# Knowledge Assessment

**Assessment event 1 of 2**

# Trainer & Assessor Marking Guide

## Criteria

### Unit code, name and release number

MSL933008 - Perform calibration checks on equipment and assist with its maintenance (1)

### Qualification/Course code, name and release number

MSL30118 - Certificate III in Laboratory Skills (1)

MSL40118 - Certificate IV in Laboratory Techniques (1)

\*\*Amend the qualification box before distributing to the student. The information here should only contain the qualification the student is enrolled in\*\*

Version: 1.0

Date created: 07/11/2019

Date modified: 20/01/2020

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RTO Provider Number 90003 | CRICOS Provider Code: 00591E

This assessment can be found in the: [Learning Bank](https://share.tafensw.edu.au/share/access/searching.do?doc=%3Cxml%2F%3E&in=P7ac4831b-430a-4b8d-8b56-f7b32ed5b9cf&q=&type=standard&sort=rank&dr=AFTER)

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## Assessment instructions

Table 1 Assessment instructions

| Assessment details | Instructions |
| --- | --- |
| **Instructions for the trainer and assessor** | This is a written assessment and will be assessing the student on their knowledge of the unit.  This assessment is in 4 sections parts:   1. Multiple choice questions (Questions 1 – 10) 2. True or False questions (Questions 11 – 20) 3. Written response (Questions 21 – 29) 4. Assessment feedback   The assessment is a take home assignment and should be issued by week 3 of the unit for submission 3 weeks prior to the end of the unit.  Model answers, sample responses or a criteria for each question are provided below.  Use these to support your judgement when determining a satisfactory result.  The student’s response to each question must contain the information indicated in this marking guide in order for their response to be correct. However, if a student provides information other than indicated below, and in the professional opinion of the assessor it is appropriate and meets the intent of the question, it may be considered correct.  The assessment feedback page must be signed by both the student and the assessor so the student displays that they have received, understood and accepted the feedback.  Complete the assessment feedback to the student and ensure you have taken a copy of the assessment prior to it being returned to the student.  Ensure the students name appears on the bottom of each page of the submitted assessment. |
| **About this marking guide** | The student’s response to each question must contain the information indicated in this marking guide in order for their response to be correct.  All questions must be answered correctly in order to satisfactorily complete this assessment event.  Assessors will need to make a judgement call as to whether each answer/response meets the criteria based upon the:   * Rules of Evidence:   + Validity – does the answer address the assessment question and does the evidence reflect the four dimensions of competency?   + Sufficiency – is the answer sufficient in terms of length and depth?   + Currency – has the work been done so recently as to be current?   + Authenticity – is this work the student’s own authentic work? * Principles of Assessment:   + Fairness – individual student’s needs are considered in the assessment process   + Flexibility – assessment is flexible to the individual student   + Validity – any assessment decision is justified, based on the evidence of performance of the student   + Reliability – evidence presented for assessment is consistently interpreted and assessment results are comparable irrespective of the assessor conducting the assessment * Dimensions of competency   + Task skills   + Task Management Skills   + Contingency Planning Skills   + Job Role Environment Skills |
| **Student must provide** | Calculator, pens and pencils |
| **Assessor must provide** | A copy of this assessment for each student |
| **Time allowed** | This is a take home assignment, due back three weeks prior to the end of the unit. |

## Part 1: Multiple choice (Questions 1 – 10)

Read the question and each answer carefully. Put an X in the table next to your chosen answer.

1. Calibration checks are important in the laboratory because:

Table 2 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. they form part of Good Laboratory Practice process |  |
| 1. they can identify equipment that is functioning poorly |  |
| 1. they make an instrument result more reliable |  |
| 1. all of the above | X |

1. **Routine** maintenance in the laboratory should be carried out on equipment/instruments:

Table 3 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. whenever there is spare time |  |
| 1. only when an instrument or piece of equipment is not working correctly |  |
| 1. according to the maintenance schedule for the instrument, unless required earlier | X |
| 1. never |  |

1. Ethical behaviour for a laboratory assistant would **not include:**

Table 4 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. working diligently and responsibly in accordance with workplace policy and procedures |  |
| 1. ensuring confidentiality of information, including client identification and test results |  |
| 1. altering a calibration result to ensure the result was compliant | X |
| 1. behaving honestly, respecting others and treating them with courtesy and impartiality |  |

