RIICCM201E

Carry Out Measurements and

Learner Guide Instructions

Who is this document for?

The learner.

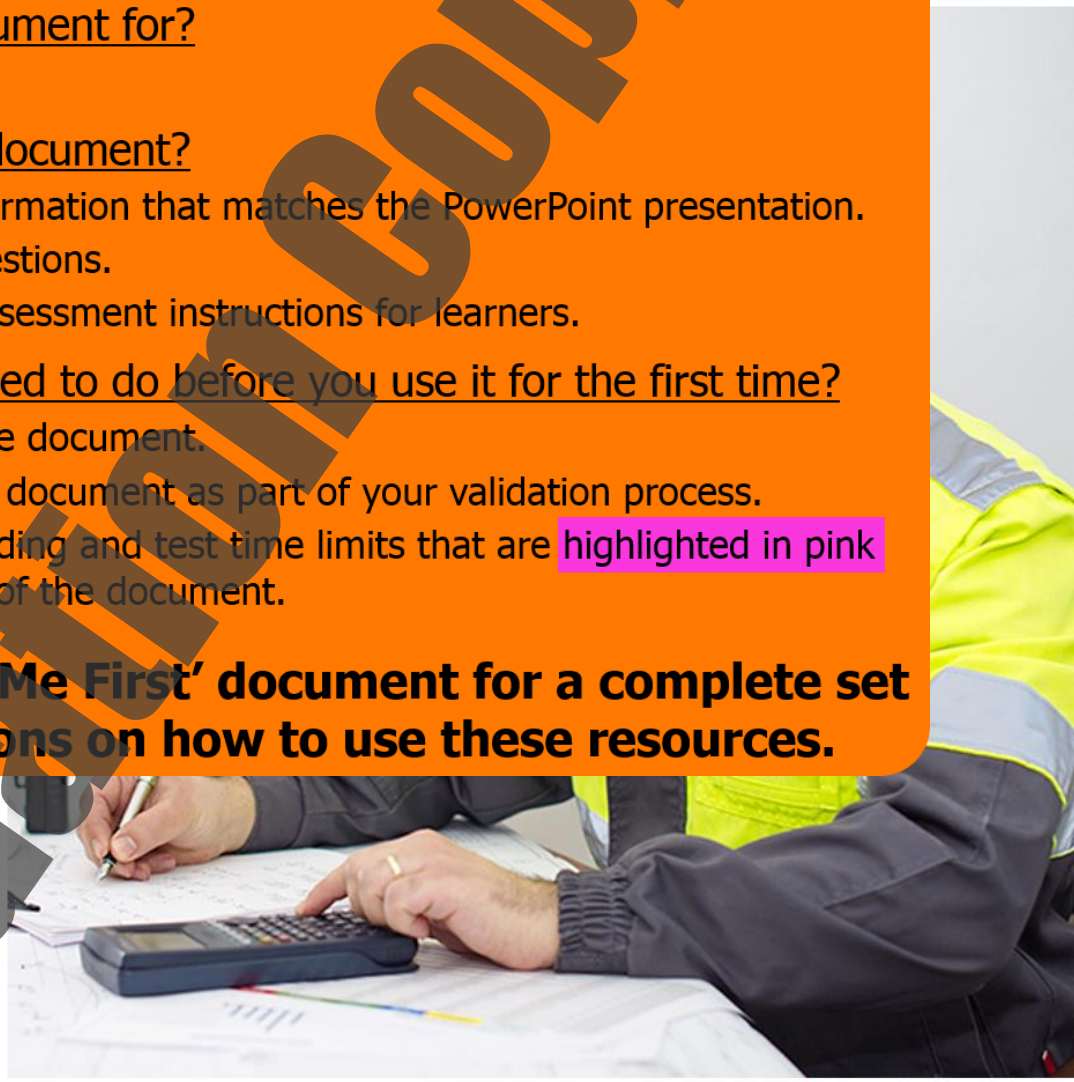
What is in this document?

- Course information that matches the PowerPoint presentation.
- Review questions.
- Practical assessment instructions for learners.

What do you need to do before you use it for the first time?

1. Rebrand the document.
2. Review the document as part of your validation process.
3. Set the reading and test time limits that are highlighted in pink at the end of the document.

See the 'Read Me First' document for a complete set of instructions on how to use these resources.



LEARNER GUIDE

RIICCM201E Carry Out Measurements and Calculations

Learner Name:	
Learner ID:	
Learner Contact Number:	
Learner Email Address:	
Date Training Commenced:	

This Book Contains:

☐ Course Information.
☐ Review Questions.
☐ Practical Assessment overview and Instructions.

