# Knowledge Assessment

**Assessment event 1 of 2**

# Trainer & Assessor Marking Guide

## Criteria

### Unit code, name and release number

MSL933005 - Maintain the laboratory/field workplace fit for purpose (1)

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

MSL30118 - Certificate III in Laboratory Skills (1)

Version: 1.0

Date created: 10/10/2019

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 parts:   1. Multiple choice questions (Questions 1-10) 2. True or False questions (Questions 11-20) 3. Short answer questions (Questions 21 – 26) 4. Assessment feedback (student facing)   The student should be provided with the Assessment by the beginning of week 3 of the unit delivery. Question 25 requires the student to access a laboratory area and note the glassware, equipment and reagents found and also the storage requirements of the items. This list when formed will form the basis of the monitoring of stocks in the laboratory in the Skills Assessment. The Knowledge Assessment paper is required to be returned by the student three weeks prior to the first occurrence of the Skills assessment task. The actual stock monitoring will occur in the Skills Assessment.  You should ensure that the Trainer is aware of this requirement for the timetabling of student access to a laboratory area. The Assessor/Trainer should provide assistance in the selection of the area the student is to identify stock. It should in this instance be an area that is already well maintained by laboratory staff.  Model answers, sample responses or 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, pencils |
| **Assessor must provide** | Assessment Task, access to Laboratory |
| **Time allowed** | To be issued by the beginning of week 3 of the unit delivery for return three weeks prior to the first occurrence of the Skills Assessment. |

## 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. (Choose the most appropriate response).

1. It is important for your safety and the safety of others in the area that you:

Table 2 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. commence the day with a clean work area |  |
| 1. clean as you go about your daily tasks |  |
| 1. finish the day leaving the laboratory clean and tidy |  |
| 1. all of the above | X |

1. Which of the following cleaning techniques would be the **most** appropriate for cleaning surfaces in a laboratory where the surfaces may be contaminated with microbiological materials?

Table 3 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. Wiping with paper towel |  |
| 1. Using a sanitising agent with scrubbing of the surface |  |
| 1. Radiation of the surface with UV light |  |
| 1. A combination of b and c | X |

1. Ethical behaviour in a laboratory would **not** include:

Table 4 Multiple choice

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

1. Sustainable practices that relate to a laboratory would **not** include:

Table 5 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. minimising waste |  |
| 1. leaving computer screens on continually | X |
| 1. turning off equipment when not in use |  |
| 1. regular cleaning of fume cupboard filters |  |

1. Field monitoring could be undertaken for:

Table 6 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. compliance under a statutory requirement |  |
| 1. part of an environmental management plan |  |
| 1. monitoring a particular site following a sampling plan |  |
| 1. all the above | X |

1. A consultative approach to WHS and environmental issues **does not** include:

Table 7 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. information about existing or new issues |  |
| 1. being directed to follow a particular set of instructions with no scope for input and consultation | X |
| 1. use of clear and understandable language and provision for non-English speaking and hearing-impaired people |  |
| 1. formal arrangements such as health and safety committees |  |

1. Incidents related to a laboratory or fieldwork could include:

Table 8 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. emergency situations such as fire, bomb threat, security threat and explosion |  |
| 1. biological, chemical or radioactive spills |  |
| 1. Injuries, such as cutting, stabbing, puncturing, crushing, immersion in water, suffocation, snake bite, hypothermia, burns allergic reactions and assaults |  |
| 1. all of the above | X |

1. Which of these would **not** be considered an appropriate reason for regular stocktake of laboratory resources (equipment and reagents)?

