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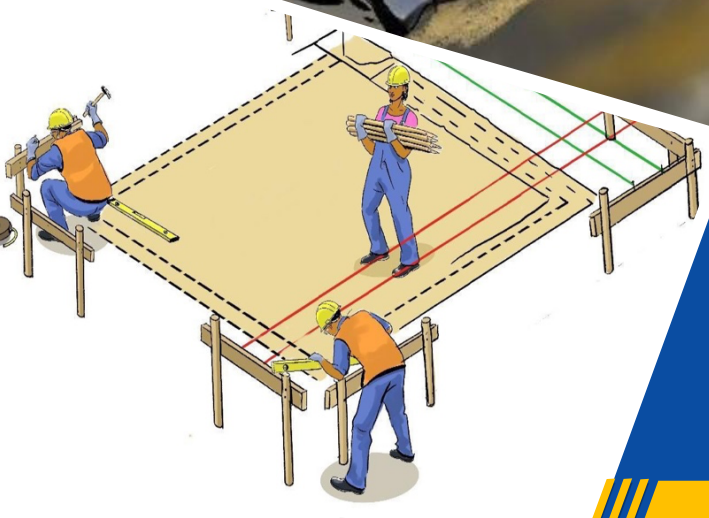

BDCSB301

BUILDING CONSTRUCTION

Building set out

TRAINER'S MANUAL

December 2023

BUILDING SET OUT

2023

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KIGALI-RWANDA

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LIST OF ABBREVIATIONS AND ACRONYMS

BM: Bench mark

BS: Back sight

CBET: Competency-Based Education and Training

FS: Fore sight

IS: Intermediate Sight

PPE: Personal Protective Equipment

RQF: Rwanda Qualification Framework

RTB: Rwanda TVET Board

TVET: Technical and Vocational Education and Training

INTRODUCTION

This trainer's manual encompasses all methodologies necessary to guide you to deliver the module titled: Set out a building. Students undertaking this module shall be exposed with practical activities that will develop and nurture their competences. The writing process of this training manual embraced competency-based education and training (CBET) philosophy by providing practical opportunities reflecting real life situations.

The trainer's manual is subdivided into units, each unit has various topics and you will start by guiding a self-assessment exercise to help students rate themselves on their level of skills, knowledge and attitudes about the unit.

The trainer's manual will give you the information about the objectives, learning hours, didactic materials and proposed methodologies and crosscutting issues.

A discovery activity follows to help students discover what they already know about the unit.

This manual will give you tips, methodologies and techniques about how to facilitate students to undertake different activities as proposed in their trainee manuals. The activities in this training manual are prepared such that they give opportunities to students to work individually and in groups.

After going through all activities, you shall help students to undertake progressive assessments known as formative and finally facilitate them to do their self-reflection to identify your strengths, weaknesses and areas for improvements.

Remind them to read the point to remember section, which provides the overall key points and takeaways of the unit.

Learning outcomes	Learning Hours	Topics
Learning outcome 1: **Select tools, equipment and materials and equipment.**	10 Hours	**1.1** Identification of Tools and Equipment
		1.2 Identification of materials
Learning outcome 2: Clear the site.	10 Hours	**2.1** Assessment of the site condition
		2.2 Clear the site
		2.3 Levelling the site
Learning outcome 3: Set profiles	50 Hours	**3.1** Levelling tools according to the work to be performed.
		3.2 Interpretation of drawing
		3.3 Use surveying instruments for setting out
		3.4 Demarcation of building lines according to drawing
		3.5 Accurate verification and correction of dimensions, levels and angles

LEARNING OUTCOME 1: PREPARE TOOLS, MATERIALS AND EQUIPMENT

Learning outcome 1: Self-Assessment

1. Ask trainees to look at the illustration above and together discuss:
   a. What does the illustration show?
   b. What is happening in the figure?
   c. What do you think will be topics to be covered under this Learning Outcome based on the figure?
2. After some brainstorming, share the main topics.
3. Ask trainees to fill out the self-assessment at the beginning of the learning outcome in their trainee's manuals.
4. Explain that:
   a. The purpose of the self-assessment is to become familiar with the topics in the learning outcome and for them to see what they know or do not know at the beginning.
   b. There is no right or wrong way to answer this assessment.
   c. It is for their own reference and self-reflection on the knowledge, skills and attitudes acquisition during the learning process.

d. They should think about themselves: do they think they have the knowledge, skills or attitudes to do this? How well?

5. Ask trainees to read the statements across the top and put a check in the column that best represents their level of knowledge, skills or attitudes.
6. Explain that: At the end of the learning outcome, they will do a self-reflection, which includes re-taking the self-assessment and identifying their strengths.
7. Ask trainees to fill in and complete the self-assessment table below to assess their level of knowledge, skills and attitudes under this Learning Outcome.

Key Competencies:

Knowledge	Skills	Attitudes
1. Describe tools and equipment used in setting out a building.	**1.** Select tools and equipment required to carry out building set out	**1.** Safe handling of tools and equipment
2. Describe the use of tools and equipment used to set out a building.	**2.** Use of different tools and equipment required in setting out a building	**2.** Safe handling of tools and equipment
3. Identify maintenance techniques of tools and equipment.	**3.** Maintain tools and equipment.	**3.** Taking care of tools and equipment
4. Explain function and quality of materials used to set out a building.	**4.** Select quality of materials used to set out a building.	**4.** Demonstrate team spirit while working with others. Avoid wastage of materials
5. Describe storage conditions of materials used to set out a building.	**5.** Apply storage techniques for materials used to set out a building.	**5.** Take necessary safety precautions while selecting materials, tools and equipment.
6. Describe storage conditions of tools, equipment and materials used to set out a building.	**6.** Apply maintenance techniques of tools and equipment used to set out a building.	**6.** Comply with national and international standards during work execution.

Steps:

Discovery Activity

Task 1:

1. Invite and guide trainees to share their experiences about the building construction process in terms of knowledge, skill and attitude in order to evaluate what they already know about the unit by using an appropriate methodology. This will be done through pair-sharing or group discussions monitored by the trainer. Allow trainees to share their prior experience in building set out by using the questions provided under task 1 in their trainee manuals. Trainer must explain all instructions well and provide assistance where necessary. Instructions should be well understood by all trainees and trainers should provide all necessary resources required to understand and perform the task well. Make sure that gender, inclusiveness, active participation and teamwork are all ensured while forming groups and during group discussion as well as presentation.

2. Remind trainees that they have to write down their summarised answer to task 1 in their trainee manual as they will use that summary during group presentation to the whole class based on the methodology you used during discussion.
3. Provide assistance where necessary by passing through all groups and manage the time well by reminding the remaining time.
4. Ask trainees to share their findings by referring to appropriate methodology you used in point 1 including: Question and answer, pair presentations and group presentations. Make sure that all students' views are gathered and taken into consideration.
5. Remember that the main objective of providing a discovery activities and its tasks was not intended to get the right or wrong answer from trainees, but instead it was a way of discovering what trainees already know about the learning outcome and also a way of helping them to have general information on what is going to be covered in this learning outcome.
6. Introduce Topic 1. 1: Identification of Tools and Equipment.

Topic 1.1: Identification of Tools and Equipment.

Objectives:

By the end of the topic, trainees will be able to:

a. Select correctly tools and equipment used in building set out
b. Describe the function of various tools and equipment used in building set out
c. Maintain tools and equipment used in building set out

Time Required: 6 Hours

Learning Methodology:

Role play, small group work, brainstorming, individual work, large group discussions, site visit.

Materials, tools and equipment Needed:

- **Materials:** Not applicable
- **Tools:** Tape measure, Decameter, Builders square, Measuring Wheel, Plumb bob, Pencil, Scriber, Spirit level, Line level, Level tube, Panga, Claw hammer, Hand saw, Hoes, Pick axel, Spade.
- **Equipment:** PPEs, Cutting equipment, Mechanical excavation plants, Wheelbarrow, Levelling instruments (Dumpy level, Theodolite, total station, GPS)

Preparation:

- ❑ Prepare a list of tools, equipment used in building set out.
- ❑ Highlight all precaution and safety measures that will govern all activities.
- ❑ Contact workshop assistants to prepare the listed tools and equipment in the workshop.
- ❑ Contact site engineer in order to organise field visits on tools and equipment preparation where possible.
- ❑ Provide conducive environment that allows trainees to acquire intended knowledge and skills

Cross Cutting Issues:

- ✓ Respect gender while forming the group and during presentation

- ✓ Dispatch people with disabilities in different groups.
- ✓ Ensure inclusiveness while giving trainees tasks.
- ✓ Provide an environment that promotes free and active participation while trainees answer questions and, during group discussion and presentations.
- ✓ Promote financial education by selecting tools and equipment of good quality and ensure their proper maintenance.
- ✓ Promote standardisation culture between trainees through team work.

Prerequisites:

- ✓ Knowledge on interpretation of catalogues
- ✓ Knowledge on handling tools and equipment
- ✓ Knowledge on safety precaution measures.

Activity 1: Problem Solving

Task 2:

1. By using an appropriate methodology such as individual work, pair-share, small group discussions, guided discussions or large group discussion, guide trainees to analyse the scenario and answer the questions provided under task 2 in their trainee manuals. Make sure all instructions are understood, inclusiveness and active participation are ensured and necessary resources are provided on time and are being used appropriately.
2. Using an appropriate methodology such as question and answer in group or pair presentations, students share their findings or answer to the whole class. Findings or answers of each group should be written on the board or flip chart and posted where they are visible to everyone in class as the remaining students will have to give their views on each group presentation.
3. After the sharing session, refer students to **Key facts 1:** Identification of tools and equipment used in building set out and discuss them together while harmonising their responses provided in the sharing session and answer any questions they may have.

Activity 2: Guided Practice

Task 3:

1. By using an appropriate methodology such as small or large group discussions and guided discussions, guide trainees to analyse the scenario provided in **Task 3** in their trainee manual and answer the questions related to it. Make sure all instructions are understood, inclusiveness and active participation are ensured, necessary resources are provided on time and they are being used appropriately.

2. Take students to the workshop and then guide them to perform the following tasks by providing clarification where necessary:

   a) Select tools and equipment used for setting out the building.
   b) Classify the tools and equipment used for setting out the building based on their function
   c) Maintain the selected tools and equipment properly.

3. Using an appropriate methodology such as question and answer in a large group or small group presentations, students share their answers to the class. Each group writes on the board or flip chart and posts their findings for reference. Make sure all students are actively giving their views on the presentation of each group.
4. Then refer students to **Key facts 1.1:** Identification of tools and equipment used in building set out and discuss together the common tools and equipment used in building set out and their functions, maintenance techniques and storage while answering any questions they have.
5. Ask trainee to identify other tools and equipment that are not covered in **key fact 1.1**

6. Inform students that they are going to use the key facts (1.1) while performing the next activity which requires them to use the knowledge, skills and attitude they have got from key facts (1.1) and guided activities.

