



## **Carpentry Level I I**

# **Learning Guide-27**

**Unit of Competence: Carry out  
measurements and calculation for  
building structure**

**Module Title: Carrying out  
Measurements and calculations for  
Building structure**

**LG Code: EIS CRP2 M7 LO1-LG-27**

**TTLM Code: EIS CRP2 M7 TTLM 0919v1**

**LO 1: Plan and prepare work**



<b>Instruction Sheet</b>	<b>Learning Guide #27</b>
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This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Confirming and applying Work instructions by using relevant information.
- Obtaining and applying *Safety (OHS)* requirements
- Selecting Measuring and calculating equipment

This guide will also assist you to attain the learning outcome stated in the cover page.

Specifically, upon completion of this Learning Guide, you will be able to:

- Confirm and apply Work instructions using relevant information.
- Obtain and apply *Safety (OHS)* requirements from site safety plan, other regulatory specifications or legal obligations
- Select measure and calculate equipment carry out tasks is consistent with job requirements, is checked for serviceability, and any faults are rectified or reported.

**Learning Instructions:**

Read the specific objectives of this Learning Guide.

Follow the instructions described below 3 to 5.

Read the information written in the information “Sheet 1, Sheet 2, and Sheet 3

Accomplish the “Self-check 1, Self-check t 2, Self-check 3, Self-check 4 and Self-check 5” in page -6, 11, and 14 respectively.

If you earned a satisfactory evaluation from the “Self-check” proceed to next information sheet.



<b>Information Sheet-1</b>	<b>Confirming and applying Work instructions by using relevant information.</b>
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## **1.1 introduction of Work Instruction**

In the building industry, most of the information required by the people performing any of the work related to a construction project comes from project documentation. So it's extremely important for you to be able to read and interpret plans, drawings, details and specifications correctly. Plans and drawings are used to communicate great amounts of technical information between the designer and builder. This technical information must be able to be communicated without any misunderstandings, which can only happen if the technical language of plans and drawings is understood by everyone who uses them.

The technical language for plans and drawings uses standardised layouts, symbols

And abbreviations, so that things look similar in any plan or drawing. With study,

Practice and experience, you'll get to know and understand this language and be able

to follow work instructions.

### **1.1.1 How to write step-by-step instructions**

- Describe the detailed instructions for the work.
- Identify roles and responsibilities.
- Give each activity its own title.
- One role activities.
- Don't combine two roles in the same step.
- Number each step.
- Use consistent formatting.

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### 1.1.2. nine (9) basic steps of writing Work Instructions

- Know exactly how to do the task.
- Plan how to write steps in order.
- Write instructions beginning with a verb.
- Write each step as a small piece.
- Include warnings as pre-steps.
- Write the steps in logical order.
- Review and edit instructions carefully.
- Express steps in the positive.
- Avoid expressing opinions, preferences, or choices

### 1.2 Types of relevant information

Before you begin a work task, it's important that you review and understand relevant information so that you can apply correct processes to the planning and preparation of a work activity. Such information can come in either written or verbal form. Here are a few Examples of the types of information you may need to plan and prepare for a task involving measurements and calculations.

- **Verbal information** Instructions received verbally from:
  - ✓ clients
  - ✓ workman ship
  - ✓ employers
  - ✓ supervisors, builders, contractors and subcontractors
  - ✓ Architects.

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- ✓ **Written information :**
- ✓ written instructions such as:
- ✓ plans, drawings and specifications
- ✓ manufacturers' instructions and specifications on plant, tools, equipment and materials
- ✓ maps on job location
- ✓ safety data sheets (SDSs)
- ✓ job safety analyses (JSAs)

### 1.2.1 plans and drawings

There are many types of plans and drawings that may be created for a building project.

The size and complexity of the project will determine which ones are required. The minimum set usually includes:

- ✓ a site plan
  - ✓ a floor plan
  - ✓ elevations
  - ✓ Sections.
- Others that may be required, depending on the project, include:
    - ✓ details
    - ✓ electrical plans
    - ✓ hydraulic plans
    - ✓ engineering plans

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### 1.3. Construction Work schedules/specifications

Construction schedules typically focus on two major aspects; determining how long each activity will take to complete and determining who is responsible for completing each activity. A construction project's schedule outlines each step that should be completed by a specific date before the next step can be taken. It also helps you with the planning of various resources including equipment and labor, among other things. A big construction project requires a lot of building materials which means you can use a schedule to buy the right materials at the right time allowing you to complete the project on time.