Table of Contents

1.1 Introduction

This course is based on the unit of competency **RIICCM201E Carry Out Measurements and Calculations**.

You will learn about:

- Planning and preparing for work.
- How to carry out measurements and calculations for civil construction work.
- Estimating quantities for jobs.

1.1.1 Measurements and Calculations

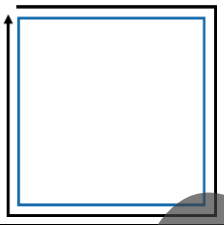
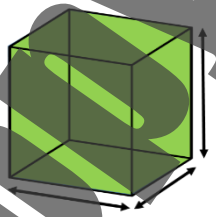
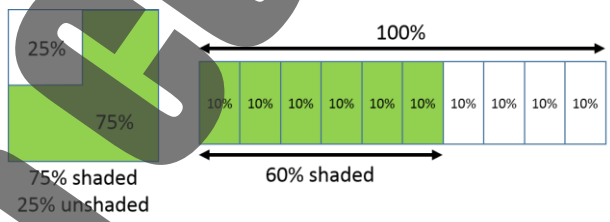
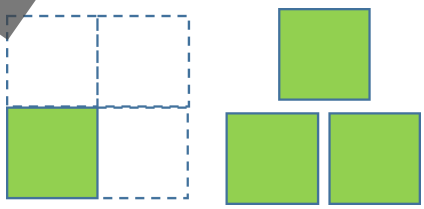
There are a wide range of things that need to be measured during civil construction projects. Measurements need to be made to make sure all work is done properly and matches the plans and specifications of the project.

Civil construction tasks require accurate information. Some information is gathered by measuring things while other information is calculated.

The things you might need to measure are:

Measurement	Description	Common Unit of Measurement	Example
Length	The longest horizontal dimension of an object.	mm (millimetre) cm (centimetre) m (metre) km (kilometre)	The trench is 6 metres long. The plank is 0.8m long. The distance to the next marker is 1.34km.
Width	The distance across an object at right angles to the length.	mm (millimetre) cm (centimetre) m (metre) km (kilometre)	The trench is 300mm wide. The path is 1.2m across.
Height or Depth	The vertical distance from the base to the top of an object or space.	mm (millimetre) cm (centimetre) m (metre) km (kilometre)	The trench is 60cm deep. The wall is 3m high.
Weight	The heaviness of an object or material.	g (gram) kg (kilogram) t (tonne)	The pallet of concrete bags weighs 415kg.
Number or Quantity	How many there are of something.	Number (1, 2, 3)	There are 250 pavers on the pallet. There are 6 concrete pipes.
Amount	How much there is of something.	m^2 (metres squared) m^3 (metres cubed) ml (millilitre) L (litre)	There are 8 cubic metres of gravel in the back of the tip truck. The container holds 12 litres of fluid.
Scale	A quantity of one value in relation to another. This is often used on work maps or plans to measure distances.	1 centimetre represents 250 metres 1 : 25,000 	

Once you have these measurements you can use them to calculate different things, including:

Item	Description	Example
Perimeter	The total distance of the edge around an object or space.	
Area	The surface space of a two-dimensional shape.	
Volume	The space that something takes up calculated from its length, width and height.	
Percentage	A fraction shown as the number or parts for every 100. For example, 80% is 80 parts in every 100 parts.	
Quantities and Amounts	How much of something you need to complete the work.	

1.2 Site Policies and Procedures

Before starting your work you need to make sure you have access to all workplace policies, procedures and documentation for the job. This will help you to do your work in the safest way and make sure all work is compliant.

1.2.1 Workplace Policies, Procedures and Documentation

Each job is different, but there are a range of standard safety guidelines that apply to all jobs.

These include:

- **Site Details** – the information and safety requirements of the workplace environment (where you will be working).
- **Hazard Details** – any hazards in the work area or related to the work.
- **Task Details** – instructions of what the work is or what you will be doing (this can include diagrams or plans). Also instructions on how to safely do the job.
- **Work Health and Safety Procedures** – including specific WHS roles and responsibilities, duty of care, training and supervision, incident reporting, risk management and the use of Personal Protective Equipment (PPE).
- **Faulty Equipment Procedures** – isolation procedures to follow or forms to fill out.
- **Signage** – site signage tells you what equipment you need to have, or areas that are not safe to be in.
- **Emergency Procedures** – instructions on what to do in emergency situations, for example if there is fire, accident or emergency where evacuation or first aid is needed.
- **General Workplace Procedures** – including reporting requirements, communication requirements, housekeeping and equipment maintenance, induction and staffing arrangements.
- **Environmental Protection Requirements** – including water and soil protection, dust suppression, rubbish removal and, recycling requirements, noise level limits, revegetation requirements, biosecurity (weed and seed) procedures and spill containment.

