

# Learning Assessment Guide

## Unit Standard 20359 – Version 1

### Demonstrate knowledge of and examine weighing and measuring instruments, weights and measures

#### Level 6 – 40 Credits

| Assessment Summary  |  |                |  |
|---|--|----------------|--|
| Learner to complete   |  |                |  |
| Learner's name:   |  |                |  |
| Employer:   |  |                |  |
| NSN no. (ROL):  |  | DOB:           |  |
| Signed:   |  | Date:          |  |
| Assessor to complete  |  |                |  |
| <input type="checkbox"/> Meets requirements <input type="checkbox"/> More training required <input type="checkbox"/> More evidence required |  |                |  |
| Assessor's name:  |  | Assessor's No. |  |
| Signed:   |  | Date:          |  |

## Before you begin...

- As well as this Learning Assessment Guide, you may also want to refer to the unit standard from the NZQA website (<http://www.nzqa.govt.nz>).
- Read the Trainee Information Kit. The kit contains important information and guidelines for Learners and can be found on the Learning State website (<http://www.learningstate.govt.nz>) under Learners, then Learning Assessment Guides.
- Check the learning resources available for this unit standard on the Learning State website (<http://www.learningstate.govt.nz>) under Learners, then Learning Assessment Guides.

This Learning Assessment Guide is made up of:

- Tasks for you to complete.
- Assessment results that your assessor will use to assess your competence.

The assessment tasks are designed to show your assessor that you can:

- Explain the New Zealand Measurement System in the context of legal metrology.
- Describe the design and application of basic components in weighing and measuring instruments.
- Follow health and safety procedures during a Weights and Measures Inspection.
- Outline the metrological characteristics for measures of length, measures of volume, weights, measuring instruments and weighing instruments.
- Determine the type of inspection required for weighing and measuring instruments, weights and measures.
- Inspect weighing and measuring instruments, weights and measures.
- Analyse results and conclude inspection.

## General Instructions:

- You will need to meet with your assessor to decide whether you will supply each piece of information required in writing or respond to the assessor asking you oral questions. You can agree on a combination of the two. In some cases the assessment task makes it clear a document is required.
- Answer the written questions.
- Carry out the practical tests. These may be verified by your assessor or a person approved by your assessor.
- Your assessor may wish to ask you further oral questions to supplement other evidence provided.
- Your assessor may ask you to carry out an inspection and/or ask you to demonstrate test procedures to supplement other evidence provided.

Please review the NZQA unit standard before starting this assessment. The special notes section contains useful definitions and reference to resources.

All activities relating to this unit standard must comply with:

- Any policies, procedures and requirements of the Ministry of Consumer Affairs Measurement and Product Safety Service.

Legislation relevant to this unit standard will include the Weights and Measures Act 1989, Weights and Measures Regulations 1991.

Documents relevant to this unit standard will include relevant OIML recommendations.

What do I do now?

- Read through all the information contained in this Learning Assessment Guide
- Familiarise yourself with each task, and the instructions
- Contact your assessor if necessary to clarify anything you are unsure of
- Complete the assessment task as agreed on with your assessor
- Contact your assessors when you have finished
- Make sure you keep a written copy of your completed assessment task if you are sending the original copy to your assessor.

## Assessment Task One – Element 1

### Introduction

This assessment task is designed to assess your ability to explain the New Zealand Measurement System in the context of legal metrology.

### Task One Questions

1. (a) Give a brief summary of the national measurement system.  
  
(b) Name the associated institutions and briefly outline their functions.
- 2 (a) Outline the international system of units.  
  
(b) Define the 2 units most commonly used for legal metrology in New Zealand.
3. The definition of legal metrology according to international standards is:
4. Outline the International metrological control system for weighing and measuring instruments and weights and measures, as used in New Zealand.
- 5 (a) List the sections of the Weights and Measures Act that apply to:
  - weighing instruments
  - measuring instruments
  - weights, and
  - measuresand give a brief explanation for each section.

