



Bar Bending and Concreting Level II

Learning Guide-10

Unit of Competence: carry out measurements and calculations for building structures

Module Title: carrying out measurements and calculations for building structures

LG CODE: EIS BBC2 M04 1019 LO1 -LG -10

TTLM CODE: EISBBC2 TTLM 10 19V1

LO₁: Plan and prepare

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Instruction Sheet	Learning Guide #10
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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 using relevant information.
- Obtaining and applying Safety (OHS) requirements
- Selecting measuring and calculating equipment
- Carrying-out measuring and calculating tasks consistent with job requirements

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 are using relevant information.
- Obtain safety (OHS) requirements from site safety plan, other regulatory specifications or legal obligations, and are applied.
- Select measuring and calculating equipment to carry out tasks is consistent with job requirements, is checked for serviceability, and any faults are rectified or report

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below
3. Read the information written in the information “Sheet 1, Sheet 2, and Sheet 3 below
4. Accomplish the “Self-check 1, Self-check 2, Self-check 3, below
5. If you earned a satisfactory evaluation from the “Self-check” proceed to next information sheet.
6. Accomplish operation sheet and lap test

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Information sheet-1	Confirming and Applying relevant Work instructions
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1.1 Confirming and Applying relevant Work instructions

1.1 .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.

1.1.2 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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1.1.3 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

1.1.4 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.
- **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)

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- ✓ job safety analyses (JSAs)

1.1.5 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

1.1.5 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; multiple choose item

Instruction : choose the correct Answer

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

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

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

3. typically focus on two major aspects; determining how long each activity will take to complete(2pt)

- A. Construction schedules
- B. Preserve life
- C. Specification
- D. none

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. -----



1.2 Obtaining and applying Safety (OHS) requirements

1.2.1 Safety requirements

Safety in the workshops is subject to a number of various risk assessments and safe codes of working practices which have to be observed and adhered to by all workshop users and enforced by the person in charge of these areas. Due to high risk activities taking place in the workshops access to these areas is restricted to authorized personnel only. No other person may enter the workshops without permission.

OHS requirements are followed in accordance with safety plans and policies. Plant, tools and equipments selected to carry out tasks are consistent with the requirements of the job, checked for serviceability and any faults are rectified or reported prior to commencement.

1.2.2 Regulatory requirements

All work performed pursuant to specifications shall comply with the Requirements of the relevant local Acts, Regulations, Standards and Codes of Practice of all authorities having jurisdiction over the work.

1.2.3 Applying safety

- Use protective clothing and equipment, use of tools and equipment, workplace environment and safety, handling of materials, use of fire fighting equipment, organizational first aid, hazard control and hazardous materials and substances
- Personal protective equipment is to include that prescribed under legislation, regulation and workplace policies and practices

Site is a permanent working place for masons, concrete workers and others. Masons and concrete workers are working for longer times in construction sites. Due to the nature of their trade while finishing workers like plasterer tile painter and other finishing workers are on site during finishing work stages of the construction process so that they are short time workers.



Care and proper order supports the construction process, and avoid accidents!

1.2.4 First aid

Is the assistance given to any person suffering a sudden illness or injury?

The key aims of first aid can be summarized in three key points, sometimes known as 'the three P's':

- **Preserve life:**The overriding aim of all medical care which includes first aid, is to save lives and minimize the threat of death.
- **Prevent further harm:** Prevent further harm also sometimes called prevent the condition from worsening, or danger of further injury, this covers both external factors, such as moving a patient away from any cause of harm, and applying first aid techniques to prevent worsening of the condition, such as applying pressure to stop a bleed becoming dangerous.
- **Promote recovery:**First aid also involves trying to start the recovery process from the illness or injury, and in some cases might involve completing a treatment, such as in the Case of applying a plaster to a small wound.

A building site should have a first aid box which as minimum contents: -

- ✓ Plasters;
- ✓ Bandages;
- ✓ Ointments;
- ✓ Disinfectant

1.2.5 Site induction

Workers who are going to be on site need to undertake a site induction before they enter the site. Any site-specific safety issues will be highlighted during the site induction, and you will also be taken through emergency procedures and other safety-related information relevant to the site.

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**Self-Check -2****Written Test**

Directions: multiple choose item

Instruction: choose the best answer

1.Site is a permanent working place for :- (5 points)

- A. Masons works C. quality control
B. Concrete workers D. 'A' and 'B' Answers

2'A building site should have a first aid box which as minimum contents(5point)

- A. Plasters C. Ointments
B. Bandages D. All

Note: Satisfactory rating –above 5 points Unsatisfactory - below 5 points

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

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Answer Questions

1. _____

2. _____



1.3. Selecting Measuring and calculating equipment

1.3.1 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.”

1.3.2 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

1.3.3 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 flexible like radio antenna it is used to accurate measure length or width,

