a collaborative learning environment.

Written Reports

- Provide detailed comments on the written reports, focusing on content, clarity, and organisation.
- Suggest additional resources or exercises to help reinforce concepts if needed.

4. Sample rubrics for scoring

Criteria	Marks	Excellent (3)	Good (2)	Poor (1)
a) Introduction and Overview	4	Thorough and insightful introduction.	Clear introduction with importance highlighted.	Limited or unclear introduction with little to no importance highlighted.
b) Data Collection	4	Comprehensive and varied selection of coordinate pairs.	Clear and relevant selection of coordinate pairs.	Limited or unclear selection of coordinate pairs.
c) Calculation of Gradient	8	Detailed and accurate calculation for all pairs.	Clear and mostly accurate calculations, with most steps shown.	Inaccurate calculations with major steps missing.
d) Determination of Equation of Straight Line	8	Detailed and accurate determination for all pairs.	Clear and mostly accurate determinations, of all pairs.	Inaccurate determinations with major steps missing.
e) Calculation of Distance Between Two Points	8	Detailed and accurate calculation for all pairs.	Clear and mostly accurate calculations, with most steps shown.	Inaccurate calculations with major steps missing.
f) Visual Aids (Graphs and Diagrams)	4	High-quality, highly effective visual aids.	Good quality and effective visual aids.	Poor quality or ineffective visual aids.
g) Analysis and Interpretation of Results	4	Thorough analysis with clear patterns and relationships.	Clear analysis with some patterns and relationships.	Limited analysis with few patterns and relationships.
h) Conclusion and Summary	4	Clear summary with thoughtful reflection.	Clear summary with some reflection.	Incomplete or unclear summary with little to no reflection.
Total Marks	40			

PLC SESSION 14: Angles

1. Introduction (20 minutes)

- 1.1** Share one thing on the lesson for week 13 delivered last week that:
- went well (NTS 1a, 1b, 2a and 2e).
 - you found challenging (NTS 1a, 1b, 2a and 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, 3d and 3j).

2. Review of Learning Plans (60 minutes)

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

Purpose

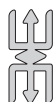
The purpose of the session is to review the learning plan for week 14 by aligning the learning plan with Learner Material and appropriate assessment strategies.

Learning Outcomes

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

- Review the activities in the Learner Materials and identify appropriate activities based on the pedagogical approaches in the Teacher Manual that can support your lesson for the week.
 - 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 Materials. Indicate the activity(ies) in your learning plan (NTS 2a, 2f, 3a and 3j).



Note

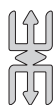
The selected activities should be included in the teacher/learner activity section of the learning plan.

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 **classwork (individual)** (NTS 3k–3p).

E.g.

- Kwamena cut the straight edge of a piece of wood to make a 45° angle. At what angle was the other piece cut?*
- Two angles are complementary. Find the two angles if one of the angles is double the other.*

Refer to Section 14 of the Learner Material (LM) and Year 1 Book 2 pages 17–18 of the Teacher Manual (TM) for more assessments tasks.



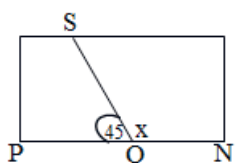
Note

- The assessment tasks/items may cover levels 1 to 4 where appropriate to ensure that assessment is differentiated for all.*
- The selected activities should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities of the learning plan.*

1.4 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)



(Both method and accuracy: 1 mark–B1)

We need to find $\angle SON$

Since PON is a straight line, its angle is 180° .

Therefore: $\angle PON = \angle POS + \angle SON$

(Method: 1 mark)

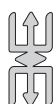
$\angle PON - \angle POS = \angle SON$

(Method: 1 mark)

$180^\circ - 45^\circ = 135^\circ$

(Accuracy: 1 mark)

Therefore, the angle at the other piece cut is 135° .



Note

- 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.*
- 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).

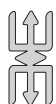
E.g.

- a) *At the start of the lesson, let learners know about the upcoming exercise to help them stay prepared and focused.*
- b) *Distribute a worksheet/write the questions on the board about 25 minutes before the lesson ends, etc.*

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.

Review the answers in class by writing/projecting on the board/projector, discussing each question and explaining the correct reasoning and methods, 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:

- i. provide constructive feedback to learners and record their assessment scores in the required format and document where appropriate (NTS 3l–3n).
- i. read PLC Session 15 and related Learner Material (NTS 3a).
- ii. bring along your Teacher Manual, PLC Handbook and learning plan on week 15 in preparation for the next session (NTS 3a).

PLC SESSION 15: Exterior and Interior Angles of Polygons

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, 2a and 2e).
- b. you found challenging (NTS 1a, 1b, 2a and 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, 3d and 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.

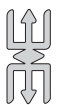
Learning Outcomes

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 Materials 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 2a, 2f, 3a and 3j).



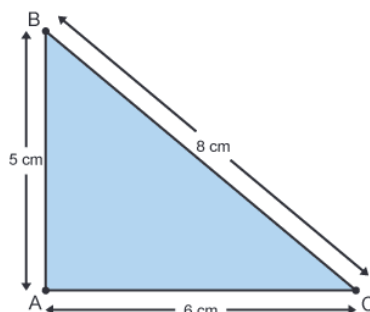
Note

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

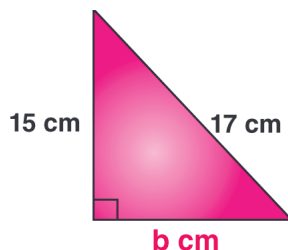
2.3 Develop assessment tasks/items based on the learning indicator(s) on assessment for the week. This week's recommended mode of assessment is **home work (individual)** (NTS 3k-3p).

E.g.

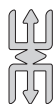
a) Does the triangle ABC contain a right angle?



b) The two sides of a right-angled triangle are given as shown in the figure. Find the third side.