List the regulations of the Weights and Measures Regulations that apply to the following and give a brief explanation for each.

- (b) weights
- (c) measures of length
- (d) measures of volume
- (e) milk and cream bottles
- (f) milk delivery measures

- (g) beer delivery measures
  - (h) weighing instruments
  - (i) semi automatic weighing instruments
  - (j) belt weighers
  - (k) weighbridges
  - (l) measuring instruments.
- 6 (a) Explain why inspectors' working standards are required.
- (b) Explain and give reasons for the traceability of working standards.

## Assessment Task Two – Element 2

### Introduction

This assessment task is designed to assess your ability to describe the design and application of basic components in weighing and measuring instruments.

### Task Two Questions

1. Describe the fundamental operating features of the following weighing and measuring instruments.
  - a) Non-automatic weighing instruments:
    1. Non self indicating
    2. Semi- self indicating
    3. Self indicating (Analogue)
    4. Self indicating (Digital).
  - b) Measuring Instrument:
    1. Liquid fuel measuring instruments.
    2. LPG measuring instruments
    3. Oil measuring instruments
2. Identify the major components and explain the purpose of each of these components in the following weighing and measuring instruments:
  - a) Non-automatic weighing instruments:
    1. Non self indicating
    2. Semi- self indicating
    3. Self indicating (Analogue)
    4. Self indicating (Digital).
3. Measuring Instrument:
  - a. Liquid fuel measuring instruments.
  - b. LPG measuring instruments
  - c. Oil measuring instruments

## Assessment Task Three – Element 3

### Introduction

This assessment task is designed to assess your ability to outline the metrological characteristics of measures of length, measures of volume, weights, measuring instruments and weighing instruments.

### Task Three Questions

1. Outline the metrological **requirements** for:

- a) measures of length
- b) measures of volume
- c) weights
- d) measuring instruments (volume, length and area)
- e) weighing instruments.

2. Outline the metrological **characteristics** for:

- a) measures of length
- b) measures of volume
- c) weights
- d) measuring instruments (volume, length and area)
- e) weighing instruments.

## Assessment Task Four – Element 4

### Introduction

This assessment task is designed to assess your ability to determine the type of inspection required for weighing and measuring instruments, weights and measures.

### Task Four Questions

1. State whether verification or inspection maximum permissible error applies for the following inspections:
  - a) A weighing instrument on which the mark of verification has been obliterated.
  - b) A weighing instrument which is in use but does not have a mark of verification on it.
  - c) A weighing instrument which has a mark of verification but does not have a current certificate of accuracy
  - d) A weighing instrument which is in use and has a current certificate of accuracy but does not have a mark of verification on it.
  - e) A liquid measuring instrument which has been recalibrated.
  - f) A liquid measuring instrument which is in use but does not have a mark of verification on it.
  - g) A liquid measuring instrument which has a mark of verification but does not have a current certificate of accuracy
  - h) A liquid measuring instrument which is in use and has a current certificate of accuracy but does not have a mark of verification on it.
  - i) A weight that does not have a mark of verification on it.
  - j) A volume measure that has a mark of verification.
  - k) A measure of length that does not have a mark of verification on it.
  - l) A measure of length that is in service.
  
2. Describe the process required for both verification and inspection of the following and give reasons for each test.
  - a) Non automatic weighing instruments
    1. Self indicating
    2. Non self indicating weighing instrument
  
  - b) Measuring instruments
    1. Fixed liquid fuel
    2. Liquid fuel measuring instruments fitted on delivery vehicles.

c) Measures of length

3. Identify the maximum permissible error for:

- a) Class II weighing instruments
- b) Class III weighing instruments
- c) Class IIII weighing instruments
  
- d) Class 0.5 liquid measuring instruments
- e) 5 g weights class  $M_1$
- f) 20 L non graduated conical measure
- g) 500 mL metal oil measure
- h) 1 m class III measure of length with a scale spacing that does not exceed 1 mm
- i) A class III digital weighing instrument with a maximum capacity of 15 kg and where  $e = 5$  g when a test load of 7.5 kg is applied.