Specification for construction. Specifications describe the materials and workmanship required for a development. They do not include cost, quantity or drawn information, and so need to be read alongside other information such as quantities, schedules and drawings.

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Self-Check -1	Written Test
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Directions: choose the Answer all the questions listed below. Use the Answer sheet provided in the next free space

1. Which of the following Verbal information Instructions received verbally from(2 points)

- A. Workman ship
- B. Employers
- C. all
- D. clients

2. one of the following basic steps of writing Work Instructions(2 points)

- A. Know exactly how to do the task.
- B. Plan how to write steps in order.
- C. Write instructions beginning with a verb.
- D. All are correct

**Note: Satisfactory rating – above 2 points      Unsatisfactory - below 2 points**

You can ask you teacher for the copy of the correct answers.

**Answer Sheet**

Score = _____
Rating: _____

Name: \_\_\_\_\_ Date: \_\_\_\_\_

- 1. -----
- 2. -----
- 3.



Information Sheet-2	Obtaining and applying <i>Safety (OHS)</i> requirements
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## 2.1. Occupational Health and Safety (OHS) requirements

### 2.1.1. Protective clothing and equipment

**Personal protective equipment (PPE)** is protective clothing, helmets, goggles, or other construction or equipment designed to protect the wearer's body from injury or infection. The hazards addressed by protective equipment include physical, electrical, heat, chemicals, biohazards, and airborne particulate matter

### 2.1.2. Handling of materials

**Material handling** is the movement, protection, storage and control of materials and products throughout manufacturing, warehousing, distribution, consumption and disposal.

. The focus is on the methods, mechanical equipment, systems and related controls used to achieve these functions.

### 2.1.3. Hazard control and hazardous materials and substances

**A hazard control program** consists of all steps necessary to protect workers from exposure to a substance or system, the training and the procedures required to monitor worker exposure and their health to hazards such as chemicals, materials or substance, or other types of hazards such as noise and vibration

### 2.1.4. Organizational first aid

First aid is medical attention that is typically administered immediately after an injury or illness occurs. It usually consists of one-time, short-term treatment, such as cleaning minor cuts, treating minor burns, applying bandages, and using non-prescription medicine.

A building site should have a first aid kit which as minimum containers:-

- Plaster
- Bandage

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- Ointment
- Disinfectant
- Someone on the site should be in charge of
- the kit and know how to deal with broken
- Bones, blows and effective strikes.
- First aid kit should be placed at convenient location
- At the site so that worker can pick it up early

### 2.1.5. Use of firefighting equipment

Anyone who is likely to have to use firefighting equipment should be trained in its use and in basic fire-fighting techniques. It is also essential that the right type of extinguisher is used for the fire. ... Some water sprays and water mist extinguishers are approved for use on electrical equipment

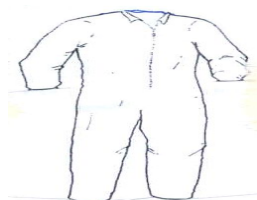
### 2.1.6. Use of tools and equipment

Hard hat:-Protects head of the worker from any falling objects dropping from high level during construction.



**Fig2.1 Hard hat**

Overall:-Protects the normal clothes from dust, grease and other spilling materials.



**Fig2.2 Overall cloths**

Safety shoe (boot):-Protects the worker form nail, sharp objects and heavy falling objects by hard-rolled leather shoes with metal toe caps.



**Fig2.3 Non-slip oil resistant shoe**

Rubber boot:- Protects the workers feet from colds, chemical, and mud in the working area.



**Fig2.4Rubber boot**

Mask: - Protects eyes of the worker from other endangering object and dust during construction.



**Fig2.5 Mask**

Goggle: - Protects eyes of the workers during welding of metal works and when placing reinforcement in the form work



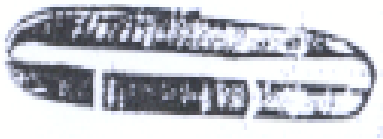
**Fig2.6 Goggles with safety glass or plastic lenses, heavy duty**

Glove:-Protects the workers from oils, chemicals, and dust and other dangerous material that affect the skin.



**Fig2.7 Gloves**

Safety Belt: - Secures laborers working in a plane where the construction is done at high level.



**Fig2.8 Safety Belt**

### **2.1.7. Workplace environment and safety**

Organizations are legally responsible for establishing and maintaining a working environment where employees are able to work safely, without risk to their physical and psychological health and welfare.

Likewise, employees are obliged to: comply with any legislative requirements and organizational policies and procedures; work in accordance with agreed safe work practices; and use all means provided to protect their health and safety.