Not every job will require all of the above, but across the scope of a larger project you should expect to come across most of the policies and procedures listed. These are put in place to ensure that your workplace runs smoothly, without putting anyone in unnecessary danger and still achieving the job outcomes required by your organisation and their customers.

Review Questions

1.	What are 3 examples of key policies, procedures and documentation you would expect to find in your workplace?	☐

1.

2.

3.

1.3 Work Instructions

You need to be clear about what work you will be doing. Make sure you have everything about the job written down before you start. This includes what you will be doing, how you will be doing it and what equipment you will be using.

All work needs to follow worksite, environment and company safety procedures.

Procedures help to make sure that all work is done in a safe way, without damaging equipment or putting people in unsafe situations. They also help to make sure that work is done in the correct order and doesn't interrupt or get in the way of other work that is happening on the site.

Your work instructions will tell you the safest way to do the job, and the equipment that you will need to use. You will need to check your work instructions with your boss or supervisor to make sure you know exactly what you need to do.

1.3.1 Receive and Clarify Work Instructions

Your supervisor will provide you with instructions for your task. Once you have been given your instructions you must:

1. **Make sure you understand exactly what you need to do** – ask questions and explain the job as you understand it back to your supervisor.
2. **Find out who else is working with you** – make sure they have received the same instructions and are clear about what needs to be done.
3. **Identify the equipment and materials you will be working with** – and double check with your supervisor that this equipment is appropriate and available for you to use.
4. **Confirm the timeline of the job** – identify whether other tasks need to be completed first, or when your task needs to be completed.

Completing these steps will ensure that you have a clear understanding of exactly what needs to be done. If the situation changes while you are carrying out the work (e.g. an unexpected hazard, or other issue is identified) you will need to speak with your supervisor for guidance on how to proceed and finish the job.

1.3.2 Work Method Statements

Many worksites require a work method statement before any dangerous work can start. A work method statement is a list of steps that outlines how a job will be done, any hazards that occur at each step, and what you need to do about them.

These statements can also be known as Safe Work Method Statement (SWMS), Job Safety Analysis (JSA) or Safe Operating Procedure (SOP).

Review Questions

2.	What things should you have written down about your job before you start?	☐

3.	What steps should you take to confirm your work requirements with your supervisor?	☐

1.

2.

3.

4.

1.4 Choose and Check Equipment

Make sure you choose tools and equipment that will help you to carry out the measurements or calculations properly and effectively.

Measuring and calculating equipment may include:

- Tape measure.
- L-square.
- Calculator.
- Computer.
- Metric ruler.
- Scale rule.
- Measuring wheel – for measuring long distances.

1.4.1 Inspecting Equipment

Before you use any equipment, you need to inspect it to make sure it is safe to use.

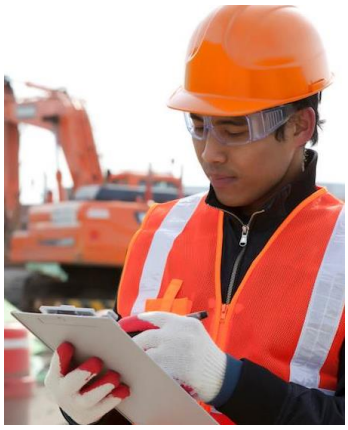
This is to make sure the measuring or calculating equipment is in full working order. Look for damage, missing parts and signs of misuse. Test the equipment to make sure it is operating correctly.

Examples of things to look for when inspecting equipment:

- Check calculators are working properly by making sure they turn on and the buttons work.
- Make sure the measuring wheel is rolling smoothly, and that any reset buttons are working correctly.
- Check that the printed measurements on tape measures, L-squares and rulers are clearly visible.

1.4.2 Reporting Faults

If you find any faults or defects during your inspection of the measuring and calculating equipment you plan to use, make sure you record and report them, in accordance with site procedures.



Most sites have a fault report form that will need to be filled in with the details. The form will generally need the equipment type, site identification numbers, what the fault is and the person reporting the fault.

Some sites will have a verbal system of reporting where you speak with a supervisor who then documents the fault, while others may require the operator to organise repairs of the fault directly.

If you are using your own measuring or calculating equipment, you will need to organise repairs or replacement of the equipment as soon as possible.