4. Given the following list of test results identify the maximum permissible error (mpe) for the determined inspection and state whether the test item is within its mpe.

Give reasons for your answers.

A. 1 g, Class  $M_1$  traders weight, on verification, error = -1 mg.

B. 10 metre tape, Class III, on verification, scale spacing not exceeding 1 mm.  
(Assume that the zero scale division is not bounded by an end surface)

Test for error at nominal length of 8 metres, error = 3.7 mm.

Test for error of any scale spacing, error = 0.2 mm.

Test for error between two consecutive scale divisions, error = 0.1 mm.

C. 20 metre tape, Class II, on inspection, scale spacing not exceeding 1 mm.  
(Assume that the zero scale division is not bounded by an end surface)

Test for error at nominal length of 18 metres, error = 7.4 mm.

Test for error of any scale spacing, error = 0.6 mm.

Test for error between two consecutive scale divisions, error = 0.6 mm.

- D. 200 ml graduated liquid measure (conical type), on verification, weight of water at 30°C at 100 ml graduation = 97.30 g.
- E. A 600 ml milk bottle, on verification, contents deficient by 8.0 ml.
- F. A 1 litre oil bottle, on inspection, deficient by 10 ml.
- G. A 10000 L milk delivery measure, with minimum graduation value of 10 L, on inspection.

Error at 2000 L graduation = +4 L

Error at 3000 L graduation = +7 L

H. Beer Delivery Measures

- a) A 2500 L beer delivery measure, on inspection. Error = +3 L
- b) A 4000 L beer delivery measure, on inspection. Error = -2 L
- c) A 3000 L beer delivery measure, on verification Error = +1.5 L

- I. A 15 kg x 0.005 kg digital indicating counter scale, Class III, on verification.

## TEST RESULTS

### Increasing load test

| Test load | Error        |
|-----------|--------------|
| Zero      | $\pm 0.25 e$ |
| 2 kg      | $\pm 2 g$    |
| 4 kg      | +4 g         |
| 6 kg      | +5 g         |
| 8 kg      | +5 g         |
| 10 kg     | +5 g         |
| 12 kg     | +7 g         |
| 14 kg     | +7.5 g       |
| 15 kg     | +7.5 g       |

### Eccentricity Test

| Position | Error |
|----------|-------|
| 1        | C     |
| 2        | +4 g  |
| 3        | +4 g  |
| 4        | +6 g  |
| 5        | +7 g  |
| 1        | C     |

- J. A 15 kg multi-interval digital indicating counter scale,  
zero to 6 kg x 0.002 kg  
6 kg to 15 kg x 0.005 kg

Class III, on verification.

## TEST RESULTS

### Increasing load test

| Test Load | Error        |
|-----------|--------------|
| Zero      | $\pm 0.25 e$ |
| 2 kg      | +1.5 g       |
| 4 kg      | +2 g         |
| 6 kg      | +3 g         |
| 8 kg      | +4 g         |
| 10 kg     | +5 g         |
| 12 kg     | +6 g         |
| 14 kg     | +8 g         |
| 15 kg     | +8.5 g       |

### Eccentricity Test

| Position | Error |
|----------|-------|
| 1        | C     |
| 2        | +1 g  |
| 3        | +2 g  |
| 4        | +3 g  |
| 5        | +4 g  |
| 1        | C     |

K. A Class 0.5 fixed liquid fuel measuring instrument. Minimum delivery = 2 L

### TEST RESULTS

| Volume Delivered | Flowrate      | Error  |
|------------------|---------------|--------|
| 2 L              |               | -15 ml |
| 5 L              | Fast Delivery | -10 ml |
| 20 L             | Fast Delivery | -40 ml |
| 20 L             | Fast Delivery | +10 ml |
| 20 L             | Slow Delivery | -30 ml |

L A Class 0.5 liquid fuel measuring instrument fitted on a vehicle.