Refer to Section 15 of the Learner Material (LM) and Year 1 Book 2 pages 23–24 of the Teacher Manual (TM) for more assessments 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.

a) $AB^2 + AC^2$

$$= 5^2 + 6^2 = 25 + 36 = 61$$

(Method: 1 mark)

The hypotenuse of the triangle BC is 8 units.

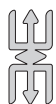
$$8^2 = 64$$

(Method: 1 mark)

$$61 \neq 64$$

(Accuracy: 1 mark)

Thus, 61 does not equal 64. Therefore, the triangle does **not** contain a right angle.

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

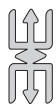
At the end of the lesson, share the assignment details with all students and make sure everyone has access, either through handouts or online, etc.

Refer to pages 57–60 of the Teacher Assessment Manual and Toolkit for more information on administration of homework.

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.

- a) *After assignments are submitted, evaluate them based on the given criteria and provide personalised feedback etc.*
- b) *In the next class, review key concepts, discuss errors, and address any questions, 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).
- a. read PLC Session 16 and related Learner Material (NTS 3a).
- b. bring along your Teacher Manual, PLC Handbook and learning plan on week 16 in preparation for the next session (NTS 3a).

PLC SESSION 16: Pythagorean Theorem

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, 2a and 2e).
 - b) you found challenging (NTS 1a, 1b, 2a and 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, 3d and 3j).

2. Review of Learning Plans (60 minutes)

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

Purpose

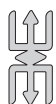
The purpose of the session is to review the learning plan for week 16 by aligning the learning plan with Learner Material and appropriate assessment strategies.

Learning Outcomes

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 Materials 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 Materials. Indicate the activity(ies) in your learning plan (NTS 2a, 2f, 3a and 3j).



Note

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

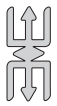
- 2.3 Develop assessment tasks/items based on the learning indicator(s) on assessment for the week. This week's recommended mode of assessment is **case study** to be presented in week 19 (NTS 3k-3p).

E.g.

Case: A fire escape ladder needs to be installed on the side of a building. The ladder must reach from the ground to a window 15 feet above, with the base of the ladder positioned 9 feet away from the building for stability. The installer needs to determine the correct length of the ladder to ensure it fits securely.

- Identify the right triangle through confirmation that the ladder forms a right-angled triangle.
- Apply the Pythagorean Theorem by calculating the length of the ladder.
- Verify the calculation to ensure its accuracy.
- Write a brief report explaining the solution, including the calculated length of the ladder and verification steps, etc.

Refer to Section 15 of the Learner Material (LM) and Year 1 Book 2 pages 23–24 of the Teacher Manual (TM) for more assessments tasks.

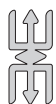
**Note**

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

Criteria	Excellent (3 marks)	Satisfactory (2 marks)	Needs Improvement (1)
Identification of Right Triangle	Correctly identifies the right triangle with clear explanation.	Identifies the right triangle but with some confusion.	Struggles to identify the right triangle correctly.
Application of Pythagorean Theorem	Accurately applies the theorem with correct calculation.	Applies the theorem with several errors.	Struggles to apply the theorem correctly.
Verification	Properly verifies the calculation with clear steps.	Verifies the calculation but with some confusion.	Struggles to verify the calculation correctly.
Clarity and Organisation of Report	Report is well-organised, clear, and structured.	Report is somewhat organised but lacks clarity.	Report is poorly organised and unclear.
Presentation	Presents findings clearly and effectively.	Presents findings but with some confusion.	Struggles to present findings clearly.

**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.

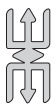
Announce at the beginning of class that a case study assignment will be conducted and provide individual learners with the case study scenario and tasks, etc.

Refer to pages 80–83 of the Teacher Assessment Manual and Toolkit for more information on case study.

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.

Conduct regular check-ins with learners to monitor their understanding and progress and offer additional support for individual learners who need further assistance, 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).
- a. read PLC Session 17 and related Learner Material (NTS 3a).
- b. bring along your Teacher Manual, PLC Handbook and learning plan on week 17 in preparation for the next session (NTS 3a).

PLC SESSION 17: Vectors

1. Introduction (20 minutes)

- 1.1** Share one thing on the lesson for week 16 delivered last week that:
- b. went well (NTS 1a, 1b, 2a and 2e).
 - c. you found challenging (NTS 1a, 1b, 2a and 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 and 3j).

2. Review of Learning Plans (60 minutes)

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

Purpose

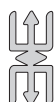
The purpose of the session is to review the learning plan for week 17 by aligning the learning plan with Learner Material and appropriate assessment strategies.

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 Materials 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 2a, 2f, 3a and 3j).



Note

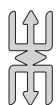
The selected activities should be included in the teacher/learner activity section of the learning plan.

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 **unannounced quiz(individual)** (NTS 3k– 3p).

E.g.

- Consider the vector a represented by the line segment which goes from the point $(1, 2)$ to the point $(4, 6)$. Calculate the components and the length of this vector.
- Find the length of the vector $a = \begin{pmatrix} 3 \\ 4 \end{pmatrix}$.
- Using the magnitude formula, find the magnitude of the vector with $u = \begin{pmatrix} 6 \\ 8 \end{pmatrix}$.

Refer to Section 17 of the Learner Material (LM) and Year 1 Book 2 pages 36–37 of the Teacher Manual (TM) for more assessments tasks.



Note

- The assessment tasks/items may cover levels 1 to 4 where appropriate to ensure that assessment is differentiated for all.
- The selected activities should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities of the learning plan.

1.4 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).

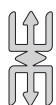
E.g.

- To find the components,

First, translate the line segment one unit left and two units down. The line segment begins at the origin and ends at $(4 - 1, 6 - 2) = (3, 4)$. **(Method: 1 mark)**

Therefore, $a = (3, 4)$.

The length of a is $|a| = \sqrt{3^2 + 4^2} = 5$ **(Accuracy: 1 mark)**



Note

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

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

E.g.

- Announce about 30 minutes to the end of the class that a pop quiz will take place.