Employer and employee health and safety responsibilities are often prescribed in legislation and supported by regulations, codes of practice and standards. These provide a foundation for guidelines on workplace safety, compensation and rehabilitation.

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<b>Self-Check -2</b>	<b>Written Test</b>
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**Directions:** Answer all the questions listed below. Use the Answer sheet provided in the next page:

1 \_\_\_\_\_ is the movement, protection, storage and control of materials (1point)

- A. Specifications
- B. plans
- C. Material handling
- D. all

2. \_\_\_\_\_ is medical attention that is typically administered immediately after an injury or illness occurs (1point)

- A. Safety
- B. First aid
- C. Hazard
- D. all

**Note: Satisfactory above – 3.5 out of 7 points Unsatisfactory - below 3.out of 7point**

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## Answer Sheet

Score = \_\_\_\_\_

Rating: \_\_\_\_\_

Name: \_\_\_\_\_

Date: \_\_\_\_\_

### Short Answer Questions

1. \_\_\_\_\_

2. \_\_\_\_\_

3. \_\_\_\_\_

4. \_\_\_\_\_



<b>Information Sheet-3</b>	<b>Selecting Measuring and calculating equipment</b>
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**3.1 introductions of Measurement**

“Measurement” is the act of determining a target's size, length, weight, capacity, or other aspect. There are a number of terms similar to “measure” but which vary according to the purpose (such as “weight,” “calculate,” and “quantify.”) In general, measurement can be understood as one action within the term “instrumentation.”

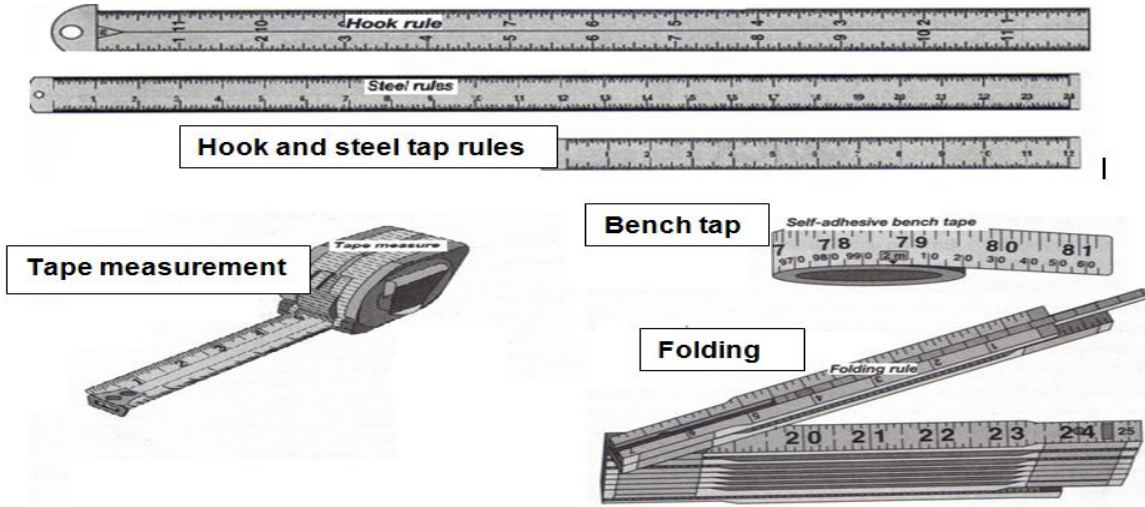
**3.1.1 measuring instrument**

Is a device for measuring a physical quantity. In the physical sciences, quality assurance, and engineering, measurement is the activity of obtaining and comparing physical quantities of real-world objects and events. Established standard objects and events are used as units, and the process of measurement gives a number relating the item under study and the referenced unit of measurement. Measuring instruments, and formal test methods which define the instrument's use, are the means by which these relations of numbers are obtained. All measuring instruments are subject to varying degrees of instrument error and measurement uncertainty

**3.1.2 Measuring tools**

- **Flexible measures:** Retractable steel tape measures, often referred to as spring tapes, are available in a variety of lengths. They are useful for setting out large areas or marking long lengths of timber and other materials.
- **Zigzag rule (folding rule):** collapsible joined poke rule. sliding metal or wood extension in to the first segment in to assist depth and side measure
- **Self-adhesive bench tap:** that is amounted to a work surface or the front edge of the work bench. handy for checking dimension while work is progress
- **Hook rule:** usually scaled both directions. This rule at one end facilitates accurate outside measures from the edge. in side measures can be taken from the straight end
- **Extension rule :** is zigzag rule ,which made up of flexi able like radio antenna it is used to accurate measure length or width,