Activity 3: Application

Task 4:

Using an appropriate methodology such as individual work, pairs or small groups trainees take them to masonry workshops or go to the construction site store with a sheet of paper to be used under task 4 in their trainee manuals. Make sure all instructions are understood, inclusiveness and active participation are ensured and necessary resources are provided on time and they are being used appropriately.

1. Listing the selected tools and equipment that are used for the following function in setting out that living house:
    a. Safety (PPE)
    b. Measuring
    c. Cutting
    d. Levelling
    e. Cleaning
2. Ask students to differentiate tools and equipment from the list they selected.
3. Ask them to provide methods they will use to clean the selected tools and equipment.
4. After finishing the above mentioned task, ask students to make a report on the performed task and mark them.
5. This activity can be done during class time and/or after class. Give students more independence in doing this task.

Topic 1.2: Identification of materials used in building set out

Objectives:

By the end of the topic, trainees will be able to:

a. Select correctly materials used in building set out
b. Describe the function of various materials used in building set out
c. Describe the quality of various materials used in building set out
d. Store materials used in building set out

Time Required: 4 Hours

Learning Methodology:

Role play, small group work, brainstorming, individual work, large group discussions, site visit.

Materials , tools and equipment Needed:

- **Materials:** Timber, Mason line or building line, Nails and soil.
- **Tools:** not applicable
- **Equipment:** not applicable

Preparation:

- ❑ Prepare a list of materials used in building set out.
- ❑ Highlight all precaution and safety measures that will govern all activities.
- ❑ Contact a workshop assistant to prepare the list of materials in the workshop.
- ❑ Contact site engineers in order to organise field visits on materials identification and preparation where possible.
- ❑ Make a requisition of materials on time

Cross Cutting Issues:

- ✓ Respect gender while forming the group and during presentation
- ✓ Dispatch people with disabilities in different groups.
- ✓ Ensure inclusiveness while giving trainees tasks.

- ✓ Provide an environment that promotes free and active participation while trainees answer questions and, during group discussion and presentations.
- ✓ Promote financial education by selecting materials of good quality and ensure their proper maintenance.
- ✓ Promote standardisation culture between trainees through team work.

Prerequisites:

- ✓ Safety health and environment
- ✓ Fundamental of building materials

Activity 1: Problem Solving

Task 5:

1. By using an appropriate methodology such as brainstorming, individual work, pair-share, small group discussions, guided discussions or large group discussion, guide trainees to analyse the scenario and answer the questions provided under task 5 in their trainee manuals. Make sure all instructions are understood, inclusiveness and active participation are ensured and necessary resources are provided on time and they are being used appropriately.
2. If you decide to use group discussion, remember to remind each group to take note summarising their agreements on each question or point they will need during the presentation.
3. By Using an appropriate methodology such as question and answer in group or pair presentations, invite the students to share their findings or answer to the whole class. Findings or answers of each group should be written on the board or posted where they are visible to everyone in class as the remaining students will have to give their views on each group presentation.
4. After the presentation stage, involve students to link what has been discussed on task 5 with the **Key facts 1.2:** Selection of materials used in building set out and their functions.

5. Remember to provide clarification and answer to student's questions referring to their answer/views provided during presentation.
6. Remember that the task for problem solving activities is not intended for marks as it will help you to link students' understanding and the key facts provided in their trainee manual.

Activity 2: Guided Practice

Task 6:

1. By using an appropriate methodology such as small or large group discussions and guided discussions, guide trainees to analyse the scenario provided in Task 6 in their trainee's manual and perform tasks related to it. Make sure all instructions are understood, inclusiveness and active participation are ensured and necessary resources are provided on time and they are being used appropriately.
2. Organise a site visit at nearly construction site or Take student in the workshop and then, guide them to perform the following tasks by providing clarification where necessary:
   a) Select essential materials used for setting out the building for a living house.
   b) Highlight the function of each selected material.
   c) Describe the quality that selected materials should have.
   d) Provide recommendations for future use of poor materials found if there is any.
3. If you decided to pay a site visit, make sure you contacted the site engineer before for audience and if, the task is to be performed in school workshop you have also to inform the workshop assistant and make sure all material you need are available on time
4. Engage trainees to perform the task at large extent and intervene where necessary by providing clarification or further explanations to what have been discussed in class on key fact 1.2. Remember to remind students to take a summary of their works as each group will have to present what they have done in the class.
5. Using an appropriate methodology such as question and answer in a large group or small group presentations, students share their answers to the class. Each group

writes on the board or posts their findings for reference. Make sure all students are actively giving their views on the presentation of each group.

6. Refer students to **Key facts 1.2:** Selection of materials used in building set out and their functions**.** and discuss together the common materials used in building set out, their functions, qualities and storage;
7. At this stage you need to explain clearly the content provided in key fact 1.2 and make sure that you answered and resolved all questions and difficulties shown by trainees during discussions or practices and, trainees are ready to engage and guide themselves to the next application tasks.
8. Inform students that they are going to use the key facts (1.2) while performing the next activity which requires them to use the knowledge, skills and attitude they have got from facts (1.2) and guided activities.

Activity 3: Application

Task 7:

1. Refer to the location you used while performing guided practice (task 6), choose one you didn't use between site visit and school workshop and use it while involving students to perform themselves or independently all activities under task 7 in their training manual.

2. Using an appropriate methodology such as individual work, pairs or small groups ask trainees to go to the masonry workshop or construction site with a sheet of paper to be used while recording their findings. Make sure all instructions are understood, inclusiveness, safety and active participation are ensured and necessary resources are available.

a) Select all materials that are used in building set out.
b) Check the quality of these materials and decide on their quality.
c) Provide the key hint for storing selected materials.
d) After finishing the above-mentioned task, ask trainees to return to the classroom and share their findings with their colleagues in a class.

Formative Assessment

1. Refer to the formative assessment provided in trainee manual at the end of Learning Outcome 1 give trainees a written assessment to check trainees' understanding and this will help you to know to what level or extent the trainees have understood the concepts of learning outcome 1.
2. It is not mandatory to use only questions provided for formative assessment in trainee manuals, you may add further questions the necessary is that, they reflect to the key **fact 1.1** and **key fact 1.2** as per trainee's manual.
3. The formative assessment should be prepared on all performance criteria to ensure that all points have been understood.
4. Formative assessment should be marked and results should be provided, analysed in order to see whether the learning outcome has been understood or further support is needed.
5. Also, while preparing formative assessment remember to use various techniques of questioning at all levels of understanding.

- **Possible solutions to the formative assessment provided in trainee manual Learning Outcome 1**

1. Complete the following table by Listing tools and equipment used to set out a building.

Answer:

Number	Tools	Equipment
1.	Builders square	PPE (safety helmet),
2.	Plumb Bob	Dumpy level
3.	spirit level	Theodolite
4	Pencil	Wheelbarrow
5	Tape Measure	PPE (Safety goggles)

2. Select the appropriate materials used to set out a building?

   Answer:

   Materials used to set out a building are: Building Line, Timber/wood, pegs, nails and soil

3. Give the proper manner to maintain tools and equipment used to set out a building.

Answer:

Refer to Key points to consider and follow in storing tools and equipment provided in the **Key fact 1.1** in trainee manual

4. Provide 4 techniques of maintaining tools and equipment.

Answer:

Four techniques of maintaining tools and equipment are: Lubrication, Cleaning, conducting regular inspection, Storing tools properly

5. Answer by True or False: The methods of cleaning tools and equipment are

a. By using beer: **False**
b. By using oil/grease: **True**
c. By using brush and water: **True**
d. By using air compressor: **True**
e. By using Pump: **True**

5. Explain why we are advised to select materials of good quality

Answer:

- Increase durability of the structure
- Reduce maintenance cost
- Provide enough strength
- Provide good workability
- Reduce wastage of materials

Points to Remember

- Tools are the items needed to manipulate and craft construction materials while Equipment on the other hand refers to tangible and durable assets that help in the production of other goods and services. Examples of equipment are like things like machinery, tools, devices etc.

- The cleaning methods for tools and equipment will depend on a number of factors but mostly the types of materials that make those tools or equipment. A combination of methods may be used across the workplace depending on the tools or equipment being cleaned.
- The quality of materials will play an important role in the end product of your task.
- Tools and equipment should be inspected regularly for proper maintenance.
- Materials form the actual product and are the parts, components, ingredients and raw materials that become a part of the product. That is, materials form the base of the product. In this context, materials can be reused or fully consumed.

Self-Reflection

1. Ask learners to retake the self-assessment at the beginning of the unit. They should then fill in the table in the Trainee's Manual to identify their areas of strength, areas for improvement and actions to take to improve. This should be done in a short time.

2. Discuss trainees' results with them. Identify any areas that are giving many trainees difficulties and plan to give additional support as needed (ex. use class time before you begin the next learning outcome to go through commonly identified difficult concepts).

3. Don't forget to appreciate the effort made by students or areas of improvement after comparing the results students provided at the beginning and the end of the learning outcome.

learning outcome 2: Self-Assessment

1. Ask trainees to look at the illustration above and together discuss:
    a. What does the illustration show?
    b. What is happening in the figure?
    c. What do you think will be topics to be covered under this Learning Outcome based on the figure?
2. After some brainstorming, share the main topics.
3. Ask trainees to fill out the self-assessment at the beginning of the learning outcome 2 in their trainee's manuals.
4. Explain that:
    a. The purpose of the self-assessment is to become familiar with the topics in the learning outcome and for them to see what they already know or do not know at the beginning.
    b. There is no right or wrong way to answer this assessment.
    c. It is for their own reference and self-reflection on the knowledge, skills and attitude acquisition during the learning process.
    d. They should think about themselves: do they think they have the knowledge, skills or attitude to do this? How well?
5. Ask trainees to read the statements across the top and put a check in the column that best represents their level of knowledge, skills or attitudes.
6. Explain that, at the end of the learning outcome, they will do a self-reflection, which includes re-taking the self-assessment and identifying their strengths.
7. Ask trainees to fill in and complete the self-assessment table below to assess their level of knowledge, skills and attitudes under this Learning Outcome 2.

Key Competencies:

Knowledge	Skills	Attitudes
1. List tools and equipment used to prepare the site.	**1.** Select tools and equipment used to prepare the site.	**1.** Safe handling of tools and equipment.
2. Describe the use of equipment used to prepare the site.	**2.** Use different types of equipment required to prepare the site.	**2.** Avoid wastage of materials.
3. Identify techniques for removing debris and hazardous materials.	**3.** Apply techniques for removing debris and hazardous objects.	**3.** Time management.
4. Identify techniques for removing top soil.	**4.** Apply techniques for removing top soil.	**4.** Taking care of tools and equipment.
5. Explain function and quality of materials used to set out a building.	**5.** Manipulate materials during setting out of building	**5.** Avoiding wastage of materials
6. Describe the purpose of levelling the site.	**6.** Apply levelling techniques	**6.** Take necessary safety precautions while clearing the site.