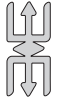
- b) *Immediately after the announcement, hand out the quiz papers or write the questions on the board, etc.*

Refer to Teacher Assessment Manual and Toolkit pages 80–83 for more data on how to administer class quiz.

- 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.

Once the answer sheets are collected, go over the answers with the class, 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:
- provide constructive feedback to learners and record their assessment scores in the required format and document where appropriate (NTS 3l–3n).
 - read PLC Session 18 and related Learner Material (NTS 3a).
 - 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, 2a and 2e).
- b. you found challenging (NTS 1a, 1b, 2a and 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, 3d and 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 and mid–semester examination by aligning the learning plan with Learner Material and appropriate assessment strategies.

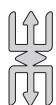
Learning Outcome

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 Materials 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 2a, 2f, 3a and 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.

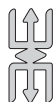
Multiple choice question

If the cosine of an angle is $\frac{1}{2}$, what is the angle?

- A. 30°
- B. 45°
- C. 60°
- D. 90°

Essay type question

- a) *A rectangular playing field is 20 metres long. A straight path is cut across the field along one of its diagonal. If the length of the path in metres is 25m; how wide is the playing field?*
- b) *Explain vectors including using models to demonstrate its meaning and state at least 3 real-life applications of vectors.*



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.*

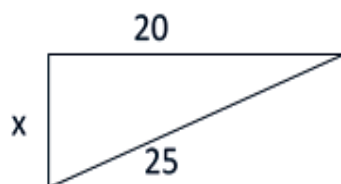
2.4 Discuss (and agree as a subject group) how you will develop the marking scheme/ rubrics for scoring the assessment task(s)/item(s) for the week's recommended assessment (NTS 3k–3p).

E.g.

Multiple choice question

Correct option: C. 60°

Essay type question



a)

This is a right-angled triangle.

Let x = width

(Both method and accuracy: 1 mark).

(Method: 1 mark)

$$20^2 + x^2 = 25^2$$

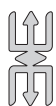
(Method:1 mark)

$$x^2 = 625 - 400 \Rightarrow x^2 = 125$$

(Method:1 mark)

$$x = 15m$$

(Accuracy:1 mark)

**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.

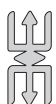
Announce the review session one week before the test to give learners ample preparation time and share a detailed syllabus outlining the topics to be covered in the test, etc.

*Refer to Session 6, **Appendix E** and **Appendix I** of this PLC Handbook for extra details on how to administer examination.*

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.

Provide comprehensive written feedback on each learner's performance, noting their strengths and areas needing 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 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).



APPENDIX I: : Sample table of test specifications for developing essay type questions

1. Sample of principles to consider when designing effective multiple choice questions (MCQ's)

- Write clear and concise questions (stems) that are easy to understand.
- Ensure that each question aligns with the learning objectives and the material covered in the course.
- Include distractors (incorrect options) that are plausible and closely related to the correct answer.
- Ensure there is only one unambiguously correct answer for each question. Avoid "all of the above" or "none of the above" options, which can sometimes confuse or mislead students.
- Design questions with varying levels of difficulty to differentiate between different levels of students understanding.
- Ensure that questions are free from cultural, linguistic, or gender bias. Use language and contexts that are accessible and fair to all learners, regardless of their background.

2. Sample of principles to consider in developing essay-type questions

- Avoid vague or complex wording that might confuse learners.
- The question should be relevant to the learning objectives and the material covered in the course.
- Design questions that allow for a comprehensive exploration of the topic.
- Formulate questions that require analysis, synthesis, and evaluation rather than mere recall of facts.
- Ensure the question is fair to all learners, considering their diverse backgrounds and abilities.
- Clearly define and communicate the criteria for grading the essay.

3. Sample table of test specifications for developing essay type questions

Focal Area	Level 1	Level 2	Level 3	Total
a. Replicating and Bisecting Angles	3	1	3	7
b. Solve problems on parallel lines, perpendicular lines and transversal.	2	2	3	7
c. Sum of the interior angles of polygons.	2	3	2	7
d. Real-life uses of Pythagorean theorem.	2	2	1	5
e. Explanation of Vectors.	2	4	2	8

Focal Area	Level 1	Level 2	Level 3	Total
f. Trigonometric functions of special angles 30° , 45° and 60° .	2	2	2	6
Total	13	14	13	40

PLC SESSION 19: Perimeter and Area of Shapes

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, 2a and 2e).
 - b. you found challenging (NTS 1a, 1b, 2a and 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, 3d and 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 Materials 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 2a, 2f, 3a and 3j).



Note

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

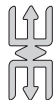
2.3 Develop assessment tasks/items based on the learning indicator(s) on assessment for the week. This week's recommended mode of assessment is **presentation and discussion of case study reports** (from week 16) (NTS 3k–3p).

E.g.

Case: A fire escape ladder needs to be installed on the side of a building. The ladder must reach from the ground to a window 15 feet above, with the base of the ladder positioned 9 feet away from the building for stability. The installer needs to determine the correct length of the ladder to ensure it fits securely.

Tasks for learners:

- Identify the right triangle through confirmation that the ladder forms a right-angled triangle.
- Apply the Pythagorean Theorem by calculating the length of the ladder.
- Verify the calculation to ensure its accuracy.
- Write a brief report explaining the solution, including the calculated length of the ladder and verification steps, etc.



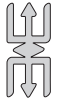
Note

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

Criteria	Excellent (3 marks)	Satisfactory (2marks)	Needs Improvement (1)
Identification of Right Triangle	Correctly identifies the right triangle with clear explanation.	Identifies the right triangle but with some confusion.	Struggles to identify the right triangle correctly.
Application of Pythagorean Theorem	Accurately applies the theorem with correct calculation.	Applies the theorem with several errors.	Struggles to apply the theorem correctly.
Verification	Properly verifies the calculation with clear steps.	Verifies the calculation but with some confusion.	Struggles to verify the calculation correctly.
Clarity and Organisation of Report	Report is well-organised, clear, and structured.	Report is somewhat organised but lacks clarity.	Report is poorly organised and unclear.
Presentation	Presents findings clearly and effectively.	Presents findings but with some confusion.	Struggles to present findings clearly.