Review Questions

4.	List 3 different types of measuring and calculating equipment.	☐

1.

2.

3.

5.	What do you need to do before using any equipment?	☐

2.1 Methods for Measuring

It is important that you choose the best method of measuring equipment for the situation. This is to ensure accurate measurements are taken and within a reasonable time frame. For example, it is difficult to measure the width of a road with a 30cm ruler, or to use a measuring wheel to check the depth of a trench.

The right tool for the job is important in any aspect of civil construction.

Short distances can be measured with a tape measure or laser measure. Longer distances need to be measured using a measuring wheel. Even longer distances need to be measured using surveying equipment or maps.

You might need a second person to help with measurements, for example holding the other end of a tape measure or recording the measurements as you make them.

If you are measuring weights or amounts of materials you may need to rely on other information such as delivery receipts or consignments.

2.1.1 Making Measurements

When using a measuring device (such as a tape measure or rule) you should start measuring from the zero mark.

The zero mark may not be at the end of the measuring tool. The zero mark of your measuring instrument should be aligned with one end of the object being measured.

NOTE: Some measuring tapes take the size of the tape dispenser into account so it can be held flat against a surface. Look for measurements on the device. Measuring tapes and rulers should be accurate to within 1mm.

NOTE: Accuracy of measurement can be affected by the angle at which you look at the measuring device.

Always try to have your eyes directly above the measuring point when taking measurements. If this is not possible, mark the point carefully with a pencil, scriber or even your fingernail so you can view the measuring point accurately when you remove the ruler or tape.

Make sure you use all measuring and calculating tools and equipment safely and effectively when carrying out operations. Check the area around you to make sure there are no other operators or equipment in the area. Always pay attention to the work area around you and move out of the way of mobile plant and equipment.

2.1.1.1 Converting Measurements

It is important to know how to convert measurements of distance (e.g. millimetres to metres), weight (e.g. kilograms to tonnes) or volume (litres to megalitres).

Measurement Type	Conversion Table	
Distance	1 kilometre (km).	1000 metres (m).
	1 metre (m).	100 centimetres (cm).
	1 centimetre (cm).	10 millimetres (mm).
Weight	1 tonne (t).	1,000 kilograms (kg).
	1 kilogram (k).	1,000 grams (g).
	1 gram (g).	1000 milligrams (mg).
Volume	1 megalitre (Ml).	1,000,000 litres (L).
	1 cubic metre (m^3).	1000 litres (L).
	1 litre (L).	1000 millilitres (mL).

Note: There are conversion tables available for converting non-metric measurements (e.g. feet, inches, and miles) and some calculators will do it for you.

2.1.1.2 Scale

Scale is used to describe one value in relation to another. This can be written, represented as a ratio or a graphic representation that you can measure with a ruler as shown below:

a) (1 centimetre represents 250 metres)
b) 1 : 25,000
c)

Scales are a useful way of creating accurate plans that represent a large area. Scales are often used on maps or construction plans to provide operators with accurate measurements of an area or a job.

2.1.1.3 Workplace Communications

Depending on the size of the area being measured you may need to coordinate with other personnel to ensure the correct measurements are taken.

You may need to use communication equipment like two-way radios to ensure accurate information is being passed from person to person, or hand signals to direct personnel into the correct position.

Always check that communication equipment is working properly before you start work.

2.1.2 Confirming and Recording Measurements

Always double-check your measurements to make sure no mistake has been made. Make a record of all measurements taken in the appropriate measurement (e.g. millimetres, metres).

You may need to check your measurements against plans and specifications to make sure:

- The site or area matches the plans.
- The work meets the requirements of the project.
- The work is within the allowable tolerances for the project.
- The next stage of the work can be carried out properly.

Review Questions

1. Fill in the blanks to show each distance that is missing:

Millimetres (mm)	Centimetres (cm)	Metres (m)
	10	0.1
25	2.5	
		2.4

2. Why is it important that you choose the best method or measuring equipment for the situation?

3. How accurate should measuring tapes and rulers be?

4.	How many metres are in 1 kilometre?	☐

5.	How many kilograms are in 1 tonne?	☐

6.	How many millilitres are in 1 litre?	☐

7.	If a scale on a map is 1cm: 10000cm, what is the length of a piece of pipe that measures 3cm on the same map?	☐

8.	What can you do to ensure the correct measurements are being made when coordinating with other personnel across a large area?	☐

9.	List 2 things you may need to make sure of when checking your measurements against plans and specifications.	☐

1.

2.