Steps:

Discovery Activity

Task 8:

1. Invite and guide trainees to share their experiences about the building construction process in terms of knowledge, skill and attitude in order to evaluate what they already know about unit 2 by using an appropriate methodology. This will be done through pair-sharing or group discussions monitored by the trainer.

2. Allow trainees to share their prior experience in building set out by using the questions provided under task 8 in their trainee manuals. Trainer must explain all instructions well and provide assistance where necessary.
3. Instructions should be well understood by all trainees and a trainer should provide all necessary resources required to understand and perform the task well.
4. Make sure that gender, inclusiveness, active participation and teamwork are all ensured while forming groups and during group discussion as well as presentation.
5. Remind trainees that they have to write down their summarised answer to task 8 in their trainee manual as they will use that summary during group presentation to the whole class based on the methodology you used during discussion.
6. Provide assistance where necessary by passing through all groups and manage the time well by reminding the remaining time.
7. Ask trainees to share their findings by referring to appropriate methodology you used in point 1 including: Question and answer, pair presentations and group presentations. Make sure that all students' views are gathered and taken into consideration.
8. Remember that the main objective of providing a discovery activities and its tasks was not intended to get the right or wrong answer from trainees, but instead it was a way of discovering what trainees already know about the learning outcome and also a way of helping them to have general information on what is going to be covered in this learning outcome.
9. Introduce Topic 2. 1: Assessment of the site condition.

Topic 2.1: Assessment of the site condition.

Objectives:

By the end of the topic, trainees will be able to:

a. Explain the reason of assessing the site condition before setting out a building
b. Describe the types and classification of soils
c. Describe the types vegetation that are commonly find on the site
d. Differentiate natural features and built environment as used in building set out Describe topographic characteristics of the site

Time Required: 2 Hours

Learning Methodology:

Role play, small group work, brainstorming, individual work, large group discussions, site visit.

Materials, tools and equipment Needed:

- **Materials:** Soil
- **Tools**: Pick axe, Hoes, Spade etc
- **Equipment:** Wheelbarrow, PPEs etc

Preparation:

- ❑ Prepare different pictures and videos illustrating different types of soil and vegetation.
- ❑ Highlight all precaution and safety measures that will govern all activities.
- ❑ Contact workshop assistant to prepare the terrain and raw materials in the workshop.
- ❑ Contact site engineer in order to organise field visit on assessment of the site condition where possible.

- ❑ Provide conducive environment that allows trainees to acquire intended knowledge and skills

Cross Cutting Issues:

- ✓ Respect gender while forming the group and during presentation
- ✓ Dispatch people with disabilities in different groups.
- ✓ Ensure inclusiveness while giving trainees tasks.
- ✓ Provide an environment that promotes free and active participation while trainees answer questions and, during group discussion and presentations.
- ✓ Promote financial education by assessing the site properly.
- ✓ Promote standardisation culture between trainees through team work.

Prerequisites:

- ✓ Knowledge on natural features of the earth
- ✓ Knowledge on types of soil and vegetation.
- ✓ Knowledge on safety precaution measures.
- ✓ Have team work spirit.
- ✓ Be attentive and show desire to learn new things

Activity 1: Problem Solving

Task 9:

1. By using an appropriate methodology such as individual work, pair-share, small group discussions, guided discussions or large group discussion, guide trainees to analyse the scenario and answer the questions provided under task 9 in their trainee manuals. Make sure all instructions are understood, inclusiveness and active participation are ensured and necessary resources are provided on time and are being used appropriately.

2. Using an appropriate methodology such as question and answer in group or pair presentations, students share their findings or answer to the whole class. Findings or

answers of each group should be written on the board or flip chart and posted where they are visible to everyone in class as the remaining students will have to give their views on each group presentation.

3. After the sharing session, refer students to **Key Facts 2.1a:** Assessment of the site condition and discuss them together while harmonising their responses provided in the sharing session and answer any questions they may have.

Activity 2: Guided Practice

Task 10:

1. By using an appropriate methodology such as small or large group discussions and guided discussions, guide trainees to analyse the scenario provided on **Task 10** in their trainee's manual and answer the questions related to it. Make sure all instructions are understood, inclusiveness and active participation are ensured, necessary resources are provided on time and they are being used appropriately.

2. Take student to the newly construction site or find a field at your school where possible and then guide them to perform the following tasks by providing clarification where necessary:
   a. Describe the type of soil on the site.
   b. Mention type of vegetation found on the site.
   c. By using a table below, differentiate natural features and built environments found on the site.

Differentiate natural features	Built environment

3. Using an appropriate methodology such as question and answer in a large group or small group presentations, students share their answers to the class. Each group writes on the board or flip chart and post their findings for reference. Make sure all students are actively giving their views on the presentation of each group.

4. Then refer students to **Key Facts 2.1a:** Assessment of the site condition and discuss together the reason of assessing the site condition in building set out, the types of soils and vegetation with their characteristics, the differentiate between natural features and built environment and the description of topographic characteristics of the site while answering any questions they have.
5. Ask trainee to identify other types of vegetation that are not covered in **Key fact 2.1.a**
6. Inform students that they are going to use the **Key facts (2.1.a)** while performing the next activity which requires them to use the knowledge, skills and attitude they have got from **Key facts (2.1.a)** and guided activities.

Activity 3: Application

Task 11:

By using an appropriate methodology such as small or large groups of trainees, take them to nearly construction sites or go to the surrounding terrain with a sheet of paper to be used under task 11 in their trainee manuals. Make sure all instructions are understood, inclusiveness and active participation are ensured and necessary resources are provided on time and they are being used appropriately.

1. Ask students to identify the type of soil found on the construction site/terrain
2. Request them to mention the type of vegetation found on the site and to recommend how they will be cleared
3. Ask students to provide the reason why the permitting officer requested to do a site assessment before proceeding with further any construction processes.
4. Ask students to List down natural features and built environments they are seeing on the site/terrain
5. Ask them to describe the topographic characteristics of the visited site
6. After finishing the above-mentioned task, ask students to make a report on the performed task and mark them.
7. This activity can be done during class time and/or after class. Give students more independence in doing this task.

Topic 2.2: Clear the site

Objectives:

By the end of the topic, trainees will be able to:

a. Identify debris and hazardous objects on/at construction site
b. Identify clearing techniques used in building set out
c. Identify cleaning techniques used in building set out

Time Required: 3 Hours

Learning Methodology:

Role play, small group work, brainstorming, individual work, large group discussions, site visit.

Materials, tools and equipment Needed:

- **Materials**: Soil
- **Tools:** Panga, Claw hammer, Hand saw, Hoes, Pick axel, Spade.
- **Equipment**: PPEs, Cutting equipment, Excavation plants/machines, Wheelbarrow

Preparation:

- ❑ Prepare a list of tools, equipment and materials used to clear the site.
- ❑ Highlight all precaution and safety measures that will govern all activities.
- ❑ Contact workshop assistant to prepare the terrain around the school.
- ❑ Contact site engineer in order to organise field visits on clearing the site where possible.
- ❑ Make a requisition of tools, equipment materials on time

Cross Cutting Issues:

- ✓ Respect gender while forming the group and during presentation
- ✓ Dispatch people with disabilities in different groups.

- ✓ Ensure inclusiveness while giving trainees tasks.
- ✓ Provide an environment that promotes free and active participation while trainees answer questions and, during group discussion and presentations.
- ✓ Promote financial education by properly clearing the site.
- ✓ Promote standardisation culture between trainees through team work.

Prerequisites:

- ✓ Knowledge on handling common hazards
- ✓ Knowledge on safety precaution measures.
- ✓ Knowledge on handling tools and equipment
- ✓ Have team work spirit.
- ✓ Be attentive and show desire to learn new things

Activity 1: Problem Solving

Task 12:

1. By using an appropriate methodology such as brainstorming, individual work, pair-share, small group discussions, guided discussions or large group discussion, guide trainees to analyse the scenario and answer the questions provided under **task 12** in their trainee's manuals. *Make sure all instructions are understood, inclusiveness and active participation are ensured and necessary resources are provided on time and they are being used appropriately.*
2. If you decide to use group discussion, remember to remind each group to take note summarising their agreements on each question or point they will need during the presentation.
3. By Using an appropriate methodology such as question and answer in group or pair presentations, invite the students to share their findings or answer to the whole class. Findings or answers of each group should be written on the board or posted where they are visible to everyone in class as the remaining students will have to give their views on each group presentation.

4. After the presentation stage, involve students to link what have been discussed on task 5 with the **Key Facts 2.2:** Clear the site
5. Remember to provide clarification and answer to student's questions referring to their answer/views provided during presentation.
6. Remember that the tasks for problem solving activities are not intended for marks as it will help you to link students' understanding and the key fact provided in their trainee manual.

Activity 2: Guided Practice

Task 13:

1. By using an appropriate methodology such as small or large group discussions and guided discussions, guide trainees to analyse the scenario provided in **Task 13** in their trainee's manual and perform tasks related to it. *Make sure all instructions are understood, inclusiveness and active participation are ensured and necessary resources are provided on time and they are being used appropriately.*
2. Organise a site visit at nearly construction site or Take student at surrounded terrain if available and then, guide them to perform the following tasks by providing clarification where necessary:

    a. Identify all debris and hazardous objects that should be removed on the site.
    b. Select the method (s) you are going to use while removing debris and hazardous objects.
    c. Select tools and equipment you need to perform that task.
    d. Identify and apply appropriate clearing method(s).
    e. Do not hesitate to ask help from your trainer for any challenge you meet.
3. If you decided to pay a site visit, make sure you contacted the site engineer before for audience and if, the task is to be performed in school surrounded terrain you have also to inform the workshop assistant and make sure the site has all required features and all material you need are available on time

4. Engage trainees to perform the task at large extent and intervene where necessary by providing clarification or further explanations to what have been discussed in class on **Key fact 2.2.** Remember to remind students to take a summary of their works as each group will have to present what they have done in the class.
5. Using an appropriate methodology such as question and answer in a large group or small group presentations, students share their answers to the class. Each group writes on the board or posts their findings for reference. Make sure all students are actively giving their views on the presentation of each group.
6. Refer students to **Key Facts 2.2:** Clear the site**.** and discuss together the common debris and hazardous objects, site clearing and cleaning techniques as well as different tools and equipment used in clearing the site during building set out.
7. At this stage you need to explain clearly the content provided in **key fact 2.2** and make sure that you answered and resolved all questions and difficulties shown by trainees during discussions or practices and, trainees are ready to engage and guide themselves to the next application tasks.
8. Inform students that they are going to use the **key facts (2.2)** while performing the next activity which requires them to use the knowledge, skills and attitude they have got from **facts (2.2)** and guided activities.