**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.

Grant each group about 15 minutes to make their presentations. The reports must follow these guidelines:

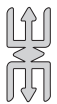
- a. *Introduction*
- b. *Problem Identification*
- c. *Methodology*
- d. *Results*
- e. *Practical Implications*
- f. *Conclusions*
- g. *Questions and Answers Session, etc.*

*Refer to **Appendix J** of this session for more details on the guidelines.*

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.

Present the correct solutions to the class, explaining each step thoroughly and highlight common errors and discuss why they occurred, using anonymous examples to illustrate points, 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).

2.3 Remember to:

- a. provide constructive feedback to learners and record their assessment scores in the required format and document where appropriate (NTS 3l–3n).
- i. read PLC Session 20 and related Learner Material (NTS 3a).
- ii. bring along your Teacher Manual, PLC Handbook and learning plan on week 20 in preparation for the next session (NTS 3a).



Appendix J: Sample guidelines for presentations and discussions of the case study report

1) Introduction

- a. **Overview of the Scenario:** Briefly describe the problem context, including the need for the ladder and the given measurement. For instance, (15 feet height, 9 feet base).
- b. **Objective:** State the goal of the presentation, which is to determine the correct length of the ladder using the Pythagorean Theorem.

2) Problem Identification

Right Triangle Identification: Explain how the given measurements form a right-angled triangle, with the height of the window and the base of the ladder representing the two legs.

3) Methodology

- a. **Pythagorean Theorem:** Introduce the Pythagorean Theorem ($a^2 + b^2 = c^2$) and explain how it applies to this scenario.
- b. **Calculation Steps:**
 - Identify the two legs of the triangle ($a = 15$ feet, $b = 9$ feet).
 - Substitute the values into the formula: $15^2 + 9^2 = c^2$.
 - Calculate the squares: $225 + 81 = c^2$.
 - Sum the squares: $306 = c^2$.
 - Find the square root of the sum: $c = \sqrt{306} \approx 17.49$ feet.

4) Results

Present the calculated length of the ladder (approximately 17.49 feet) and explain its significance in ensuring the ladder reaches from the ground to the window securely.

5) Practical Implications

Discuss the importance of accurate measurements for safety and stability. Briefly describe how the correct ladder length will ensure a secure installation.

6) Conclusion

Summarise the problem, the application of the Pythagorean Theorem, and the resulting ladder length and also emphasise the importance of mathematical concepts in solving real-life problems.

7) Q&A Session

Invite questions from the audience and provide clear explanations for any queries related to the problem, methodology, or results.

PLC SESSION 20: Volume of Prisms

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, 2a and 2e).
 - b. you found challenging (NTS 1a, 1b, 2a and 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, 3d and 3j).

2. Review of Learning Plans (60 minutes)

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

Purpose

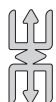
The purpose of the session is to review the learning plan for week 20 by aligning the learning plan with Learner Material and appropriate assessment strategies.

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 Materials 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 2a, 2f, 3a and 3j).



Note

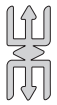
The selected activities should be included in the teacher/learner activity section of the learning plan.

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 **presentation and discussion of individual project work reports** (from week 16) (NTS 3k–3p).

E.g.

Task: Conduct a detailed investigation into the properties of straight lines in a coordinate plane. Each project should include the following:

- Determine the gradient and equation of straight lines based on given pairs of coordinates.
- Calculate the distance between two points on each straight line.
- Present your findings in a comprehensive report, supported by visual aids such as graphs and diagrams, etc.



Note

- The assessment tasks/items may cover levels 1 to 4 where appropriate to ensure that assessment is differentiated for all.
- The selected activities should be included in the 'Assessment DoK aligned to Curriculum and TM' section below teacher/learner activities of the learning plan.

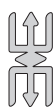
2.4 Discuss (and agree as a subject group) how you will develop the marking scheme/ rubrics for scoring the assessment task(s)/item(s) for the week's recommended assessment (NTS 3k–3p).

E.g.

Rubrics for scoring

Criteria	Marks	Excellent	Good	Needs improvement
1. Introduction and Overview	4	Thorough and insightful introduction.	Clear introduction with importance highlighted.	Limited or unclear introduction with little to no importance highlighted.
2. Calculation of Gradient	8	Detailed and accurate calculation for all pairs.	Clear and mostly accurate calculations, with most steps shown.	Inaccurate calculations with major steps missing.
3. Determination of Equation of Straight Line	8	Detailed and accurate determination for all pairs.	Clear and mostly accurate determinations, of all pairs.	Inaccurate determinations with major steps missing.
4. Calculation of Distance Between Two Points	8	Detailed and accurate calculation for all pairs.	Clear and mostly accurate calculations, with most steps shown.	Inaccurate calculations with major steps missing.

Criteria	Marks	Excellent	Good	Needs improvement
5. Visual Aids (Graphs and Diagrams)	4	High-quality, highly effective visual aids.	Good quality and effective visual aids.	Poor quality or ineffective visual aids.
6. Analysis and Interpretation of Results	4	Thorough analysis with clear patterns and relationships.	Clear analysis with some patterns and relationships.	Limited analysis with few patterns and relationships.
7. Conclusion and Summary	4	Clear summary with thoughtful reflection.	Clear summary with some reflection.	Incomplete or unclear summary with little to no reflection.
Total Marks	40			



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.

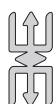
Take sample of individual projects work and present them to the class for discussions. In the presentations and discussions, look for the;

- i) introduction to the scenario by explaining that the community needs to determine the distance between two features in the park using specific coordinates, etc.

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.