### TEST RESULTS

| Volume Delivered | Flowrate                  | Error   |
|------------------|---------------------------|---------|
| 220 L            | Fast Delivery             | +600 ml |
| 220 L            | Fast Delivery             | +100 ml |
| 220 L            | Slow Delivery             | +700 ml |
| 220 L            | Slow Delivery (Long Hose) | +900 ml |

## M Length Measuring Instruments

- |       |            |                  |          |                 |
|-------|------------|------------------|----------|-----------------|
| a) i) | Class II,  | on inspection,   | at 50 m, | error = +230 mm |
| ii)   | Class II,  | on verification, | at 20 m, | error = +60 mm  |
| b) i) | Class I,   | on verification, | at 25 m, | error = +35 mm  |
| ii)   | Class I,   | on inspection,   | at 10 m, | error = +20 mm  |
| c) i) | Class III, | on inspection,   | at 50 m, | error = +600 mm |
| ii)   | Class III, | on verification, | at 30 m, | error = +100 mm |

## N Area measuring instrument on verification.

**Nominal Area of Template (m<sup>2</sup>)****Instrument reading (m<sup>2</sup>)**

- |    |     |      |
|----|-----|------|
| a) | 1.0 | 0.99 |
| b) | 1.0 | 1.02 |

## Assessment Task Five – Element 5

### Introduction

This assessment task is designed to assess your ability to:

- follow health and safety procedures during a Weight and Measures inspection
- inspect weighing and measuring instruments, weights and measures in accordance with organisational requirements
- analyse results and conclude inspection.

### Demonstration Instructions

1. Provide your assessor with completed verification forms confirming that one of each of the following inspections was successfully completed:
  - Digital weighing instrument (Price computing).
  - Driveway flowmeter.
  - Mechanical non self indicating weighing instrument.
  - LPG measuring instrument.
  - High capacity weighing instrument, where it is necessary to use substitution material. (e.g. Weighbridge or hopper weighing instrument).
2. Refer to the verification form for a list of the criteria you will be expected to meet.
3. Provide your assessor with copies of all test reports.
4. Your assessor may ask you carry out an inspection and/or ask you to demonstrate test procedures to supplement other evidence provided.

## Task Five Questions

For the following types of instruments:

- Beltweigher
- Area measuring instrument
- Length measuring instrument

you must describe:

- 1 The things you would look for in the operating environment that may have an adverse effect on the accuracy of measurement results.
- 2 The operational error in the use of the instrument under examination that may have an adverse effect on the accuracy of measurement results.
- 3 The specialised testing equipment you would select to test the instrument.
- 4 How you would examine the instrument for compliance with the weights and measures legislation.

## Verification Form

Unit 20359 Version 1: Demonstrate knowledge of and inspect weighing and measuring instruments, weights and measures.

The verifier can be your assessor or another person approved by your assessor.

### Name of Learner:

The learner is currently being assessed against this unit standard. Part of the assessment includes ensuring that the learner can:

- demonstrate that he/she is aware of and follows the correct health and safety procedures during a weights and measures inspection.
- inspect weighing and measuring instruments, weights and measures in accordance with organisational requirements.
- analyse results and conclude an inspection.

You have been asked to provide evidence in relation to this. The assessor may wish to contact you to clarify your responses.

Thank you for your help.

Name of verifier:

Email:

Position:

Phone:

### Type of instrument tested:

I can verify the following:

1. The learner followed all organisational health and safety procedures when working on the client's premises.

Comments:

2. The learner insured that the safety of all persons present during the inspection in accordance with policy and procedures.

Comments:

3. At all times during the inspection the learner showed respect for the client's property. (For example, equipment, product, documents, personal effects etc.)