Activity 3: Application

Task 14:

1. Refer to the location you used while performing guided practice (task 13), choose one you didn't use between site visit and school terrain and use it while involving students to perform themselves or independently all activities under task 14 in their trainee's manual.
2. Using an appropriate methodology such as pairs, lager or small groups ask trainees to go to the school's surrounding terrain or construction site with a sheet of paper to be used while recording their findings. *Make sure all instructions are understood, inclusiveness, safety and active participation are ensured and necessary resources are available.*
3. Ask students to identify all debris and hazardous objects found on the site.

4. Ask students to highlight safety precaution measures they are going to apply while removing hazardous objects
5. Ask them to mention all tools and equipment required to perform the task.
6. Ask students to identify the clearing method (s) being or to be used.
7. Ask students if the clearing method(s) being applied is appropriate? If No, ask them to provide their recommendation based on the nature of the task.
8. After finishing the above mentioned task, ask students to make a report on the performed task and mark them.
9. This activity can be done during class time and/or after class.
10. Give students more independence in doing this task.

Topic 2.3: Levelling of the site

Objectives:

By the end of the topic, trainees will be able to:

a. Explain the purpose of levelling as used in building set out
b. Describe the techniques of removing during site preparation
c. Describe equipment mostly used while removing top soil
d. Describe ground levelling techniques used in building set out

Time Required: 5 Hours

Learning Methodology:

Role play, small group work, brainstorming, individual work, large group discussions, site visit.

Materials , tools and equipment Needed:

- **Materials:** Timber, Mason line or building line, Nails and soil.
- **Tools:** Spirit level, Level tube, Laser, Hoes, Spade, Panga, Brush, Saw, Hummer, Pick axle
- **Equipment:** Barometer, Dumpy level, Total station, Theodolite, PPEs, Wheelbarrow, Bulldozer, Mechanical auger, Draglines, Back actor/ Backhoe, Pneumatic drill, Truck

Preparation:

- ❑ Prepare a list of tools and equipment used in levelling the site.
- ❑ Highlight all precaution and safety measures that will govern all activities.
- ❑ Contact workshop assistants to prepare the listed tools equipment and in the workshop.
- ❑ Contact site engineer in order to Organise field visit on materials identification and preparation where possible.
- ❑ Make a requisition of materials on time

Cross Cutting Issues:

- ✓ Respect gender while forming the group and during presentation
- ✓ Dispatch people with disabilities in different groups.
- ✓ Ensure inclusiveness while giving trainees tasks.
- ✓ Provide an environment that promotes free and active participation while trainees answer questions and, during group discussion and presentations.
- ✓ Promote financial education by using well levelling tools and equipment and ensure their proper maintenance.
- ✓ Promote standardisation culture among trainees through team work.

Prerequisites:

- ✓ Knowledge on unit measurement such length, angles, height and volume
- ✓ Knowledge on using levelling tools and equipment
- ✓ Knowledge on handling levelling tools and equipment
- ✓ Knowledge on safety precaution measures.

Activity 1: Problem solving

Task 15:

1. By using an appropriate methodology such as brainstorming, individual work, pair-share, small group discussions, guided discussions or large group discussion, guide trainees to analyse the scenario and answer the questions provided under task 15 in their trainee's manual. *Make sure all instructions are understood, inclusiveness and active participation are ensured and necessary resources are provided on time and they are being used appropriately.*
2. If you decide to use group discussion, remember to remind each group to take note summarising their agreements on each question or point they will need during the presentation.
3. By Using an appropriate methodology such as question and answer in group or pair presentations, invite the students to share their findings or answer to the whole class.

Findings or answers of each group should be written on the board or posted where they are visible to everyone in class as the remaining students will have to give their views on each group presentation.

4. After the presentation stage, involve students to link what has been discussed on task 15 with the **Key Facts 2.3:** Levelling of the site.
5. Remember to provide clarification and answer to student's questions referring to their answer/views provided during presentation.
6. Remember that the task for problem solving activities is not intended for marks as it will help you to link students' understanding and the key fact provided in their trainee manual.

Activity 2: Guided Practice

Task 16:

1. By using an appropriate methodology such as small or large group discussions and guided discussions, guide trainees to analyse the scenario provided in **Task 16** in their trainee's manual and perform tasks related to it. Make sure all instructions are understood, inclusiveness and active participation are ensured and necessary resources are provided on time and they are being used appropriately.
2. Take student in the workshop or in the given terrain inside the school and then, guide them to perform the following tasks by providing clarification where necessary:
   a. Explain why it is necessary to level that ground.
   b. Select the method you are going to use while levelling the ground
   c. Select tools and equipment you need to perform that task.
   d. Identify and apply appropriate levelling techniques you are going to use.
   e. Explain your decision of choosing the applied levelling techniques.
   f. Provide help or assistance for any challenge the students meet.
3. Make sure you contact or inform the workshop assistant about the task to be carried out and ask him/her to prepare all necessary tools, equipment and material to ensure that they are available on time.
4. Engage trainees to perform the task at large extent and intervene where necessary by providing clarification or further explanations to what have been discussed in class on key

fact 2.3. Remember to remind students to take a summary of their works as each group will have to present what they have done in the class.

5. Using an appropriate methodology such as question and answer in a large group or small group presentations, students share their answers to the class. Each group writes on the board or posts their findings for reference. Make sure all students are actively giving their views on the presentation of each group.
6. Refer students to **Key Facts 2.3:** Levelling of the site and discuss together the purpose for Levelling, common techniques of removing topsoil and the equipment that are mostly used for this task and also the common levelling techniques as applied in building set out.
7. At this stage you need to explain clearly the content provided in **key fact 2.3** and make sure that you answered and resolved all questions and difficulties shown by trainees during discussions or practices and, trainees are ready to engage and guide themselves to the next application tasks.
8. Inform students that they are going to use the **key facts (2.3)** while performing the next activity which requires them to use the knowledge, skills and attitude they have got from **facts (2.3)** and guided activities.

Activity 3: Application

Task 17:

1. Refer to the location you used while performing guided practice (task 16), choose one you didn't use between site visit and school workshop and use it while involving students to perform themselves or independently all activities under **task 16** in their trainee's manual.
2. Using an appropriate methodology such as individual work, pairs or small groups ask trainees to go to the masonry workshop or construction site with a sheet of paper to be used while recording their findings. *Make sure all instructions are understood, inclusiveness, safety and active participation are ensured and necessary resources are available.*
3. Ask students to highlight all tools and equipment they are going to use.

4. Ask students to mention the levelling techniques they are going to use based on size, cost and nature of the terrain
5. Ask them to Describe the method to be used while removing the topsoil
6. Remind and check that students apply the safety precaution while performing the task.
7. Ask student to make a comparison in terms of performance and quality result from the method applied in each site
8. Encourage students to provide advice or recommendation to the project owner if there is any.
9. After finishing the above mentioned task, ask students to make a report on the performed task and mark them.
10. This activity can be done during class time and/or after class. Give students more independence in doing this task.

Formative Assessment

1. Refer to the formative assessment provided in trainee manual at the end of Learning Outcome 2, give trainees a written assessment to check trainees' understanding and this will help you to know to what level or extent the trainees have understood the concepts of learning outcome 2.
2. It is not mandatory to use only questions provided for formative assessment in trainee manuals, you may add further questions the necessary is that they reflect to the **key fact 2.1, key fact 2.2** and **key fact 2.3** as per trainee manual.
3. The formative assessment should be prepared on all performance criteria to ensure that all points have been understood.
4. Formative assessment should be marked and results should be provided, analysed in order to see whether the learning outcome has been understood or further support is needed.
5. Also, while preparing formative assessment remember to use various techniques of questioning at all levels of understanding.

- **Possible solutions to the formative assessment provided in trainee manual**

Learning Unit 2

1. Complete the following table by Listing the tools and equipment that are mostly used to prepare the site.

Answer:

Number	Tools	Equipment
1.	Hoes	Wheelbarrow
2.	Spade	PPEs
3.	Panga	Bulldozer
4.	Brush	Mechanical auger
5.	Pick axe	Back actor

2. What are the types of soil? And differentiate them briefly.

Answer:

✓ Sand, silt, clay, loam and peat

3. Select the appropriate types of vegetation that you can find on the site to prepare.

Answer:

✓ Forest, Grassland, Tundras, Desert and Ice sheet

4. Explain why we need to conduct a site investigation before starting any construction processes.

Answer:

✓ In order to identify the following features:

- The strength of the soil, because this affects the design of the foundations.
- Type of the soil which will be excavated
- Amount of the water in the ground because this affects the design of the foundations and working procedures.
- Amount of clean or contaminated ground
- Amount that the ground slopes
- Access to services such as mains water, electricity and drainage
- Best position for the building in terms of the local climate
- Position of natural features such as trees, rocks and streams.

- Position of other buildings near the site
- Location of site boundaries and access road.
- Evaluating or estimating the nature, ability or quality of the site.

a. Respond to the following statement by **true** or **false**.

The reason why are we advised to keep aside the top soil while preparing the site is:

a. Because it is not fertile and not useful for agricultural purpose
b. Because it is fertile and useful for agricultural purpose
c. Because it is black soil
d. Because it is contains stones

Answer:

a. Because it is not fertile and not useful for agricultural purpose……**False**
b. Because it is fertile and useful for agricultural purpose……**True**
c. Because it is black soil …… **False**
d. Because it is contains stones …… **False**

5. Differentiate methods used while removing top soil.

Answer:

- ✓ Manual techniques: Removing top soil by Manual method with the help of hand tools like Hoes, spades, Machetes and pickaxes.
- ✓ Mechanical techniques: Removing top soil by Mechanical method using mechanical equipment that makes the job much easier.