After grading and presentations, have a class discussion to talk about the detailed feedback, noting correct calculations and 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 20 and provide feedback on your lesson (NTS 1f, 3g).

2.3 Remember to:

- b. provide constructive feedback to learners and record their assessment scores in the required format and document where appropriate (NTS 3l–3n).
- c. read PLC Session 21 and related Learner Material (NTS 3a).
- d. bring along your Teacher Manual, PLC Handbook and learning plan on week 21 in preparation for the next session (NTS 3a).

PLC SESSION 21: Data and Collection Methods

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, 2a and 2e).
 - b. you found challenging (NTS 1a, 1b, 2a and 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, 3d and 3j).

2. Review of Learning Plans (60 minutes)

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

Purpose

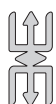
The purpose of the session is to review the learning plan for week 21 by aligning the learning plan with Learner Materials and appropriate assessment strategies.

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 Materials 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 Materials. Indicate the activity(ies) in your learning plan (NTS 2a, 2f, 3a and 3j).



Note

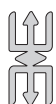
The selected activities should be included in the teacher/learner activity section of the learning plan.

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 **research work (group)** (NTS 3k–3p).

E.g.

- a) Use any of the following data collection method to collect data for an assigned project e.g. favourite foods of Science 1 Classes in the school;
 - i) interviews
 - ii) experiments
 - iii) observations
 - iv) surveys
 - v) sensor data collection
- b) The data below are the scores of 21 learners in a creative arts test. Organise it into a frequency distribution table by grouping them 59, 65, 61, 62, 53, 55, 60, 70, 64, 56, 58, 58, 62, 62, 68, 65, 56, 59, 68, 61, 67.

Refer to Section 21 of the Learner Material (LM) and Year 1 Book 2 page 71 of the Teacher Manual (TM) for more assessments tasks.



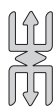
Note

- 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.

An interview is a structured conversation where one person (the interviewer) asks questions, and the other person (the interviewee) provides answers, etc. (**Accuracy: 1 mark**)



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).

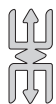
E.g.

- a) *Using pre-existing groups, hand out the worksheet/write the questions on the board about 30 minutes before the lesson concludes.*
- b) *Ask each group to use survey, interviews, experiments, etc. to research and collect data as instructed and present to class, etc.*

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.

- a) *Write personalised comments for each student, pointing out their specific strengths and areas where they can improve.*
- b) *Review the answers with the entire class by displaying them on the board or projector, discussing the correct solutions and methods, 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: Data Organisation and Presentation.

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, 2a and 2e).
- b. you found challenging (NTS 1a, 1b, 2a and 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, 3d and 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 Materials and appropriate assessment strategies.

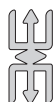
Learning Outcome

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 Materials 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 Materials. Indicate the activity(ies) in your learning plan (NTS 2a, 2f, 3a and 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.

- a) *The data below represents the number of trees that survived in a survey by 100 schools that decided to plant 100 tree saplings in their gardens on world environment day. Use the data to answer the questions that follow.*

95, 67, 28, 32, 65, 65, 69, 33, 98, 96, 76, 42, 32, 38, 42, 40, 40, 69, 95, 92, 75, 83, 76, 83, 85, 62, 37, 65, 63, 42, 89, 65, 73, 81, 49, 52, 64, 76, 83, 92, 93, 68, 52, 79, 81, 83, 59, 82, 75, 82, 86, 90, 44, 62, 31, 36, 38, 42, 39, 83, 87, 56, 58, 23, 35, 76, 83, 85, 30, 68, 69, 83, 86, 43, 45, 39, 83, 75, 66, 83, 92, 75, 89, 66, 91, 27, 88, 89, 93, 42, 53, 69, 90, 55, 66, 49, 52, 83, 34, 36.

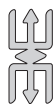
Represent the given data in the form of frequency distribution.

- b) *The data below shows the amount of money that Bruwaa spent on buying some items:*

- pepper – GH4
- onions – GH4
- salt – GH2
- fish – GH10

Draw a pie chart for the data.

Refer to the Section 22 of the Learner Material (LM) and Year 1 Book 2 pages 81–83 of the Teacher Manual (TM) for more assessments 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.*

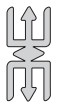
1.4 Discuss (and agree as a subject group) how you will develop the marking scheme/rubrics for scoring the assessment task(s)/item(s) for the week's recommended assessment (NTS 3k–3p).

E.g.

a)

Number of plants survived	Tally Marks	Number of schools (frequency)
20 - 29	III	3
30 - 39	IIII	14
40 - 49	IIII II	12
50 - 59	III	8
60 - 69	IIII IIII III	18
70 - 79	IIII	10
80 - 89	IIII IIII IIII III	23
90 - 99	IIII II	12
Total		100

1 mark each for well tallied mark(method), 1 mark each for each frequency(accuracy) and 2 marks for a well-drawn diagram (both method and accuracy)

**Note**

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

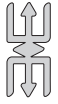
Before the close of the lesson, provide learners with an overview of the tasks and objectives and divide learners into small and convenient groups and distribute task sheets detailing real-life data organisation, presentation, and analysis tasks, etc. and present their practical report in tables, charts, etc.

Refer to the Teacher Assessment Manual and Toolkit Pages 107-110 for more information on research works.

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.

Praise learners for clear explanations, thorough investigations, and effective use of digital tools and highlight examples of well-organised data, accurate visuals, and insightful analysis during presentations, 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 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: Collection and Analysis of Data

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, 2a and 2e).
 - b. you found challenging (NTS 1a, 1b, 2a and 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, 3d and 3j).

2. Review of Learning Plans (60 minutes)

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

Purpose

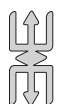
The purpose of the session is to review the learning plan for week 23 by aligning the learning plan with Learner Materials and appropriate assessment strategies.

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 Materials 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 Materials. Indicate the activity(ies) in your learning plan (NTS 2a, 2f, 3a and 3j).