Table 9 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. To ensure there are adequate supplies for expected requirements |  |
| 1. To identify who is putting items away inappropriately | X |
| 1. To check for out of date materials |  |
| 1. To ensure chemicals are stored correctly |  |

1. Which of these would be classified as inappropriate storage of stock (reagents and/or equipment)?

Table 10 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. Reagents stored alphabetically in their various classes |  |
| 1. Large volumes of poisonous material stored on work benches | X |
| 1. Flammable liquids stored in a flammable liquid cupboard |  |
| 1. Large containers stored on the bottom shelves |  |

1. Which of the following would be inappropriate for a chemical store?

Table 11 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. A lockable poison cupboard |  |
| 1. Fire-proof cupboard for volatile, flammable liquids |  |
| 1. An unventilated room | X |
| 1. Offsite storage for large amounts of hazardous materials |  |

## 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. Sterilisation is the destruction of all micro-organisms on a surface. | True |
| 1. An SDS is an important document that contains information on the clean-up of spills of hazardous materials. | True |
| 1. Minimising environmental impact should consider the effect of movement of vehicles in the field. | True |
| 1. When completing fieldwork reporting abnormal emissions or discharges would be considered as part of the legal and ethical requirements of the task. | 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. Visitors to a laboratory are not required to wear any personnel protective equipment as they will not be undertaking any task. | False |
| 1. The hazardous chemical register for a worksite must be available to all workers involved in the use, storage and handling of hazardous chemicals. | True |
| 1. If changing work pressures may result in stock shortages the issue should be raised with those responsible for ordering urgently. | True |
| 1. A technician in a laboratory has the right to expect that all possible controls are in place to lower laboratory risks. | True |
| 1. Maintenance issues related to equipment/instruments need only to be looked at during scheduled maintenance periods. | False |

## Part 3: Short answer (Questions 21 - 26)

Read the question carefully. Your answer should be a minimum of 5 words but no longer than 50 words.

**Note:** a table may only require a single word response.

1. Choose three routine tasks you complete in the laboratory/field and complete the following table for each showing:
2. the task
3. typical hazards and controls in place for the task
4. typical equipment required for the task
5. typical materials/resources required for the task
6. PPE required for the task.
7. waste minimisation and disposal procedures
8. environmental sustainability issues

Table 13 Short answer

|  |  |
| --- | --- |
| Task 1 | Monitor the pH of water samples, weekly in the field |
| Typical hazards and controls in place | Seasonal variations in the wildlife at the sites eg snakes and mosquitos in summer: Control completed Senior First Aid  Possibility of falling out of the boat into the lake. Control: life jacket must be worn.  Sunburn: sunscreen and a brimmed hat to be worn |
| Typical equipment | Calibrated pH probe  Life jacket  Small boat (with all emergency equipment)  Map  GPS  Small dinghy (kept on site and maintained by client) |
| Typical materials/resources | pH buffers  distilled water wash bottle  record sheets  chain of custody forms if samples to be taken  spare sample bottles  first aid kit |
| PPE required | Long pants and long sleeved shirt  Broad brimmed hat  Enclosed shoes  Sunscreen  Long stick  Walkie talkie or phone |
| Waste minimisation and disposal procedures | Nothing is permitted to remain at the site.  All refuse is returned to the laboratory. |
| Environmental sustainability issues | Care must be taken getting to the site (follow paths, limit the disturbance to surrounding area.  Noise pollution if the boat is particularly noisy |
| Task 2 | Ash determination on coal samples (samples provided). |
| Typical hazards and controls in place | High temperatures associated with ashing process. Control: long tongs provided to access the furnace  Overuse injury from many batches of samples. Control: rotation of work schedule to limit overuse.  Sharp material should the crucibles break: Glass bin available, training provided in how to dispose of broken crucibles. |
| Typical equipment | Muffle furnace capable of temperatures ip to 900 oC  Crucibles + lids  Muffle tongs  4 dp analytical balance  Desiccator for dry cooling |
| Typical materials/resources | Certified reference material for check of procedure  Result sheets |
| PPE required | Enclosed shoes  Long sleeved shirt and long pants  Safety glasses |
| Waste minimisation and disposal procedures | Left over sample is retained for possible later checking.  Ash product is disposed of general waste bin |
| Environmental sustainability issues | High cost of running ovens at 900 oC |
| Task 3 | Preparing HPLC mobile phase (80% methanol 20% water pH adjusted to 3.5) |
| Typical hazards and controls in place | Methanol is flammable: no naked flames in area  Vacuum filtration to remove solids and also to degas: (glass ware checked for breakages, hoses not perished)  SDS for Methanol available for operator. |
| Typical equipment | 2L glass beaker  Measuring cylinders  Storage bottle (labelled)  Millipore vacuum apparatus |
| Typical materials/resources | HPLC grade methanol  Purified water |
| PPE required | Safety glasses  Protective clothing  Enclosed shoes  Gloves |
| Waste minimisation and disposal procedures | Excess solution can be poured down the sink  Minimum quantities taken to prevent losses |
| Environmental sustainability issues | Disposal into drainage system |