6. What do you understand by levelling?

Answer:

It is the process of find the elevations of points on the earth's surface for topographic maps

7. What are the techniques used for levelling the site? And explain where each technique can be used.

Answer:

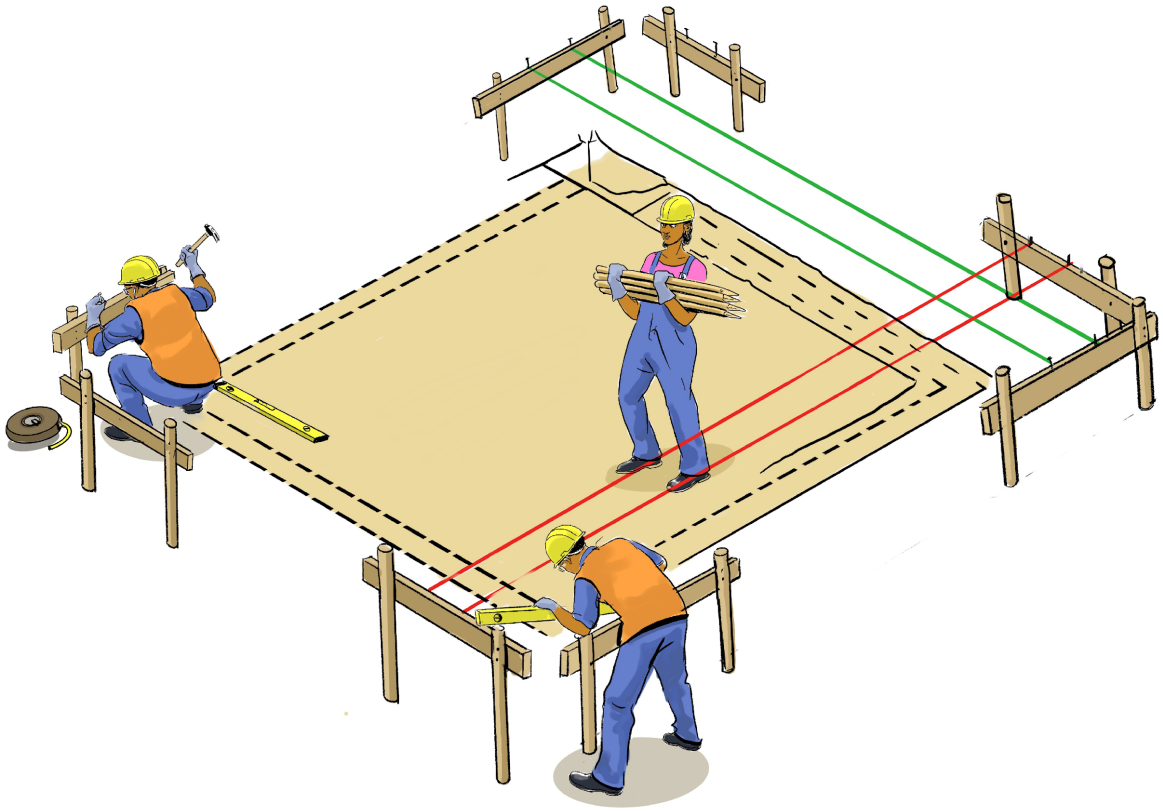
Differential technique, Trigonometric technique, Barometric technique (for more explanation see **Key Facts 2.3:** Levelling of the site in trainee's manual)

Points to Remember

- The levelling method will depend on a number of factors but mostly the nature of debris, cost, type of structures, workmanship and surrounding environment. A combination of methods may be used across the workplace.
- Where Cleaning of the site is required during site preparation, just make sure you choose an appropriate method based on the nature of the site and the cost it will take.
- The levelling techniques will depend on a number of factors but mostly the size of the land to be levelled, available cost, type of structures, workmanship, location and surrounding environment. So it's up to you to choose the best one based on highlighted factors
- Safety precaution measures should be taken carefully while removing hazardous materials as they are harmful to human life especially chemical waste, gas and sharpened materials.
- Selecting a good building site will play a key role in term of cost, durability and quality of your building

Self-Reflection

1. Ask learners to retake the self-assessment at the beginning of the unit. They should then fill in the table in the Trainee's Manual to identify their areas of strength, areas for improvement and actions to take to improve. This should be done in a short time.
2. Discuss trainees' results with them. Identify any areas that are giving many trainees difficulties and plan to give additional support as needed (ex. use class time before you begin the next learning outcome to go through commonly identified difficult concepts).
3. Don't forget to appreciate the effort made by students or areas of improvement after comparing the results students provided at the beginning and the end of learning outcome.



Learning outcome 3: Self-Assessment

1. Ask trainees to look at the illustration above and together discuss:
    a. What does the illustration show?
    b. What is happening in the figure?
    c. What do you think will be topics to be covered under this Learning Outcome based on the figure?

After some brainstorming, share the main topics.

2. Ask trainees to fill out the self-assessment at the beginning of the learning outcome in their trainee's manuals.
3. Explain that:
    a. The purpose of the self-assessment is to become familiar with the topics in the learning outcome and for them to see what they know or do not know at the beginning.
    b. There is no right or wrong way to answer this assessment.

c. It is for their own reference and self-reflection on the knowledge, skills and attitudes acquisition during the learning process.
d. They should think about themselves: do they think they have the knowledge, skills or attitudes to do this? How well?

4. Ask trainees to read the statements across the top and put a check in the column that best represents their level of knowledge, skills or attitudes.
5. Explain that:
    a. At the end of the learning outcome, they will do a self-reflection, which includes re-taking the self-assessment and identifying their strengths.
6. Ask trainees to fill in and complete the self-assessment table below to assess their level of knowledge, skills and attitudes under this Learning Outcome.

Key Competencies:

Knowledge	Skills	Attitudes
1. Describe levelling and tools and surveying instruments used in building set out	**1.** Select levelling hand tools and surveying instruments required to carry out building set out	**1.** Safe handling of tools and instrument
2. Describe the use of levelling hand tools and surveying instruments used to set out a building.	**2.** use levelling hand tools and surveying instruments required in in setting out a building	**2.** Attention to details.
3. Describe drawing elements.	**3.** Interpret drawing elements.	**3.** Time management.
4. Describe setting out methods.	**4.** Apply setting out methods.	**4.** Taking care of tools and instruments.
5. Explain main terms used in levelling	**5.** Take and fill data from surveying instruments in a levelling book.	**5.** Demonstrate team spirit while working with others

Knowledge	Skills	Attitudes
6. Identify Procedures of Checking dimensions, levels and angles	**6.** Apply Procedures of Checking dimensions, levels and angles.	**6.** Take necessary safety precautions while setting a building profile.
7. Identify and describe errors during building set out.	**7.** Correct errors during building set out	**7.** Comply with national and international standards during work execution.

Steps:

Discovery Activity

Task 18:

1. Invite and guide trainees to share their experiences about the building construction process in terms of knowledge, skill and attitude in order to evaluate what they already know about the unit by using an appropriate methodology. This will be done through pair-sharing or group discussions monitored by the trainer. Allow trainees to share their prior experience in building set out by using the questions provided under task 8 in their trainee manuals. Trainer must explain all instructions well and provide assistance where necessary. Instructions should be well understood by all trainees and trainers should provide all necessary resources required to understand and perform the task well. Make sure that gender, inclusiveness, active participation and teamwork are all ensured while forming groups and during group discussion as well as presentation.
2. Remind trainees that they have to write down their summarised answer to task 18 in their trainee manual as they will use that summary during group presentation to the whole class based on the methodology you used during discussion.
3. Provide assistance where necessary by passing through all groups and manage the time well by reminding the remaining time.

4. Ask trainees to share their findings by referring to appropriate methodology you used in point 1 including: Question and answer, pair presentations and group presentations. Make sure that all students' views are gathered and taken into consideration.
5. Remember that the main objective of providing a discovery activities and its tasks was not intended to get the right or wrong answer from trainees, but instead it was a way of discovering what trainees already know about the learning outcome and also a way of helping them to have general information on what is going to be covered in this learning outcome.
6. Introduce Topic 3. 1: Identification of Levelling tools used in building set out.

Topic 3.1: Identification of Levelling tools used in building set out.

Objectives:

By the end of the topic, trainees will be able to:

a. Explain the levelling term as used in building set out.
b. Describe the use of levelling hand tools used in building set out.
c. Describe the procedure of using hand tools while levelling.

Time Required: 5 Hours

Learning Methodology:

Role play, small group work, brainstorming, individual work, large group discussions, site visit.

Materials, tools and equipment needed:

- **Materials:** Not applicable
- **Tools:** Tape measure, Plumb bob, Hammer, Arrows, Ranging rod etc.
- **Equipment:** Dump level, Total station, Theodolite, Prism square, GPS, PPEs etc.

Preparation:

- ❑ Prepare different pictures and videos illustrating the procedure of using levelling hand tools.
- ❑ Prepare a list of levelling hand tools used in building set out
- ❑ Highlight all precaution and safety measures that will govern all activities.
- ❑ Contact workshop assistant to prepare all required tools in the workshop.
- ❑ Contact site engineer in order to organise field visit on assessment of the site condition where possible.
- ❑ Provide conducive environment that allows trainees to acquire intended knowledge and skills

Cross Cutting Issues:

- ✓ Respect gender while forming the group and during presentation
- ✓ Dispatch people with disabilities in different groups.
- ✓ Ensure inclusiveness while giving trainees tasks.
- ✓ Provide an environment that promotes free and active participation while trainees answer questions and, during group discussion and presentations.
- ✓ Promote financial education by handling well levelling hand tools and by using proper materials while levelling.
- ✓ Promote standardisation culture between trainees through team work.

Prerequisites:

- ✓ Basics drawing
- ✓ Fundamental of tools used in building construction

Activity 1: Problem Solving

Task 19:

1. By using an appropriate methodology such as individual work, pair-share, small group discussions, guided discussions or large group discussion, guide trainees to analyse the scenario and answer the questions provided under task 19 in their trainee manuals. Make sure all instructions are understood, inclusiveness and active participation are ensured and necessary resources are provided on time and are being used appropriately.

2. Using an appropriate methodology such as question and answer in group or pair presentations, students share their findings or answer to the whole class. Findings or answers of each group should be written on the board or flip chart and posted where they are visible to everyone in class as the remaining students will have to give their views on each group presentation.

3. After the sharing session, refer students to **Key Facts 3.1:** Identification of Levelling tools used in building set out and discuss them together while harmonising their responses provided in the sharing session and answer any questions they may have.

Activity 2: Guided Practice

Task 20:

1. By using an appropriate methodology such as small or larger group discussions and guided discussions, guide trainees to analyse the scenario provided in **Task 20** in their trainee's manual and answer the questions related to it. *Make sure all instructions are understood, inclusiveness and active participation are ensured, necessary resources are provided on time and they are being used appropriately.*
2. Take student to the building construction workshop at your and then guide them to perform the following tasks by providing clarification where necessary:
   a. Select levelling hand tools used in building set out.
   b. Describe the working principle of each selected levelling hand tools.
   c. Apply procedures of using selected levelling hand tools
   d. Select a wall or surface and level it by using each selected levelling hand tools and make a comparison on their occurrence.
   e. After applying procedures of using levelling hand tools, mention the advantages for each and provide disadvantages if there is any
3. Using an appropriate methodology such as question and answer in a small or large group presentations, students share their answers to the class. Each group writes on the board or flip chart and posts their findings for reference. *Make sure all students are actively giving their views on the presentation of each group.*
4. Then refer students to **Key Facts 3.1:** Identification of Levelling tools used in building set out and discuss together the common levelling hand tools, their use and the procedures of using them while levelling for building set out, while answering any questions they have.
5. Ask trainees to identify other types of levelling hand tools that are not covered in key fact 3.1.