Comments:

4. The learner used the safety protective aids necessary to meet workplace and organisational requirements during the inspection. (For example, protective clothing, safety footwear, safety helmet, eye and ear protectors, reflective jacket etc.)

Comments:

5. The learner dealt with items of potential danger in accordance with organisational requirements. (For example, operating machinery, fork lifts, vehicles, cranes, dangerous goods, etc.)

Comments:

6. The learner analysed the operation environment to determine its impact on the accuracy of measurement results.

Comments:

7. The learner identified operational error in the use of the weighing and measuring instruments, weights and measures under examination.

Comments:

8. The learner was able to select the appropriate specialised testing equipment and used it in accordance with organisational requirements.

Comments:

9. The learner correctly determined the maximum permissible error.

Comments:

10. The learner examined the weighing instrument, or measuring instrument, or weight, or measure for compliance with the weights and measurements legislation.

Comments:

11. The learner was able to analyse the inspection results and implement the appropriate action. This may include certification, verification, rejection, legal action, an infringement offence notice, a letter of warning or no action.

Comments:

12. The learner correctly identified and reported performance problems with weighing and measuring instruments.

Comments:

13. The learner completed all documentation in accordance with organisational requirements. This may include test sheets, certificate of accuracy, breach report, infringement offence notice, letter of warning, advice notice.

Comments:

Signed:

Date:

## Assessment Results

These are the judgements that your assessor will use to assess you:

|   |     |    |
|---|-----|----|
| Can the learner explain the New Zealand measurement system in the context of legal metrology as follows?  | Yes | No |
| Has the national measurement system been described and the associated institutions been identified and their functions outlined?  | Yes | No |
| Have the international system of units been outlined and the 2 units most commonly used for legal metrology in NZ been defined?   | Yes | No |
| Has legal metrology been defined according to international standards?  | Yes | No |
| Has the international metrological control system as used in NZ been outlined?  | Yes | No |
| Have the sections of the Weights and Measures Act that apply to the following been listed and brief explanation for each section been given? <ul style="list-style-type: none"> <li>• weighing instruments</li> <li>• measuring instruments</li> <li>• weights</li> <li>• measures</li> </ul> | Yes | No |
| Have the Weights and Measures Regulations that apply to weights been listed and a brief explanation been given for each?  | Yes | No |
| As above for measures of length?  | Yes | No |
| As above for measures of volume?  | Yes | No |
| As above for milk and cream bottles?  | Yes | No |
| As above for milk delivery measures?  | Yes | No |
| As above for beer delivery measures?  | Yes | No |
| As above for weighing instruments?  | Yes | No |
| As above for semi automatic weighing instruments?   | Yes | No |
| As above for belt weighers?   | Yes | No |
| As above for weighbridges?  | Yes | No |
| As above for measuring instruments?   | Yes | No |
| Has the reason why inspectors' working standards are required been explained?   | Yes | No |

|  |     |    |
|--|-----|----|
| Has the reason for the traceability of working standards been explained?   | Yes | No |
| Can the learner identify and outline the application of basic components in weighing and measuring instruments as follows?   | Yes | No |
| <p>Have the fundamental operating features of the following weighing and measuring instruments been described?</p> <p>a) Non-automatic weighing instruments:</p> <ol style="list-style-type: none"> <li>1. Non self indicating</li> <li>2. Semi- self indicating</li> <li>3. Self indicating (Analogue)</li> <li>4. Self indicating (Digital).</li> </ol> <p>b) Measuring Instrument:</p> <ol style="list-style-type: none"> <li>1. Liquid fuel measuring instruments.</li> <li>2. LPG measuring instruments</li> <li>3. Oil measuring instruments</li> </ol>  | Yes | No |
| <p>Have the major components in the following weighing and measuring instruments been identified and the purpose of each of these components been explained?</p> <p>a) Non-automatic weighing instruments:</p> <ol style="list-style-type: none"> <li>1. Non self indicating</li> <li>2. Semi- self indicating</li> <li>3. Self indicating (Analogue)</li> <li>4. Self indicating (Digital).</li> </ol> <p>b). Measuring Instrument:</p> <ol style="list-style-type: none"> <li>1. Liquid fuel measuring instruments.</li> <li>2. LPG measuring instruments</li> <li>3. Oil measuring instruments</li> </ol> | Yes | No |
| Can the learner outline the metrological characteristics of measures of length, measures of volume, weights, measuring instruments and weighing instruments as follows?  | Yes | No |
| <p>Have the metrological <b>requirements</b> for:</p> <ol style="list-style-type: none"> <li>a) measures of length</li> <li>b) measures of volume</li> <li>c) weights</li> <li>d) measuring instruments (volume, length and area)</li> <li>e) weighing instruments.</li> </ol> <p>been outlined?</p>   | Yes | No |