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**Figure 3.1 measuring tools**

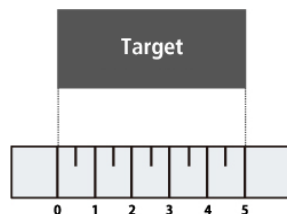
### 3.2 Difference between Measurement and Inspection

Measurement refers to the quantification of results obtained by using measurement tools. As such, inspection refers to comparing the values obtained through measurement with available references to determine whether a product is acceptable or not. When measuring a length using a ruler, it is possible to make some sort of decision based on the value, such as “The measurement is a little too long/short.” This determination is another way of saying, “Based on the value obtained using a ruler (measurement), it has been determined that this value is slightly longer (or shorter) than the length of interest.” Although there is often no need to use these definitions separately, it is a good idea to at least recognize the difference between the two.

#### 3.2.1 Differences in Measurement Methods

Measuring a target can be done through either direct measurement or indirect measurement.

- **Direct Measurement:-** Direct measurement is measurement done by bringing the target into contact with the measurement system to read the length, height, or other aspect directly. Although direct measurement allows measurement results to be known as they are, errors may occur depending on the skill of the person doing the measurement.



**Figure 3.2 reading tap measurement**



- **Indirect Measurement:** - Indirect measurement is done, for example, by using a dial gauge to measure the height difference between a measurement target and a gauge block and using that height to indirectly determine the target's height. Because this type of measurement is based on a reference, indirect measurement is also referred to as “comparative measurement.”

### **3.2.2 Measurement system**

Any of the systems used in the process of associating numbers with physical quantities and phenomena. Although the concept of weights and measures today includes such factors as temperature, luminosity, pressure, and electric current, it once consisted of only four basic measurements: mass (weight), distance or length, area, and volume (liquid or grain measure). The last three are, of course, closely related.

Basic to the whole idea of weights and measures are the concepts of uniformity, units, and standards. Uniformity, the essence of any system of weights and measures, requires accurate, reliable standards of mass and length and agreed-on units. A unit is the name of a quantity, such as kilogram or pound.

### **3.3. Selecting Measuring equipment**

One of the tasks at planning of quality inspection is selection of measuring *equipment*. The measuring instruments are the most important part of the measuring process so their selection has to be done carefully. The selection of measuring instruments is a complex task, which depends on the size, the character and the value of measured magnitude. The purpose of this paper is to analyze the existing methods for selection of measuring equipment.

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<b>Self-Check -3</b>	<b>Written Test</b>
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Directions: Answer all the black space questions listed below. Use the Answer sheet provided in the next page:

1. All measuring instruments are subject to varying degrees of-----and -----(3 points)
2. Measuring a target can be done through either -----or-----.(3 points)

**Note: Satisfactory rating - 3 and 6 points      Unsatisfactory - below 3 and 6 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = \_\_\_\_\_

Rating: \_\_\_\_\_

Name: \_\_\_\_\_ Date: \_\_\_\_\_

Short Answer Questions

1. \_\_\_\_\_ and \_\_\_\_\_
2. \_\_\_\_\_ or \_\_\_\_\_



## List of Reference Materials

1. ISO 14253-2:2013 Geometrical product specifications (GPS) - Inspection by measurement of work pieces and measuring equipment - Part 2:
2. ISO measuring equipment and in product verification - Technical Corrigendum 1 14253-2:2011/Cor 1:2013).
3. Chrysler Corporation, Measurement System Analysis, Reference Manual, , Ford Motor Company, General Motors Corporation, 1995.
3. General Motors Corp. GMPT Specification MS 1. Adam Opel AG Russelsheim, October 1998.
4. E. Dietrich, Measurement System Capability, Reference Manual, Q-DAS® GmbH, Birkenau, 2002.
5. ISO 14253-1:2013 Geometrical product specifications (GPS) - Inspection by measurement of work pieces and measuring equipment – Part 1: Decision rules for proving conformity or nonconformity with specifications.

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## **Annex I**

### **Answer keys for learning guide -27**

#### **Answer key**

#### **Self-check**

##### **Information Sheet-1**

**1, D**

**2, D**

##### **Information Sheet-2**

**1. C**

**2, B**

##### **Information Sheet-3**

1. Instrument error and measurement uncertainty
2. length, weight, capacity, or other aspect

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