6. Inform students that they are going to use the key facts (3.1.) while performing the next activity which requires them to use the knowledge, skills and attitude they have got from key facts (3.1) and guided activities.

Activity 3: Application

Task 21:

By using an appropriate methodology such as small or larger groups of trainees, take them to nearby construction sites or go to the surrounding terrain or building construction workshop with a sheet of paper to be used under task 21 in their trainee's manuals. *Make sure all instructions are understood, inclusiveness and active participation are ensured and necessary resources are provided on time and they are being used appropriately.*

1. Ask students to mention levelling hand tools they are going to use to perform the following task
    a. To check the vertical height required to be filled for the side with lower slope.
    b. To check the horizontal levelling before filling the soil.
2. Ask students what will indicate to them that their site is completely levelled and ready for further building set out process.
3. After finishing the above mentioned task, ask students to make a report on the performed task and mark them.
4. This activity can be done during class time and/or after class. Give students more independence in doing this task.

Topic 3.2: Interpretation of drawing

Objectives:

By the end of the topic, trainees will be able to:

a. Explain the purpose of construction drawing as used in building set out.
b. Describe the main component of construction drawings for houses.
c. Interpret drawing elements used in building set out.

Time Required: 5 Hours

Learning Methodology:

Role play, small group work, brainstorming, individual work, large group discussions, site visit.

Materials, tools and equipment needed:

- **Materials:** Not applicable
- **Tools:** Drawings, Measuring tools (Tape measure and Decameter)
- **Equipment**: Not applicable

Preparation:

- ❑ Prepare a house plan with its section and elevation to be interpreted while setting out a building.
- ❑ Prepare a list of mostly used architectural and furniture symbols
- ❑ Prepare a list of common safety sign used in building construction
- ❑ Highlight all precaution and safety measures that will govern all activities.
- ❑ Contact workshop assistant to prepare the terrain around the school.
- ❑ Contact site engineer in order to organise field visit on interpretation of where possible.
- ❑ Make a requisition of tools, equipment materials on time

Cross Cutting Issues:

- ✓ Respect gender while forming the group and during presentation

- ✓ Dispatch people with disabilities in different groups.
- ✓ Ensure inclusiveness while giving trainees tasks.
- ✓ Provide an environment that promotes free and active participation while trainees answer questions and, during group discussion and presentations.
- ✓ Promote financial education by interpreting construction drawings.
- ✓ Promote standardisation culture between trainees through team work.

Prerequisites:

- ✓ Basic Knowledge on unit measurement and scale
- ✓ Basic knowledge on basic drawing
- ✓ Knowledge on interpretation of catalogues
- ✓ Knowledge on safety precaution measures.

Activity 1: Problem Solving

Task 22:

1. By using an appropriate methodology such as brainstorming, individual work, pair-share, small group discussions, guided discussions or large group discussion, guide trainees to analyse the scenario and answer the questions provided under task 22 in their trainee's manuals. *Make sure all instructions are understood, inclusiveness and active participation are ensured and necessary resources are provided on time and they are being used appropriately*.
2. If you decide to use group discussion, remember to remind each group to take note summarising their agreements on each question or point they will need during the presentation.
3. By Using an appropriate methodology such as question and answer in group or pair presentations, invite the students to share their findings or answer to the whole class. Findings or answers of each group should be written on the board or posted where they

are visible to everyone in class as the remaining students will have to give their views on each group presentation.

4. After the presentation stage, involve students to link what have been discussed on task 5 with the **Key Facts 3.2:** Interpretation of drawing
5. Remember to provide clarification and answer to student's questions referring to their answer/views provided during presentation.
6. Remember that the tasks for problem solving activities are not intended for marks as it will help you to link students' understanding and the key facts provided in their trainee manual.

Activity 2: Guided Practice

Task 23:

1. Using an appropriate methodology such as small or larger group discussions and guided discussions, guide trainees to analyse the scenario provided in **Task 23** in their trainee's manual and perform tasks related to it. *Make sure all instructions are understood, inclusiveness and active participation are ensured and necessary resources are provided on time and they are being used appropriately.*
2. Take student the building construction or masonry workshop and then, guide them to perform the following tasks refer to the scenario provided under the **task 23** in the trainee training manual and don't forget to provide clarification where necessary:
    a. Given the scale of 1:4, therefore from the measured length what would be the length of each wall on a paper/drawing?
    b. Mention all features you are seeing and that you think were represented by symbols on drawing.
    c. Identify all safety signs within your workshop and explain what they inform the building user(occupancy).
    d. Provide help or any challenge students meet.
3. Make sure you contact or inform the workshop assistant about the task to be done and ask him to avail all required material on time.

4. Engage trainees to perform the task at large extent and intervene where necessary by providing clarification or further explanations to what have been discussed in class on **key fact 3.2.** Remember to remind students to take a summary of their works as each group will have to present what they have done in the class.
5. Using an appropriate methodology such as question and answer in a large group or small group presentations, students share their answers to the class. Each group writes on the board or posts their findings for reference. *Make sure all students are actively giving their views on the presentation of each group.*
6. Refer students to **Key Facts 3.2:** Interpretation of drawing and discuss together the purpose of construction drawings, the main component of construction drawings for houses and, how to interpret drawing elements while setting a building.
7. At this stage you need to explain clearly the content provided in **key fact 3.2** and make sure that you answered and resolved all questions and difficulties shown by trainees during discussions or practices and, trainees are ready to engage and guide themselves to the next application tasks.
8. Inform students that they are going to use the **key facts (3.2)** while performing the next activity which requires them to use the knowledge, skills and attitude they have got from **facts (3.2)** and guided activities.

Activity 3: Application

Task 24:

1. By using building construction or masonry workshops at your school and, involve students to perform themselves or independently all activities under the task 24 in their training manual.

2. Using an appropriate methodology such as pairs, lager or small groups ask trainees to go to the school workshop with a sheet of paper to be used while performing the task 24 in their training manual. *Make sure all instructions are understood, inclusiveness, safety and active participation are ensured and necessary resources are available.*

a. Refer to the plan given under task 24 in the trainee manual, ask students to select all windows within that plan by using a pencil.
b. Ask students to tick wherever they find a door on the provided house plan. Objects
c. Ask students to express what the following letter represents on the drawing?
    i. W2
    ii. V1
    iii. D1 and D2
d. Ask students to explain the meaning of dashed lines provided between the cooking space and the nearby room?
e. Ask students to highlight other drawing element that are missing on this plan based on the nature and function of each room
f. Ask students to refer to the drawing and cut the given plan into two required sections that show information regarding the foundation, Floor and ground levels, Roof design, Window and door heights.
g. Ask students to return to class and share their findings with their colleagues.
h. After finishing the above mentioned task, ask students to make a report on the performed task and mark them.
i. This activity can be done during class time and/or after class. Give students more independence in doing this task.

Topic 3.3: Use surveying instruments for setting out

Objectives:

By the end of the topic, trainees will be able to:

a. Identification surveying instruments and their main parts as used in building set out
b. Describe the procedures of setting up surveying instruments while setting a building.
c. Take data from surveying instruments and Fill levelling book
d. Describe ground levelling techniques used in building set out

Time Required: 15 Hours

Learning Methodology:

Role play, small group work, brainstorming, individual work, large group discussions, site visit.

Materials, tools and equipment Needed:

- **Materials**: Timber, Mason line or Building line, Nails.
- **Tools**: hoes, spade, Panga, Saw, Hummer, Pick axe
- **Equipment:** Dumpy level, Total station, Theodolite, PPEs, Wheelbarrow.

Preparation:

- ❑ Prepare a list of surveying instruments used in building set out the site.
- ❑ Find catalogues of above-mentioned surveying instruments.
- ❑ Highlight all precaution and safety measures that will govern all activities.
- ❑ Contact workshop assistant to prepare the listed surveying instruments and other required equipment in the workshop.
- ❑ Contact site engineer in order to organise field visit on use of surveying instruments where possible.
- ❑ Make a requisition of materials on time.

Cross Cutting Issues:

- ✓ Respect gender while forming the group and during presentation
- ✓ Dispatch people with disabilities in different groups.
- ✓ Ensure inclusiveness while giving trainees tasks.
- ✓ Provide an environment that promotes free and active participation while trainees answer questions and, during group discussion and presentations.
- ✓ Promote financial education by using well surveying instruments and equipment and ensuring their proper maintenance.
- ✓ Promote standardisation culture between trainees through team work.

Prerequisites:

- ✓ Knowledge on unit measurement such length, angles, height and volume.
- ✓ Knowledge on handling tools and equipment.
- ✓ Knowledge on interpretation drawing.
- ✓ Knowledge on collecting and organising simple data.
- ✓ Knowledge on safety precaution measures.

Activity 1: Problem Solving

Task 25:

1. By using an appropriate methodology such as brainstorming, individual work, pair-share, small group discussions, guided discussions or large group discussion, guide trainees to analyse the scenario and answer the questions provided under task 25 in their trainee manuals. *Make sure all instructions are understood, inclusiveness and active participation are ensured and necessary resources are provided on time and they are being used appropriately.*

2. If you decide to use group discussion, remember to remind each group to take note summarising their agreements on each question or point they will need during the presentation.
3. By Using an appropriate methodology such as question and answer in group or pair presentations, invite the students to share their findings or answer to the whole class. Findings or answers of each group should be written on the board or posted where they are visible to everyone in class as the remaining students will have to give their views on each group presentation.
4. After the presentation stage, involve students to link what has been discussed on task 15 with the **Key Facts 3.3:** Use surveying instruments for setting out. Remember to provide clarification and answer to student's questions referring to their answer/ views provided during the presentation.
5. Remember that the tasks for problem solving activities are not intended for marks as it will help you to link students' understanding and the key facts provided in their trainee manual.

Activity 2: Guided Practice

Task 26:

1. By using an appropriate methodology such as small or larger group discussions and guided discussions, guide trainees to analyse the scenario provided in Task 26 in their trainee's manual and perform tasks related to it. *Make sure all instructions are understood, inclusiveness and active participation are ensured and necessary resources are provided on time and they are being used appropriately.*
2. Take student in the building construction or masonry workshop and where possible find also a terrain around your school to be used while taking some data and then, guide them to perform the following tasks by providing clarification where necessary:
    a) Identify all necessary surveying instruments to be used while performing well the provided task.
    b) Explain the function of the main part of each highlighted surveying instrument.
    c) Describe the procedure of setting up and using identified surveying instruments.

d) Explain how data are taken from surveying instruments.
e) Mention the methods to be used while calculating the reduced level.