1. Arrange the following into an appropriate order for the general cleaning and disinfection of a work surface. Place the numbers in order to achieve the best result for the disinfection of a laboratory bench found in the chemical laboratory:

|  |  |
| --- | --- |
| Order | Procedure |
| 5 | Apply disinfectant to the surface and allow it to soak in |
| 6 | Leave surface to dry |
| 1 | Remove obvious physical contaminants such as such as dirt |
| 4 | Wipe down the surface |
| 2 | Clean with hot water and detergent |
| 3 | Rinse with water to remove detergent traces |

1. Select and name two different surfaces that you clean in your laboratory (these could be in a general laboratory, a micro-laboratory, balance room, instrumental laboratory etc.). Complete the table indicating:

* The location of the surface
* The type of the clean (general, sanitising or sterilisation)
* The appropriate cleaning agents
* The equipment required
* Wastes generated and any special procedures for their disposal
* PPE required

Responses are for specific laboratory surfaces; different surfaces may be presented as responses to the question.

|  |  |
| --- | --- |
| Surface 1 | 25 mm Panel coated in thermosetting resins |
| Location of the surface | Microscope area |
| Type of clean | Disinfectant: daily (or as required if a spill or contamination suspected) |
| Cleaning agents | Disinfectant for daily clean  Bleach for weekly clean (or more often if necessary). |
| Equipment required | Cleaning cloths/papertowel  Spray bottles |
| Wastes generated/ special procedures | Cleaning cloths/paper used to wipe down should be placed in plastic bags, sealed and then disposed of in hazardous waste bin |
| PPE | Safety glasses, laboratory coat, safety glasses and gloves.  Face shield if biological contamination suspected |
| **Surface 2** | 32 mm Chemical resistant laminate on high moistyre resistant MDF |
| Location of surface | General purpose teaching laboratory |
| Type of clean | General clean with detergent and water.  After any procedures using biological materials sanitisation clean. |
| Cleaning agents | “Liquinox” |
| Equipment required | Dust pan and brush to remove solid ‘soil’  Spray bottle  Cleaning cloth |
| Wastes generated/ special procedures | Paper towel and solids placed in ‘normal’ refuse, unless the material is known to have specific waste disposal requirements. |
| PPE | Safety glasses, laboratory coat, safety glasses and gloves |

1. Read the following SOP for the Cleaning and Storage of Glassware and then complete the exercise at the end.

**Note:** for this task cleanliness includes the absence of residue and trace contaminants.

**SOP: Cleaning and Storage of Glassware**

1. Examine for physical damage: Any cracked or broken glassware is to be discarded in the broken glass disposal container
2. Cleaning and removal of residue
   1. Remove all tape and labels
   2. Wash with a laboratory grade detergent. (Cleaning with a stiff brush will be sufficient to give a thorough physical clean)
   3. Where water-insoluble organic compounds have been used, organic solvents such as ethanol or propanone by be required
   4. Strong acids are useful for removing resistant residues, such as insoluble metal salts and decomposed organic matter. **Note:** if strong acids such as sulfuric and nitric are to be used the SDS should be read closely before use
   5. Rinse well several times with tap water and then rinse with distilled water if required. The glassware is now read for drying
3. Automatic cleaning apparatus
   1. If available, a laboratory dishwasher may be used for cleaning some types of laboratory glassware (beakers, conical flasks, volumetric flasks)
   2. Automated pipette and burette washers may be used if available. Burette taps must be open and have at least 3 washes with a cleaning solutions, followed by several rinses with pure water
4. Sterilisation
   1. glassware that has been contaminated with micro-organisms will need to be sterilised by autoclaving
   2. After sterilising, glassware can then be cleaned as outlined above
5. Drying