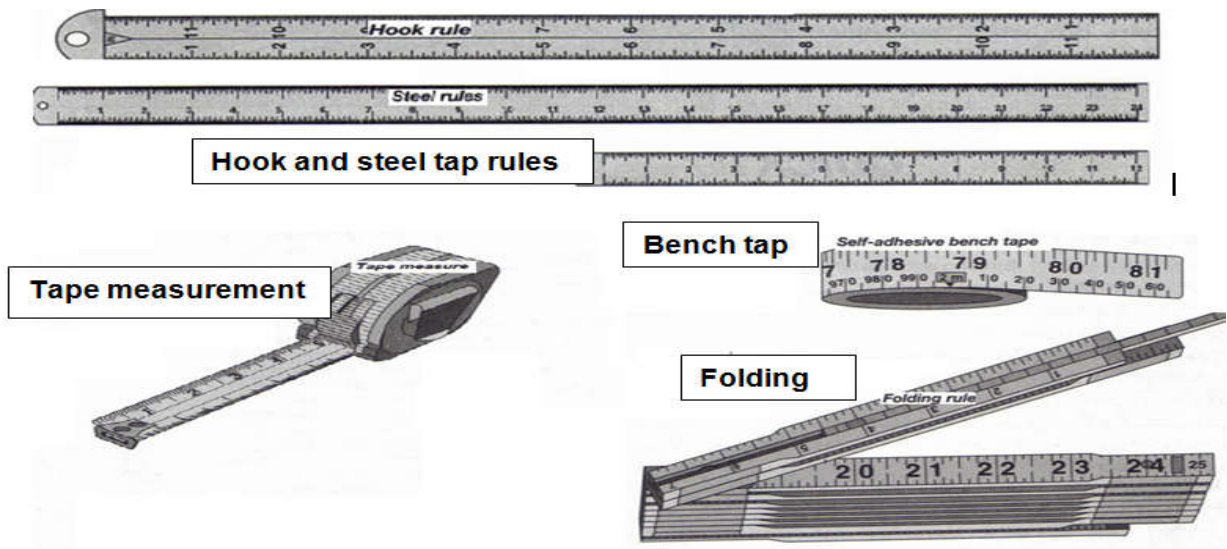


Figure 3.1 measuring tools

1.3.4 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.

1.3.5 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.

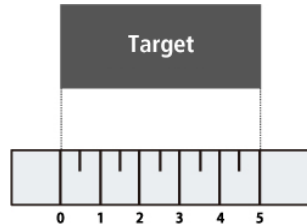


Figure 3.2 reading tap measurement

- **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.”

1.3.6 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.

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1.3.7 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.

- **Calculators**

A general-purpose of calculator is required for calculations. It just needs to be a fairly small, inexpensive one that you can easily get the hang of to perform basic calculations. Later, in more detailed estimating, you'll use a scientific calculator to perform more complex calculations.



Figure 3.3 calculator

- **Scale rules**

A scale rule is a plastic rule of 150 or 300 mm in length used to scale off dimensions when they're not given on the drawing. They can be triangular or flat like a standard ruler. They have a different scale printed along each edge. Some have a single scale per edge, and others have two scales combined on one edge. Different brands may vary in the way the scales are grouped. The most common scales you'll see on a scale rule are 1:1, 1:5, 1:10, 1:20, 1:50, 1:100, 1:200 and 1:500. On the top edge of the rule below, the scales are 1:1 and 1:100, so the dimensions they show differ by a factor of 100.

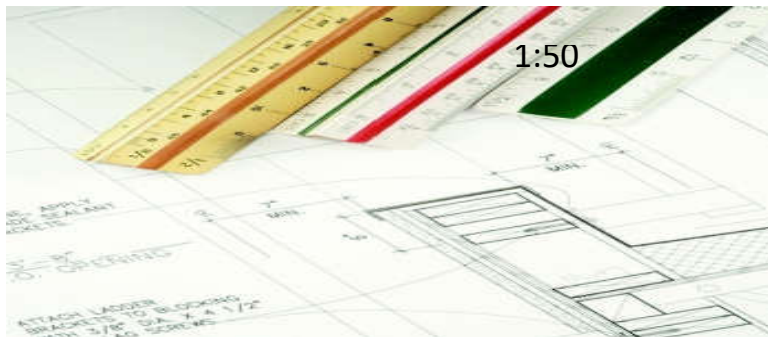


Figure 3.4 Scale rules

Another scale rule edge is shown below. In this case, the dimensions differ by a factor of 10 (1:50 is 10 times larger than 1:500).

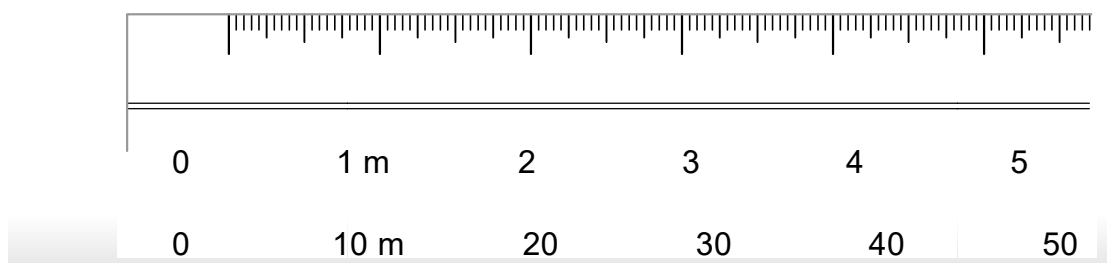


Figure 3.5 ruler scale



To measure something to scale, put the zero mark on the left-hand edge of what you're measuring, and read the length at the right-hand edge.

How to read scale

Reading scale is covered in A Read and interpret plans and specifications; however, we'll look at the basics here. By using a scale rule, a measurement can be determined from the plan provided to its actual size. If a drawing or house plan is set at a scale of 1:100, that means that all items on the house plan are one hundred times larger in reality.

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**Self-Check -3****Written Test**

Directions: multiple choose item

Instruction choose the correct answer

1. _____ is measurement done by bringing the target into contact with the measurement system to read the length, height, or other aspect directly

A. Direct measurement

B. Scale rules

C. How to read scale

D. Indirect Measurement

2. _____ is the act of determining a target's size, length, weight, capacity, or other aspect.

A. calculator

B. Measurement

C. scale

D. none

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. _____

2. _____



Self check 1

Key answer

1.D

2.D

3.A

Self check 1

Key answer

1.D

2.D

Self check 1

Key answer

1. A

2.B



Reference

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Chrisler 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.
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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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