3. Provide help or assistance for any challenge the students meet.
4. Make sure you contact or inform the workshop assistant about the task to be carried out and ask him/her to prepare all necessary tools, equipment and material to ensure that they are available on time.
5. Engage trainees to perform the task at large extent and intervene where necessary by providing clarification or further explanations to what have been discussed in class on **Key fact 3.3.** Remember to remind students to take a summary of their works as each group will have to present what they have done in the class.
6. Using an appropriate methodology such as question and answer in a large group or small group presentations, students share their answers to the class. Each group writes on the board or posts their findings for reference. *Make sure all students are actively giving their views on the presentation of each group.*
7. Refer students to **Key Facts 3.3:** Use surveying instruments for setting out and, discuss together about the surveying instruments and their main parts, taking data from surveying instruments and Fill levelling book and the application of methods for reduction of levels as used in building set out.
8. At this stage you need to explain clearly the content provided in **Key fact 3.3** and make sure that you answered and resolved all questions and difficulties shown by trainees during discussions or practices and, trainees are ready to engage and guide themselves to the next application tasks.
9. Inform students that they are going to use the **Key facts (3.3)** while performing the next activity which requires them to use the knowledge, skills and attitude they have got from facts (3.3 and guided activities.

Activity 3: Application

Task 27:

1. By using building construction or masonry workshops at your school and, involve students to perform themselves or independently all activities under the task 27 in their training manual.

a. Using an appropriate methodology such as individual work, pairs or small groups ask trainees to go to the masonry workshop with a sheet of paper to be used while recording their findings. *Make sure all instructions are understood, inclusiveness, safety and active participation are ensured and necessary resources are available.*

b. Ask students to highlight all surveying instruments you are going to use while performing the provided task.
c. Ask students to identify the method of reduction of levels to be used while computing various levels.
d. Ask students to take a point as A as a datum from which they are going to determine the elevation of other points.
e. Ask students to Record taken data from le surveying instrument in levelling book or sheet
f. Ask students to compute or calculate all needed reduced levels by using two different methods of reduction of levels and check that students apply the safety precaution while performing the task.
g. Ask students to decide which method of reduction of levels they think is the best one based on workability and time after completing the above tasks.
h. After finishing the above mentioned task, ask students to make a report on the performed task, ask them to present their report and mark them.

i. This activity can be done during class time and/or after class. Give students more independence in doing this task.

Topic 3.4: Demarcation of building lines according to drawing

Objectives:

By the end of the topic, trainees will be able to:

a. Describe the General steps involved for setting out of the building**.**
b. Describe setting out methods for construction of a building
c. Explain the advantages and disadvantages of setting out methods as used in building set out.

Time Required: 20 Hours

Learning Methodology:

Role play, Small group work, Brainstorming, Individual work, Large group discussions, Site visit.

Materials, tools and equipment Needed:

- **Materials:** Timber, Mason line or building line, Nails.
- **Tools:** Hoes, Spade, Panga, Spirit level, Saw, Hummer, Pick axle, Builder square, Tape measure
- **Equipment:** Dumpy level, Total station, Theodolite, GPS, PPEs, Wheelbarrow.

Preparation:

- ❑ Prepare a list of tools, equipment and surveying instruments used to set out the building profile at the site.
- ❑ Prepare a drawing plan to be used while setting a profile.
- ❑ Highlight all precaution and safety measures that will govern all activities.
- ❑ Contact workshop assistant to prepare the listed tools, surveying instrument and other required equipment in the workshop.
- ❑ Contact site engineer in order to organise field visit on setting a profile.
- ❑ Make a requisition of materials on time.

Cross Cutting Issues:

- ✓ Respect gender while forming the group and during presentation
- ✓ Dispatch people with disabilities in different groups.
- ✓ Ensure inclusiveness while giving trainees tasks.
- ✓ Provide an environment that promotes free and active participation while trainees answer questions and, during group discussion and presentations.
- ✓ Promote financial education by using well tools, surveying instruments and equipment and ensuring their proper maintenance.
- ✓ Promote standardisation culture between trainees through team work.

Prerequisites:

- ✓ Knowledge on unit measurement such length, angles, height and volume.
- ✓ Knowledge on handling tools and equipment.
- ✓ Knowledge on interpretation of catalogues and drawing.
- ✓ Knowledge on collecting and organising simple data.
- ✓ Knowledge on safety precaution measures.
- ✓ Basic knowledge on the quality of materials.

Activity 1: Problem Solving

Task 28:

1. By using an appropriate methodology such as brainstorming, individual work, pair-share, small group discussions, guided discussions or large group discussion, guide trainees to analyse the scenario and answer the questions provided under task 28 in their trainee manuals. *Make sure all instructions are understood, inclusiveness and active participation are ensured and necessary resources are provided on time and they are being used appropriately.*

2. If you decide to use group discussion, remember to remind each group to take note summarising their agreements on each question or point they will need during the presentation.
3. By Using an appropriate methodology such as question and answer in group or pair presentations, invite the students to share their findings or answer to the whole class. Findings or answers of each group should be written on the board or posted where they are visible to everyone in class as the remaining students will have to give their views on each group presentation.
4. After the presentation stage, involve students to link what has been discussed on task 28 with the **Key Facts 3.4:** Demarcation of building lines according to drawing. Remember to provide clarification and answer to student's questions referring to their answer/ views provided during the presentation.
5. Remember that the tasks for problem solving activities are not intended for marks as it will help you to link students' understanding and the key facts provided in their trainee manual.

Activity 2: Guided Practice

Task 29:

1. By using an appropriate methodology such as small or larger group discussions and guided discussions, guide trainees to analyse the scenario provided in Task 29 in their trainee's manual and perform tasks related to it. *Make sure all instructions are understood, inclusiveness and active participation are ensured and necessary resources are provided on time and they are being used appropriately.*
2. Take student in the building construction or masonry workshop and where possible find a terrain around your school to be used while setting a building profile and then, guide them to perform the following tasks by providing clarification where necessary:
   a. Mention the General Steps you are going to follow while setting that dormitory.
   b. Select the appropriate building set out method to be used.
   c. Apply all steps of using the method you selected at point b.
   d. Give the Advantages and disadvantages of the method used.

e. What are your recommendations to the school for future building projects?

3. Provide help or assistance for any challenge the students meet.
4. Make sure you contact or inform the workshop assistant about the task to be carried out and ask him/her to prepare all necessary tools, equipment and material to ensure that they are available on time.
5. Engage trainees to perform the task at large extent and intervene where necessary by providing clarification or further explanations to what have been discussed in class on key fact 3.4. Remember to remind students to take a summary of their works as each group will have to present what they have done in the class.
6. Using an appropriate methodology such as question and answer in a large group or small group presentations, students share their answers to the class. Each group writes on the board or posts their findings for reference. Make sure all students are actively giving their views on the presentation of each group.
7. Refer students to **Key Facts 3.4:** Demarcation of building lines according to drawing and, discuss together about the general steps involved for setting out the building, building setting out methods, their area of application, the steps or procedure for each method as well as the advantages and disadvantages for each method as used in building set out.
8. At this stage you need to explain clearly the content provided in **key fact 3.4** and make sure that you answered and resolved all questions and difficulties shown by trainees during discussions or practices and, trainees are ready to engage and guide themselves to the next application tasks.
9. Inform students that they are going to use the **key facts (3.4)** while performing the next activity which requires them to use the knowledge, skills and attitude they have got from facts (3.4) and guided activities.

Activity 3: Application

Task 30:

1. By using building construction or masonry workshops at your school and, involve students to perform themselves or independently all activities under the task 30 in their training manual.

2. Using an appropriate methodology such as individual work, pairs or small groups ask trainees to go to the masonry workshop with a sheet of paper to be used while recording their findings. Make sure all instructions are understood, inclusiveness, safety and active participation are ensured and necessary resources such as the drawing plan for the dormitory are available.

a. Ask students to mention the general Steps they are going to follow while setting the dormitory.
b. Ask students to select the appropriate building set out method to be used.
c. Ask students to apply all steps of setting out that dormitory by using the method they selected at point b.
d. Ask students to give the Advantages and disadvantages of the method used at point
e. Involve students to provide recommendations to the school for future building projects?
f. After finishing the above mentioned task, ask students to make a report on the performed task, ask them to present their report and mark them.
g. This activity can be done during class time and/or after class. Give students more independence in doing this task.

Topic 3.5: Accurate verification and correction of dimensions, levels and angles

Objectives:

By the end of the topic, trainees will be able to:

a. Describe the procedures of Checking dimensions, levels and angles for building set out.
b. Identified errors that may arise while setting a building.
c. Describe the possible ways of correcting identified errors.

Time Required: 5 Hours

Learning Methodology:

Role play, small group work, brainstorming, individual work, large group discussions, site visit.

Materials, tools and equipment Needed:

- **Materials**: Mason line or Building line, Nails.
- **Tools:** Spirit level, Builder square, Tape measure.
- **Equipment:** Dumpy level, Total station, GPS, Theodolite, PPEs.

Preparation:

- ❑ Prepare a list of tools, equipment and surveying instruments used to check out the building profile at the site.
- ❑ Prepare a drawing plan to be used while comparing to the building profile.
- ❑ Highlight all precaution and safety measures that will govern all activities.
- ❑ Contact workshop assistant to prepare all required tools, surveying and equipment in the workshop.
- ❑ Contact site engineer in order to organise field visit on checking of a building profile.
- ❑ Make a requisition of materials on time.

Cross Cutting Issues:

- ✓ Respect gender while forming the group and during presentation
- ✓ Dispatch people with disabilities in different groups.
- ✓ Ensure inclusiveness while giving trainees tasks.
- ✓ Provide an environment that promotes free and active participation while trainees answer questions and, during group discussion and presentations.
- ✓ Promote financial education by using well tools and equipment and ensuring their proper maintenance.
- ✓ Promote standardisation culture between trainees through team work.

Prerequisites:

- ✓ Knowledge on using measuring tool
- ✓ Knowledge on demarcation of the building line
- ✓ Knowledge on handling tools and equipment.
- ✓ Knowledge on interpretation of drawing.
- ✓ Knowledge on collecting and organising simple data.
- ✓ Knowledge on safety precaution measures.

Activity 1: Problem Solving

Task 31:

1. By using an appropriate methodology such as brainstorming, individual work, pair-share, small group discussions, guided discussions or large group discussion, guide trainees to analyse the scenario and answer the questions provided under task 31 in their trainee manuals. *Make sure all instructions are understood, inclusiveness and active participation are ensured and necessary resources are provided on time and they are being used appropriately.*

2. If you decide to use group discussion, remember to remind each group to take note summarising their agreements on each question or point they will need during the presentation.
3. By Using an appropriate methodology such as question and answer in group or pair presentations, invite the students to share their findings or answer to the whole class. Findings or answers of each group should be written on the board or posted where they are visible to everyone in class as the remaining students will have to give their views on each group presentation.
4. After the presentation stage, involve students to link what has been discussed on task 28 with the **Key Facts 3.5:** Accurate verification and correction of dimensions, levels and angles. Remember to provide clarification and answer to student's questions referring to their answer/ views provided during the presentation.
5. Remember that the tasks for problem solving activities are not intended for marks as it will help you to link students' understanding and the key facts provided in their trainee manual.