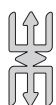
Note

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 portfolio assessment (NTS 3k–3p).

E.g.

Task: Compile and submit a comprehensive portfolio that represents your work for the entire academic year. The portfolio should include a selection of assignments, projects, quizzes, tests, reflective pieces, and both mid-semester and end-of-semester examination papers. This portfolio will serve as a record of your progress and development over the course of the academic year and will be assessed to evaluate your overall understanding and growth in the subject matter.



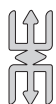
Note

- 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.

Learner's pieces of work	Score
Assignments/Exercises	10 marks
Projects/Case studies	10 marks
Quizzes and Tests	10 marks
Reflective Pieces	5 marks
Mid-semester and End-of-semester Papers	5 marks
Total marks	40 marks



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).

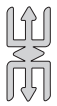
E.g.

Communicate the final deadline for portfolio submission to all students to ensure timely and complete submissions and ask learners to submit their completed portfolios either as a physical document, etc.

- 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.

Provide written/oral feedback on each learner's work. Highlight specific strengths, such as completeness and organisation of the portfolio, quality of the work included and identify areas for improvement to guide their learning process, 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:
- provide constructive feedback to learners and record their assessment scores in the required format and document where appropriate (NTS 3l–3n).
 - read PLC Session 24 and related Learner Material (NTS 3a).
 - 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:
- went well (NTS 1a, 1b, 2a and 2e).
 - you found challenging (NTS 1a, 1b, 2a and 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, 3d and 3j).

2. Review of Learning Plans (60 minutes)

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

Purpose

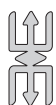
The purpose of the session is to review the learning plan for week 24 and end of semester examination by aligning the learning plan with Learner Material and appropriate assessment strategies.

Learning Outcome

Review your learning plan for week 24 and prepare for end of semester considering the cross-cutting issues (NTS 2b, 2c, 2e, 2f, 3a, 3d, 3e, 3g–3k and 3o).

Learning Indicators

- Review the activities in the Learner Materials and identify appropriate activities based on the pedagogical approaches in the Teacher Manual that can support your lesson for the week.
 - 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 lessons in your learning plan, identify activities that align with these in the Learner Material. Indicate the activity(ies) in your learning plan (NTS 2a, 2f, 3a and 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.

Multiple choice question

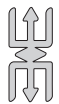
A triangle has angles measuring 35° , 45° , and 100° . What type of triangle is it?

- A. Right Triangle
- B. Acute Triangle
- C. Obtuse Triangle
- D. Equilateral Triangle

Essay Type Questions:

- a. Consider the vector **a** represented by the line segment which goes from the point (1, 2) to the point (4, 6). Calculate the components and the length of this vector?
- b. The table below shows the temperature, in degrees Celsius, recorded on 22 February, 2023. Construct a line graph for the data in the table.

Table: Temperature 22 Feb			
8:00	10:00	12:00	14:00
24°	32°	36°	29°



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.

MCQ: Correct Answer: C. Obtuse Triangle

Essay type question

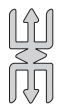
- a) To find the components, translate the line segment one unit left and two units down. The line segment begins at the origin and ends at $(4-1, 6-2) = (3, 4)$.

Therefore, $a = (3, 4)$

(Method: 1 mark)

The length of a is $|a| = \sqrt{3^2 + 4^2} = 5$

(Accuracy: 1 mark)

**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.

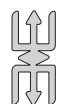
- a) *Inform learners about the upcoming examination at least one week before the test date.*
- b) *Distribute a comprehensive syllabus detailing the topics that will be covered in the test, etc.*

Refer to Session 12–Appendix G of this PLC Handbook and Teacher Assessment Manual and Toolkit pages 83–86 for more information on how to conduct examinations.

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.

Schedule and hold a review session the next semester to address learner's strengths and areas needing improvement that emerged during the test, 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 K: Principle to Consider when Designing Multiple Choice Questions, Easy-type Questions and Sample Table of Test Specifications

1. Sample of principles to consider when designing effective multiple choice questions (MCQ's)

- Write clear and concise questions (stems) that are easy to understand.
- Ensure that each question aligns with the learning objectives and the material covered in the course.
- Include distractors (incorrect options) that are plausible and closely related to the correct answer.
- Ensure there is only one unambiguously correct answer for each question. Avoid "all of the above" or "none of the above" options, which can sometimes confuse or mislead students.
- Design questions with varying levels of difficulty to differentiate between different levels of students understanding.
- Ensure that questions are free from cultural, linguistic, or gender bias. Use language and contexts that are accessible and fair to all learners, regardless of their background.

2. Sample of principles to consider in developing essay-type questions

- Avoid vague or complex wording that might confuse learners.
- The question should be relevant to the learning objectives and the material covered in the course.
- Design questions that allow for a comprehensive exploration of the topic.
- Formulate questions that require analysis, synthesis, and evaluation rather than mere recall of facts.
- Ensure the question is fair to all learners, considering their diverse backgrounds and abilities.
- Clearly define and communicate the criteria for grading the essay.

3. Sample table of test specifications for developing essay type questions

Focal Area	Level 1	Level 2	Level 3	Total
a. Perimeter of 2-D shapes	3	1	3	7
b. Real-life problems on perimeter and area measurement.	2	2	3	7
c. Volume of prisms	2	3	2	7
d. Identify and validate quantitative & qualitative data collection methods.	2	2	1	5

Focal Area	Level 1	Level 2	Level 3	Total
e. Data organisation & presentation	2	4	2	8
f. Simple and compound probability experiments	2	2	2	6
Total	13	14	13	40

Appendices

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)

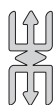
Summative Assessment

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 Examinations
- End-of-Semester examinations.
- 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 on 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

21 st 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 • Communalism • 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*

21 st 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.

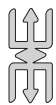
In providing feedback, use the sandwich method (CCC), which starts with a positive aspect of the work (**compliment**), followed by constructive criticism (**correction**), and concludes with another positive note (**compliment**). To set the stage for effective feedback, clearly communicate the learning 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 learners 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 biased 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.