|  |     |    |
|--|-----|----|
| <p>Have the metrological <b>characteristics</b> for:</p> <ul style="list-style-type: none"> <li>a) measures of length</li> <li>b) measures of volume</li> <li>c) weights</li> <li>d) measuring instruments (volume, length and area)</li> <li>e) weighing instruments</li> </ul> <p>been outlined?</p>   | Yes | No |
| <p>Can the learner determine the type of inspection required for weighing and measuring instruments, weights and measures as follows?</p>  | Yes | No |
| <p>Has the type of inspection (verification or on inspection) been determined for each of the 12 scenarios?</p>  | Yes | No |
| <p>Has the process required and reasons for each test for both verification and inspection of:</p> <ul style="list-style-type: none"> <li>a) Non automatic weighing instruments <ul style="list-style-type: none"> <li>1. Self indicating</li> <li>2. Non self indicating weighing instrument</li> </ul> </li> <li>b) Measuring instruments <ul style="list-style-type: none"> <li>1. Fixed liquid fuel</li> <li>2. Liquid fuel measuring instruments fitted on delivery vehicles</li> </ul> </li> <li>c) Measures of length</li> </ul> <p>been described?</p> | Yes | No |
| <p>Has the maximum permissible error for each of the 9 weights, measures, weighing or measuring instruments been identified?</p>   | Yes | No |
| <p>Have all the test items listed been correctly identified as within or exceeding mpe?</p>  | Yes | No |
| <p>Can the learner:</p> <ul style="list-style-type: none"> <li>• follow health and safety procedures during a Weight and Measures inspection</li> <li>• inspect weighing and measuring instruments, weights and measures in accordance with organisational requirements</li> <li>• analyse results and conclude inspection</li> </ul> <p>as follows?</p>   | Yes | No |
| <p>Were organisational health and safety procedures followed when working on the client's premises?</p>  | Yes | No |
| <p>Was the safety of all persons present during the inspection assured in accordance with policy and procedures?</p>   | Yes | No |

|  |     |    |
|--|-----|----|
| Did the learner show respect for the client's property?  | Yes | No |
| Did the learner use the safety protective aids necessary to meet workplace and organisational requirements during the inspection?                  | Yes | No |
| Were items of potential danger dealt with in accordance with organisational requirements?  | Yes | No |
| Was the operation environment analysed to determine its impact on the accuracy of measurement results?   | Yes | No |
| Was any operational error in the use of the weighing and measuring instruments, weights and measures under examination identified?                 | Yes | No |
| Was the appropriate specialised testing equipment selected and used it in accordance with organisational requirements?                             | Yes | No |
| Was the maximum permissible error correctly determined?  | Yes | No |
| Was the weighing instrument, or measuring instrument, or weight, or measure examined for compliance with the weights and measurements legislation? | Yes | No |
| Were the inspection results analysed and the appropriate action implemented?   | Yes | No |
| Were performance problems with weighing and measuring instruments correctly identified and reported?   | Yes | No |
| Was all documentation completed in accordance with organisational requirements?  | Yes | No |