Activity 2: Guided Practice

Task 32:

1. By using an appropriate methodology such as small or larger group discussions and guided discussions, guide trainees to analyse the scenario provided in Task 32 in their trainee's manual and perform tasks related to it. *Make sure all instructions are understood, inclusiveness and active participation are ensured and necessary resources are provided on time and they are being used appropriately*.
2. Take student in the nearly building construction site or use your masonry workshop where you have set a building profile for previous task and then, guide them to perform the following tasks by providing clarification where necessary:
    a. List specified tools and equipment you need in order to verify and correct dimensions, levels and angles of the building profile.
    b. Identify errors that may arise while setting the building profile.

c. Identify error that may arise while setting the building profile
d. Suggest the cause of errors in building set out and Explain how you will correct the errors

3. Provide help or assistance for any challenge the students meet.

4. Make sure you contact or inform the workshop assistant about the task to be carried out and ask him/her to prepare all necessary tools, equipment and material to ensure that they are available on time.

5. Engage trainees to perform the task at large extent and intervene where necessary by providing clarification or further explanations to what have been discussed in class on Key fact 3.5. Remember to remind students to take a summary of their works as each group will have to present what they have done in the class.

6. Using an appropriate methodology such as question and answer in a large group or small group presentations, students share their answers to the class. Each group writes on the board or posts their findings for reference. *Make sure all students are actively giving their views on the presentation of each group.*

7. Refer students to **Key Facts 3.5:** Accurate verification and correction of dimensions, levels and angles and, discuss together about the procedures of Checking dimensions, levels and angles, identification and correction of errors for setting out.

8. At this stage you need to explain clearly the content provided in **Key fact 3.5** and make sure that you answered and resolved all questions and difficulties shown by trainees during discussions or practices and, trainees are ready to engage and guide themselves to the next application tasks.

9. Inform students that they are going to use the **Key facts (3.5)** while performing the next activity which requires them to use the knowledge, skills and attitude they have got from **facts (3.5)** and guided activities.

Activity 3: Application

Task 33:

1. By using building construction or masonry workshops at your school and, involve students to perform themselves or independently all activities under the task 33 in their training manual.

2. Using an appropriate methodology such as individual work, pairs or small groups ask trainees to go to the masonry workshop or nearby terrain used for setting a profile under previous task with a sheet of paper to be used while recording their findings. *Make sure all instructions are understood, inclusiveness, safety and active participation are ensured and necessary resources such as the drawing plan for the dormitory are available.*

a. Ask students to list specified tools and equipment they need in order to verify and correct dimensions, levels and angles of the building profile.
b. Ask students to explain and apply the procedure of Checking dimensions, levels and angles.
c. Ask students to identify errors that may arise while setting the building profile.
d. Ask student to identify error that may arise while setting the building profile
e. Ask students to suggest the cause of errors in building set out and Explain how you will correct them
f. After finishing the above mentioned task, ask students to make a report on the performed task, ask them to present their report and mark them.
g. This activity can be done during class time and/or after class. Give students more independence in doing this task.

Formative Assessment

1. Refer to the formative assessment provided in trainee's manual at the end of Learning Outcome 3 give trainees a written assessment to check trainees' understanding and this will help you to know to what level or extent the trainees have understood the concepts of learning outcome 2.

2. It is not mandatory to use only questions provided for formative assessment in trainee manuals, you may add further questions the necessary is that, they reflect to the **key fact 3.1, key fact 3.2, fact 3., 3key fact 3.4 and key fact 3.5** as per trainee manual.

3. The formative assessment should be prepared on all performance criteria to ensure that all points have been understood.

4. Formative assessment should be marked and results should be provided, analysed in order to see whether the learning outcome has been understood or further support is needed.

5. Also, while preparing formative assessment remember to use various techniques of questioning at all levels of understanding.

- **Possible solutions to the formative assessment provided in trainee manual**

Learning Unit 3

1. Read carefully the following List of levelling hand tools used in building set out and select the appropriate.
    a. Trower
    b. Jointer
    c. Vernier calliper
    d. Spirit level
    e. Club hammer
    f. Level tube
    g. GPS
    h. Laser

    Answer:

    ✓ Tools: Spirit level, level tube and laser
2. Describe the procedure of using tube level.

    Answer:

    Refer to Key Facts 3.1: Identification of Levelling tools used in building set out
3. Among the following surveying instruments, select 3 surveying instruments used in building set out.
    a. Camera
    b. Dumpy level
    c. Theodolite
    d. Spirit level
    e. total station
    f. GPS

    Answer:

    Dumpy level, theodolite, total station and GPS.
4. Give the methods of building set out?

    Answer:

    The common building set out method are:

    ✓ Builder's square method

    ✓ 3-4-5 method

- ✓ Levelling instrument (surveying) method
- ✓ Prismatic square method

5. Highlight the general Steps involved for setting out of the building.

Answer:

General steps involved for setting out of building are

- ✓ Establish the baseline
- ✓ Set out the right angle at the correct length and check the diagonals
- ✓ Set up the profile boards to allocate the width of the trench, foundation and walls.
- ✓ Check dimensions, levels and angles.

6. Differentiate the main component of construction drawings for houses.

Answer:

- ✓ Plans: It shows all walls and openings as seen from top view
- ✓ Sections; it shows the levels, dimensions and construction details in a vertical view (as if cut through with a knife).
- ✓ Elevations: it shows the outside (face) of the building. It also provides view from one side of the construction when looking at it from outside

7. Differentiate methods of reduction of levels

Answer:

There are two methods for reduction of levels:

- ✓ Rise and Fall method and
- ✓ Height of instrument method.

For their differences see key Facts 3.3: Use surveying instruments for setting out

8. Respond the following statements by **true** or **false**

The following are the types of errors that may arise during building set out?

a. Instrumental Error
b. Grammatical error
c. Personal Error
d. Mental error
e. Errors due to Natural Cause

Answer:

A. Instrumental Error……**True**

B. Grammatical error ……**False**

C. Personal Error……**True**

D. Mental error ……**False**

E. Errors due to Natural Cause ……**True**

9. Use the data provided in the table below and fill the missing R.L (reduced level) by using the height of instrument method

Answer:

See answer bold.

POINT	STAFF READING		Height of instrument	R.L(m)	Remarks
	B.S(m)	F.S(m)			
A	2.365		102.365	100	B.M
S1	0.685	1.235	101.815	**101.130**	T.P.$_1$
S2		3.570		**98.245**	T.P.$_2$
B		2.340		**97.650**	T.P.$_3$

Points to Remember

- The levelling method will depend on a number of factors but mostly the nature of debris, cost, type of structures, workmanship and surrounding environment. A combination of methods may be used across the workplace.
- Where Cleaning of the site is required during site preparation, just make sure you choose an appropriate method based on the nature of the site and the cost it will take.
- The levelling techniques will depend on a number of factors but mostly the size of the land to be levelled, available cost, type of structures, workmanship, location and surrounding environment. So it's up to you to choose the best one based on highlighted factors
- Safety precaution measures should be taken carefully while removing hazardous materials as they are harmful to human life especially chemical waste, gas and sharpened materials.
- Selecting a good building site will play a key role in term of cost, durability and quality of your building

Self-Reflection

1. Ask learners to retake the self-assessment at the beginning of the unit. They should then fill in the table in the Trainee's Manual to identify their areas of strength, areas for improvement and actions to take to improve. This should be done in a short time.
2. Discuss trainees' results with them. Identify any areas that are giving many trainees difficulties and plan to give additional support as needed (ex. use class time before you begin the next learning outcome to go through commonly identified difficult concepts).
3. Don't forget to appreciate the effort made by students or areas of improvement after comparing the results students provided at the beginning and the end of learning outcome.

Summative Assessment

Read the integrated situation here below and perform the tasks that follow:

NYAGISOZI TSS is a public technical secondary school located in Nyaruguru district, Nyagisozi sector and Muriza village. This school is facing problems of being ranked poorly in the previous quality audit due to ineffective management of trainees' portfolios, the auditing team provided the recommendation to the school of improving trainees' portfolios storage for effective records keeping.

The school management committee decided to construct a new store in its compound and R&E Cons Ltd company won the tender of constructing the above said store. The store will have two rectangular rooms with 5m of width and 7m of length for each, it has also a verandah in front of 2*2 m and each room has one door and two windows. After receiving the architectural drawing, the company wants to start implementing the project but, R&E Cons Ltd has realised that they need a qualified mason who will help them in setting out the proposed store in order to meet all requirements as per design. As one of the candidates who is competing for this position, you are requested to perform the following task within 5 hours.

1. Prepare the site
2. Put in place environmental protective measures.
3. Interpret the given drawing
4. Demarcate building line in order to set store profile.
5. verify and correct dimensions, levels and angles

   Given that:

   - ✓ Required tools, material and equipment are on site.
   - ✓ The thickness of the wall is 30 cm
   - ✓ The thickness of the foundation is 50 cm

Resources	
Materials	**Equipment and Tools**
Nails, Timbers, String (building lines, Pegs soil (silt and sand Peat), water and planks, papers.	Tools: Spirit level, level tube, tape measure, pick axle, hoes, decameter, hammers, spade, machete, saw, pencil. Equipment: PPE, levelling instrument (dumpy level/ theodolite/total station), Wheelbarrow, truck, excavator.

CHECKLIST

Assessable outcomes	Assessment criteria (Based on performance criteria)	Indicator	Observation		Marks allocation
			Yes	No	
Learning outcome 1: Select tools, materials and equipment (20%)	1.1. Appropriate tools are selected according to the work to be performed	Tools are properly selected			5
	1.2. Equipment is selected according to the work to be performed	Equipment are properly selected			7
	1.3. Adequate materials are selected according to the standard	Materials are properly selected			8
Learning outcome 2: Clear the site (30%)	2.1. Systematic assessment of the site is done according to the level needed.	Site is assessed systematically			10
	2.2. Working area is properly cleared from trees, roots, bushes, grasses and other unnecessary waste.	Working area is cleared properly			10

	2.3. Working area is leveled from uneven top soil according to the design specifications	Working area is leveled			10
Learning outcome 3: **Set profiles** **(50%)**	3.1. Relevant levelling tools are used according to the work to be performed.	Tools are selected			5
	3.2. Drawing is correctly interpreted in accordance with standards signs and symbols.	signs and symbols are correctly interpreted			15
	3.3. Surveying instruments are accurately used based on drawing dimensions.	Surveying instruments are accurately used			15
	3.4. Methodical demarcation of building lines is done as per drawing dimensions of trenches, foundation and walls.	Demarcation of building lines is done as per drawing dimensions of trenches, foundation and walls.			15
Total marks					**100**
Percentage Weightage					**100%**
Minimum Passing line % (Aggregate): 70%					

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