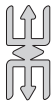
Case Study As An Assessment Strategy

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 too 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 learners 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 learners 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.)

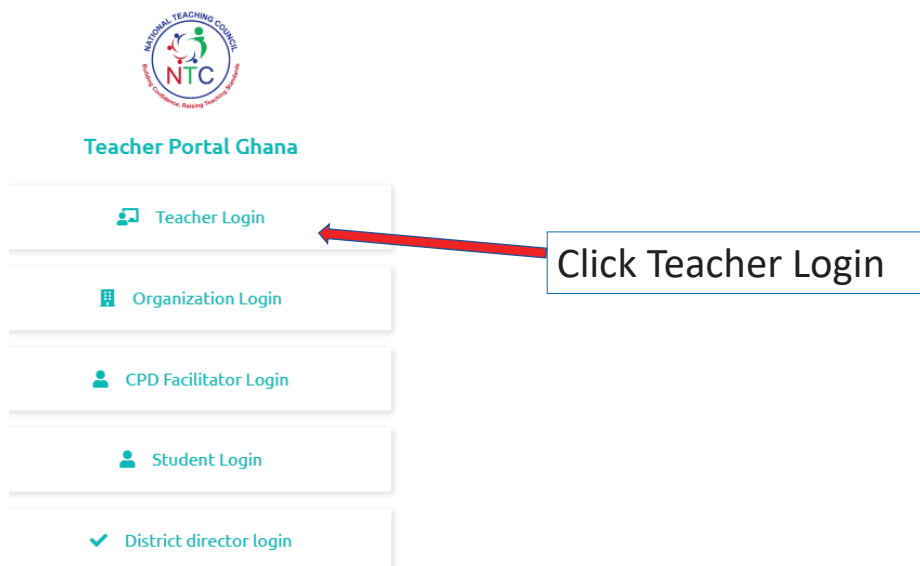
.....

Appendix 4: How to Check CPD Points and Training Records on Teacher Portal Ghana

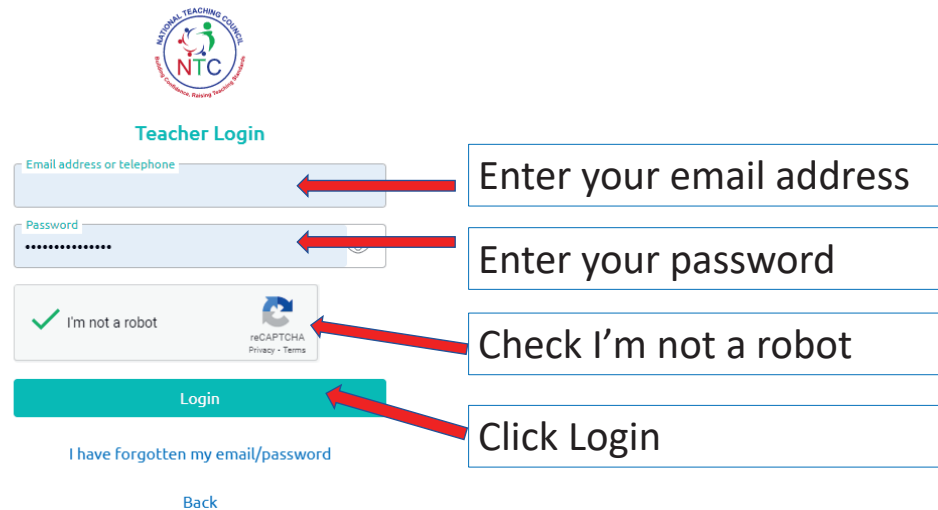
1. Visit *tpg.ntc.gov.gh* and click Login



2. On the Login page, click Teacher Login



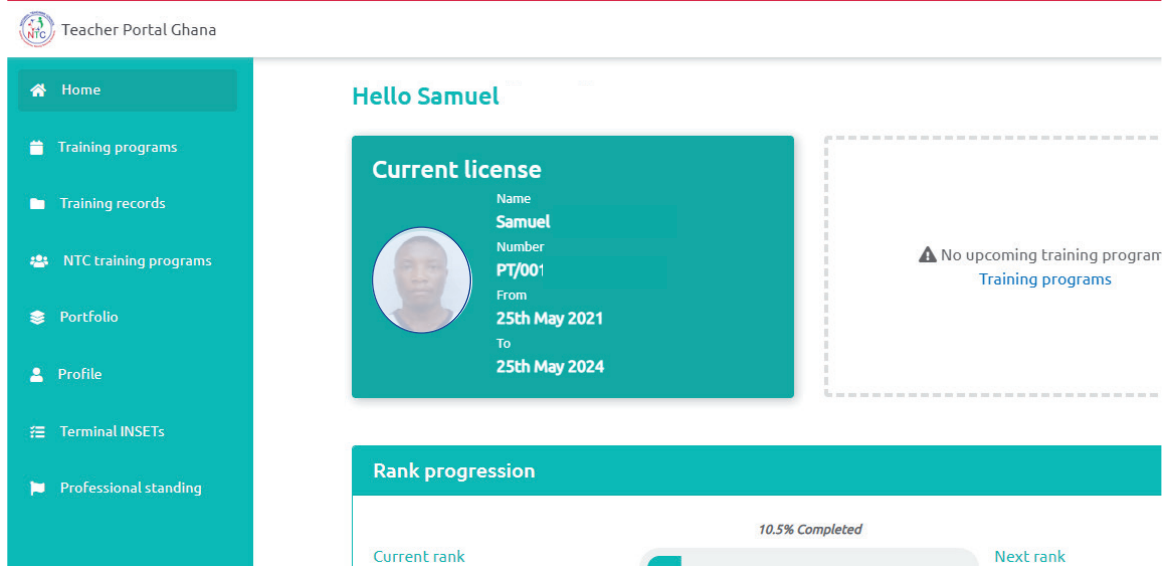
3. On the **Teacher Login** page enter your email address and password and then click **Login**