5.1 If the glassware is not required immediately after cleaning, then air drying on a rack is satisfactory. Hot air drying racks or glassware drying cupboards can accelerate drying

1. Storage

6.1 Once dry, glassware should be stored in the appropriate place in the laboratory

After examining the SOP: Cleaning and Storage of Glassware, rearrange the steps in the table for cleaning and storing glassware into the appropriate order in which they should be carried out to ensure the glassware is ready for use.

|  |  |  |
| --- | --- | --- |
| Steps | No | Correct Order |
| Wash residue with organic solvent | 1 | Dispose of damaged glassware in glass disposal container |
| Place clean, dry glassware in storage cabinet | 2 | Remove any labels |
| Remove any labels | 3 | Wash with detergent and cleaning brush |
| Dispose of damaged glassware in glass disposal container | 4 | Wash residue with organic solvent |
| Rinse several times with distilled water | 5 | Rinse several times with tap water |
| Place clean glassware on drying rack | 6 | Rinse several times with distilled water |
| Wash with detergent and cleaning brush | 7 | Place clean glassware on drying rack |
| Rinse several times with tap water | 8 | Place clean, dry glassware in storage cabinet |

1. For an allocated area of a laboratory complete the table below by:

* identifying the particular laboratory area
* listing the main types of glassware, equipment, reagents that are available
* listing storage requirements for the identified glassware, equipment, reagents.

This list will form one section of your later Skills Assessment. The section will be returned to you at the Skills Assessment for you to complete a stocktake on the identified glassware, equipment and reagents over 2 sessions.

Student area should relate to the actual areas they are familiar with and should not be a full stocktake of an entire area. Guidance will be provided by the trainer as to the actual area to be examined.

| Laboratory area: Preparation Room 1 | | | | | |
| --- | --- | --- | --- | --- | --- |
| Glassware | Storage | Equipment | Storage | Reagents | Storage |
| Beakers: Glass  2 L, 1 L, 800 mL, 600 mL, 400 mL, 250 mL, 100 mL, 80 mL | On shelving  In sizes | Glass thermometer | In labelled drawer | Concentrated acids:  HCl, H2SO4, HNO3, HF | Corrosive liquid cabinet |
| Volumetric flasks:  1L, 500 mL, 250 mL, 200 mL, 100 mL, 50 mL, 25 mL, 10 mL | Clean  Lids on  In sizes | Retort stands | On Floor next to sink | Diluted acids | Lower shelf |
| Conical flasks:  500 mL  250 mL  100 mL | Clean  On shelves, in sizes | pH meter | Probe in standing solution on bench | Indicator solutions:  Phenolphthalein  Screened methyl orange | Labelled dropper bottles on shelf |
| Storage bottles:  1L Schott, 500 mL Schott | Clean, lids on;  Cupboard | DO probe | On bench (probe in saturated air) | General chemicals (A-Z) | Alphabetically sorted in categories and placed on shelves |
| 50 mL burettes | Upside down on rack, taps open | Calculators (class set) | Bookcase | pH papers | Drawer |
| Pipettes:  100mL, 50 mL, 40 mL, 30 mL, | In drawers labelled with size | Pipette fillers | In drawer near | Various filter papers | Drawer |
| Millipore filtration apparatus | Clean on shelves |  |  | 5M NaOH |  |
|  |  |  |  |  |  |
|  |  |  |  |  |  |

1. Describe the process for the collection of used equipment, the inspection of faults and removal from service of equipment that needs repair in the laboratory area:

Assessor will need to familiarise themselves with the procedures for the particular laboratory.

At the beginning and end of each use the technician inspects to ensure there are no obvious faults/breaks in the equipment.

If the equipment is found to be faulty it can be tagged out of service, supervisor notified, recorded in maintenance requests.

Laboratory technician should not attempt any electrical repairs.