1. Which of the following would be considered routine personal protective equipment for conducting calibration checks?

     ****  

A B C D E F G

Table 5 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. A, E, G, D |  |
| 1. B, C, F, E |  |
| 1. A, C, D, F | X |
| 1. B, C, F, G |  |

1. Legislative requirements that apply to laboratory workers include:

Table 6 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. WHS and workers compensation |  |
| 1. equal employment, anti-discrimination and anti-harassment |  |
| 1. environmental protection |  |
| 1. all the above | X |

1. Checking the calibration of a piece of equipment/instrument should occur:

Table 7 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. when scheduled |  |
| 1. if a problem is detected in a run of results |  |
| 1. after servicing |  |
| 1. all the above | X |

1. The **most** appropriate way to reduce the environmental impact of **used** batteries in equipment would be to:

Table 8 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. place in the normal refuse bin |  |
| 1. collect and take to appropriate disposal facility | X |
| 1. change all equipment to mains power |  |
| 1. use only rechargeable batteries |  |

1. Ethical and legal work practices could include:

Table 9 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. following industry codes of practice |  |
| 1. sensitivity towards an issue |  |
| 1. proper acknowledgement of copyright and intellectual property |  |
| 1. all of the above | X |

1. Estimates of uncertainty could include:

Table 10 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. the repeatability of results |  |
| 1. drift in a calibrated instrument |  |
| 1. resolution of the equipment |  |
| 1. all of the above | X |

1. Which of the following could be generated as waste from maintenance of equipment?

Table 11 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. Spent reagents |  |
| 1. Disposable PPE |  |
| 1. Broken glass and sharps |  |
| 1. All the above | X |

## Part 2: True or false (questions 11-20)

Read the question and then write **True** or **False** in the space provided.

Table 12 True or false

| Question | Write *True* or *False* |
| --- | --- |
| 1. Recording measurements/results accurately and legibly is an important skill for all laboratory workers | True |
| 1. Maintenance issues related to equipment/instruments need only to be looked at during scheduled maintenance | False |
| 1. Ongoing training of workers forms part of Good Laboratory Practice | True |
| 1. The purpose of paperwork for WHS and environmental incidents is not to blame but to determine how avoid the situation occurring again in the future | True |
| 1. Calibration and maintenance logs for equipment are part of the traceability requirements for quality assurance in a laboratory | True |
| 1. Electrical repairs related to equipment/instruments should only be conducted by authorised personnel | True |
| 1. When equipment is quarantined it is important that all laboratory procedures are followed to ensure the equipment is not placed back into service until it has been serviced and found to be operating correctly | True |
| 1. Comparing previous calibration data may provide an indication that equipment is beginning to show a problem | True |
| 1. When undertaking cleaning of equipment or work area it is not necessary to refer to the Safety Data Sheets for any decontamination or disinfection agents that may be required | False |
| 1. WHS and environmental management requirements would include applying standard precautions as they relate to hazardous situations | True |

## Part 3: Short Answer (Questions 21 – 29)

Complete your answers in the spaces provided. (A maximum of 75 words is suggested for any one part).

Q21. Identify and name two pieces of equipment in the laboratory that you:

* set-up
* run calibration checks
* clean
* maintain

For each item complete the table below providing the information requested.

Lots of different examples could be provided. Assessor is to determine what is available to the student in the particular laboratory area. Benchmark responses provided for Balance and Refractometer.

Table 13 Written response

| Equipment 1 | Laboratory Balance |
| --- | --- |
| 1. PPE required for the equipment identified | Safety glasses  Enclosed shoes  Protective laboratory coat |
| 1. Purpose of the equipment | Routine operation for determination of mass or weighing our mass of required materials |
| 1. Key components of the equipment | Weigh pan,  Electronic system |
| 1. Pre-use checks required | Ensure level surface  High and low mass checked to ensure reading correct |
| 1. Calibration checks required | Mass of standard object taken to ensure reading is correct.  Generally outside calibration/servicing done twice a year |
| 1. Maintenance checks required | Check instrument readings are stable |
| 1. Hazards associated with the processes | Electrical problems |
| 1. Safety checks required and appropriate actions | Electrical tags current  No exposed wires  No spills in area |
| 1. Common faults and typical repairs | Do not use if tag is not current.  Report for tag and test  Clean spills using workplace protocols |
| 1. Cleaning requirements (including equipment required) | General area of balance to be kept uncluttered and free from spills  Balance pans to be clean  Exterior surface to be wiped clean  Equipment: cleaning cloth, balance brush |
| 1. Storage requirements | Power off to unit at the end of the day.  If between uses the balance should be clean, dry level and tared. |
| 1. Sources of uncertainty and adjustments that can be made | Uncertainty will be different for each balance, (various relates to sensitivity vs capacity)  Limit of reading is important for the actual task  **Controlled by:**  Limit air flow around balance  Samples should be equilibrated to room temperature |
| 1. Documentation required to be completed | Calibration check documentation  Maintenance documentation |
| 1. When and how service agents/suppliers are contacted | Scheduled under contract, for twice a year servicing of balances.  Supervisor notified if required prior (calibration checks indicate balance should be quarantined) and contact made with service agent. |
| 1. Describe the procedure in place in your laboratory for the ordering of stock | When stock are at levels requiring ordering, the laboratory technician will contact the resources person and let them know to reorder. |