The image shows the Teacher Login page with the following elements and annotations:

- Teacher Login** (Page Title)
- Email address or telephone** (Input field) → **Enter your email address**
- Password** (Input field) → **Enter your password**
- I'm not a robot** (reCAPTCHA) → **Check I'm not a robot**
- Login** (Button) → **Click Login**
- [I have forgotten my email/password](#)
- [Back](#)

4. After a successful login you will get access to your **TPG account** (Check image below)



The image shows the Teacher Portal Ghana dashboard for a user named Samuel. The dashboard includes the following sections:

- Header:** Teacher Portal Ghana
- Left Sidebar:**
 - Home
 - Training programs
 - Training records
 - NTC training programs
 - Portfolio
 - Profile
 - Terminal INSETs
 - Professional standing
- Main Content Area:**
 - Hello Samuel**
 - Current license**
 - Name: Samuel
 - Number: PT/001
 - From: 25th May 2021
 - To: 25th May 2024
 - Rank progression**
 - Current rank
 - 10.5% Completed
 - Next rank
 - No upcoming training program** (with link to [Training programs](#))

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)

The screenshot shows the 'Teacher Portal Ghana' interface. The side menu on the left has 'Training records' highlighted. The main content area is titled 'Training records' and shows a list of training programs. A red arrow points from the 'Training records' menu item to the main content area. A red bracket on the right side of the list of programs is labeled 'List of training programs'.

Teacher Portal Ghana

Training records
Records for training programs registered and/or attended

Total points: 1.8988

Sensitization on Education Policies	⚠ Marked as absent
Differentiated Learning	✓ Processed Credits: 1.32
Advanced Mobile Learning with Multimedia (AMLM)	✓ Processed Credits: 0.5788

List of training programs

Click to view training records

List of Contributors

NaCCA Team	
Name of Staff	Designation
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2.	Agriculture	Dr. Esther Fobi Donkor	University of Energy and Natural Resources, Sunyani
3.	Arabic	Dr. Murtada Mahmoud Muaz	AAMUSTED
4.		Dr Mohammed Almu Mahaman	University for Development Studies
5.	Applied Technology	Michael Korblah Tsorgali	AAMUSTED
6.		Gilbert S. Odjamgba	Ziavi Senior High Technical School
7.		Engr. Dr. Prosper Mensah	CSIR – Forestry Research Institute of Ghana
8.	Home Economics	Rev. Sr. Jusinta Kwakyewaa	St. Francis Senior High Technical School
9.	Performing Arts	Prof. Emmanuel Obed Acquah	University of Education Winneba
10.	French	Maurice Adjetey	
11.	Art and Design Foundation	Angela Owusu-Afriyie	Opoku Ware School
12.	Ghanaian Language	David Sarpei Nunoo	University of Education Winneba, Ajumako Campus

No.	Subject	Name of Writer	Institution
13.	Art and Design Studio	Dzorka Etonam Justice	Kpando SHS
14.	Agricultural Science	Issah Abubakari	Half-Assini SHS
15.	Manufacturing Engineering	Dr. Kofi Owura Amoabeng	Kwame Nkrumah University of Science and Technology
16.		Ali Morrow Fatormah	Mfantshipim School
17.		Benjamin Atribawuni Asaaga	Kwame Nkrumah University of Science and Technology
18.	Design and Communication Technology	Henry Angmor Mensah	Anglican Senior High School, Kumasi
19.	Religious Studies	Anthony Mensah	Abetifi College of Education
20.	Spanish	Franklina Kabio-Danlebo	University of Ghana
21.	Social Studies	Dr. Frank Awuah	Dambai College of Education
22.	Religious and Moral Education	Clement Nsorwineh Atigah	Tamale Senior High School
23.	Literature-in-English	Angela Aninakwah	West African Senior High School
24.		Blessington Dzah	Ziavi Senior High Technical School
25.	Chemistry	Michael Amissah	St. Augustine's College
26.	Biology	Abraham Kabu Otu	Prampram Senior High School
27.	Mathematics	Collins Kofi Annan	Mando Senior High School
28.	Additional Mathematics	Gershon Kwame Mantey	University of Education, Winneba
29.	General Science	Saddik Mohammed	Ghana Education Service
30.	English Language	Perfect Quarshie	Mawuko Girls SHS
31.	Biomedical Science	Jennifer Fafa Adzraku	Université Libre de Bruxelles
32.		Davidson N.K. Addo	Bosomtwi STEM
33.	Robotics	Dr. Nii Longdon Sowah	University of Ghana
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No.	Subject	Name of Writer	Institution
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37.	Physical Education and Health (Core and Elective)	Benedictus Kondoh	St. Thomas Aquinas Senior High School
38.		Bagonluri Kizito Mwinig-Kumo	Wa Technical Institute
39.	Computing	Osei Amankwa Gyampo	Wesley Girls SHS, Kumasi
40.	Information Communication Technology	Raphael Senyo Dordoe	Ziavi Senior High Technical School
41.	Geography	George Boateng	Berekum College of Education
42.	History	Kofi Adjei Akrasi	Opoku Ware School
43.	Economics	Salitsi Freeman Etonam	Anlo Senior High School
44.	Government	Samuel Kofi Adu	Fettehman Senior High School
45.	Business Studies	Theodosia Larteley Oppong	Aburi Girls Senior High School
46.		Ansbert Avoles Baba	Bolgatanga Senior High School, Winkogo
47.	Physics	John Tetteh	Benso SHTS
48.	Technical Support	Benjamin Sundeme	St. Ambrose College of Education
49.		Edward Mills Dadson	University for Education, Winneba
50.		Eric Abban	Mt. Mary College of Education
51.		Jennifer Fafa Adzraku	Université Libre de Bruxelles