Table 14 Written response

| Equipment 2 | Refractometer |
| --- | --- |
| 1. PPE required | Safety glasses (may be removed whilst reading is being taken)  Enclosed shoes  Protective laboratory coat |
| 1. Purpose of the equipment | Measure refractive index  It is also possible to measure % sugar |
| 1. Key components of the equipment | Eye piece  Sample holder  Light adjuster (focus) |
| 1. Pre-use checks required | Eye station cleaned of dust from packaging.  Glass lens is cleaned carefully to avoid scratching  Ideally eye piece wiped with ethanol to sanitise prior to use |
| 1. Calibration checks required | Instrument checked for calibration factor each session or run, using a pure known (distilled water, trichloromethane) |
| 1. Maintenance checks required | Light source is working  Area is clean and free of debris and clutter |
| 1. Hazards associated with the processes | Use of flammable solvent for cleaning (ethanol) |
| 1. Safety checks required and appropriate actions | Electrical tags current  No spills in area  Appropriate waste containers available  **Actions:**  Do not use if tag is not current.  Report for tag and test  Obtain correct waste containers |
| 1. Common faults and typical repairs | Prism is scratched: requires new prisms (possible grinding down of surface) |
| 1. Cleaning requirements (including equipment required) | General area of refractometer is to be kept uncluttered and clean  Prism should be clean, dry and free of deposited residue from previous use |
| 1. Storage requirements | Prism should be cleaned with solvent and allowed to air dry  Power should be off between uses |
| 1. Sources of uncertainty and adjustments that can be made | Test result will vary due to temperature of solution  Result is corrected for temperature  Instrumental error corrected for using purified water value as guide |
| 1. Documentation required to be completed | Calibration paperwork  Maintenance logs |
| 1. When and how service agents/suppliers are contacted | Trainer/supervisor should be notified. Management would make a decision as to whether to scrap and repurchase. The Resources person for the laboratory would contact the service agent or the supplier |
| 1. Describe the procedure in place in your laboratory for the ordering of stock | When stock are at levels requiring ordering, the laboratory technician will contact the resources person and let them know to reorder. |

1. Why is it important that all laboratory records are maintained with all information related to any calibration task? Indicate the type of information you are required to record in your laboratory.

|  |
| --- |
| Responses may include any of the following, but are not limited to:  Could include:   * Requirement of workplace quality processes * Allows for the identification of trends that could be indicating instrument failure * Provides a check back if a result is questioned * Allows for checking between operators * All data can be checked by any operator   Information recorded could include:   * Date * Location of instrument (particularly if not in fixed position) * operator * calibration object/ sample reference number * Pass or fail status * Maintenance required/requested * Adjustments made to instrument to recalibrate * When next calibration is due |

1. Why is it important that all laboratory records are maintained with information relating to faulty equipment?

|  |
| --- |
| To ensure:   * WHS compliance * Warranty requirements are met * All personnel are aware of particular situations with equipment/instruments |

1. Why should an operator check the equipment/instrument every time it is used to identify if it is safe to use?

|  |
| --- |
| A number of reasons could be provided but the major reason would be to ensure personnel safety when using the instrument. Just because the tag is on, in date etc there could be a problem.  Other reasons could include:   * Identifying possible breakdowns * It is a requirement of the workplace to monitor performance |

1. For the following scenario identify what the Laboratory Assistant would be likely to do in the situation by answering Yes or No to the provided statements by placing an X in the box. If your response is **No** indicate what should be the action of the Laboratory Assistant.

**Note:** Read the scenario and all the statements before you make any responses.

Table 15 Written response

|  |  |  |  |
| --- | --- | --- | --- |
| *On commencing work in the laboratory on a Monday morning (8am) the Laboratory Assistant notices that a piece of equipment has fallen on the floor and is lying in a puddle of water. The equipment is required for a batch of tests by the Laboratory Technician at 9:30. The equipment is not scheduled for routine maintenance for 3 weeks.* | | | |
| ***STATEMENT*** | ***YES*** | ***NO*** | *ACTION* |
| 1. Ensure the area is safe before you do anything | X |  |  |
| 1. Walk away as it is not your problem |  | X | Workplace protocols would generally indicate that all incidents are reported. So reporting is important |
| 1. Report the incident according to workplace protocols | X |  |  |
| 1. Determine if you can safely pick up the equipment yourself, if not seek assistance from another person | X |  |  |
| 1. When the equipment is back in position plug it in and turn it on |  | X | A full check would need to be made to ensure it is operational. It may be that protocol requires it to be ‘tagged’ out of operation until an electrical check is completed |
| 1. If the instrument is one you are familiar with and are authorised to work on, run routine checks on performance | X |  |  |
| 1. You find a fault that requires maintenance, but do nothing as maintenance is not scheduled for 3 weeks |  | X | Workplace procedures would generally indicate that all faults are reported immediately and service personnel notified |
| 1. You document your routine check results as required by your workplace | X |  |  |

1. Explain why regular maintenance of instruments/equipment is important in the laboratory.

|  |
| --- |
| This could be a requirement of the quality system of the Laboratory. This in turn leads to confidence in the result that may be reported.  It provides a mechanism for ensuring work can be completed in a timely manner and there are no delays in reporting results  It can extend the ‘life’ of the instrument/equipment and reduce the necessity for large repair costs |

1. What is your laboratory procedure for quarantining equipment/instruments that are faulty (unsafe or not calibrating correctly)?

|  |
| --- |
| Assessor should check each laboratory to determine satisfactory responses.  Responses may include:   * Tagging out equipment with Out-of-service or Danger tag * Notifying supervisor of problem * Documenting the problem * Removing the equipment/instrument from general work area if possible * Contacting service agents |

1. Every laboratory operates under legal and ethical requirements. Legal requirements could be concerned with WHS, Food Safety, the Environment and contract obligations. Ethical requirements could be concerned with confidentiality related to both personnel and reporting of results. Explain how both legal and ethical issues are addressed in a laboratory familiar to you: Responses will vary depending on Laboratory

Table 16 Written response

|  |  |
| --- | --- |
| LEGAL | ETHICAL |
| Laboratory certification will require workplace systems that look at quality, maintenance of records, training of personnel  WHS must be addressed in training of operators to ensure no worker is placed at risk. Equipment should be well maintained  Internal audits may be required for instance in area of food and biological services  HACCP requirements must be met if in area of food in particular  Environmental issues must be addressed, this could be reporting on results linked to licences.  Contract issues may be present requiring a result very shift for instance. | Emphasis required on confidentiality of contracts, results, reporting etc.  Authorised personnel may issue results as required  For personnel in the laboratory this could also include moral rights, etiquette and sensitivity towards particular subjects. |

1. **Good Laboratory Practice (GLP)** are methods that are accepted practice for laboratories. The aims of GLP include:

* Ensure consistency
* Reliability
* Uniformity
* Quality

The principles of GLP are related to:

* Organisation and personnel management
* Quality assurance program
* Facilities
* Equipment, reagents and materials
* Test systems
* Standard operating Procedures
* Reporting of results
* Storage of records and reports

How does the calibration and maintenance of equipment in a laboratory you are familiar with assist in meeting the principles of GLP? (Your response should be no more than 200 words)

Will be laboratory dependent for the particular response. Examples that may be provided could include:

|  |
| --- |
| * Workers are fully trained in all aspects of the work they are required to undertake * Training is ongoing * Standard Operating Procedures are in use and constantly being improved * Changes to SOP are communicated to all personnel * Records are all up to date * Sample integrity is maintained throughout the process from time of sampling til the reporting of the final result (ie traceability of sample is evident) * Equipment, reagents and materials are routinely inspected for non-compliance * Laboratory may undertake result checks using different methods and instruments * Laboratory may participate in inter-laboratory checks of standard results as part of a validation process * Calibration of equipment: is routinely completed, documented and reported |