# Knowledge Assessment

# **Assessment event 1 of 3**

# Trainer & Assessor Marking Guide

## Criteria

### Unit code, name and release number

MSL933006 - Contribute to the achievement of quality objectives (1)

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

MSL30118 - Certificate III in Laboratory Skills (1)

Version: 1.0

Date created: 13/08/2019

Date modified: 18/12/2019

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Hamilton Campus

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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 – 15) 2. True or False questions (Questions 16 – 25) 3. Short answer questions (Questions 26 – 38) 4. Assessment feedback   Model answers, sample responses or criteria for each question are provided below.  Use these to support your judgement when determining a satisfactory result. Note however, that where the question relates specifically to the student laboratory (simulated or real) you will need to have confirmed the expected response for that workplace.  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, ruler |
| **Assessor must provide** | Classroom suitable for conducting a written assessment |
| **Time allowed** | 2 hours |

## 1: Multiple choice (Questions 1 – 15)

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

1. Which of the following is an indication of quality?

Table 2 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. Meeting specifications |  |
| 1. Value for money |  |
| 1. Detecting and removing defects |  |
| 1. All of the above | X |

1. Continuous improvement has a number of benefits including:

Table 3 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. a reduction in wasted time and materials |  |
| 1. greater staff motivation to perform at their best |  |
| 1. continued customer satisfaction leading to repeat business |  |
| 1. all of the above | X |

1. Which of the statements below would you NOT expect to find in your organisation’s Code of Ethics?

Table 4 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. Act honestly in all dealings with customers and other employees |  |
| 1. Maintain confidentiality of laboratory procedures and results |  |
| 1. Professional behaviour only applies during working hours | X |
| 1. Avoid taking unnecessary risks that may cause harm to yourself or others |  |

1. Staff training is required within an organisation to:

Table 5 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. provide upskilling of workers |  |
| 1. ensure continuous improvement |  |
| 1. commission new equipment or processes |  |
| 1. all the above | X |

1. Which of the following would **not** be an appropriate reaction to a customer complaint?

Table 6 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. Staying calm |  |
| 1. Being abusive in response to the complaint | X |
| 1. Negotiating a solution to the problem |  |
| 1. Taking responsibility to file and report the problem |  |

1. Which of the following is a reason for trying to minimise waste?

Table 7 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. Reducing potential environmental damage |  |
| 1. To meet regulations for effluent quality |  |
| 1. Reduce the cost to the business of waste disposal |  |
| 1. All of the above | X |

1. Which of the following would **not** be considered to be part of a professional development program for a worker in a laboratory/field testing role?

Table 8 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. Informal on-the-job training, buddying with a more experienced technician |  |
| 1. Formal off-the-job structured course around new instrumentation |  |
| 1. Structured self-paced on-line course work related to particular processes in your job role |  |
| 1. Attendance at a seminar that does not relate to the laboratory area | X |

1. A performance review provides the employee with an opportunity to:

Table 9 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. establish personal goals that will fit in with organisational values and standards | X |
| 1. plan the next vacation |  |
| 1. inform the employer that they will not be participating in any more training |  |
| 1. take leave if expectations are too high |  |

1. Data can be used to monitor variations in a process and also to make improvements in a process. For data to be useful it must be:

Table 10 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. relevant and reliable |  |
| 1. representative |  |
| 1. readable |  |
| 1. all of the above | X |

1. Which of the following would be considered appropriate behaviour if you take a customer complaint by phone?

Table 11 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. Listen carefully and take notes on the call |  |
| 1. Don’t get into an argument or be abusive |  |
| 1. Take responsibility for seeing that the issue is resolved |  |
| 1. All the above | X |

 

W X

 

Y Z

Identify the process run charts above which show in order:

* A stable process running fairly constantly
* The process showing recuring cycles of high, medium to low results
* The process is jumping from highs to lows
* The process is heading out of control

Table 12 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. Z, Y, X, W |  |
| 1. Z, X, W, Y | X |
| 1. X, Y, Z, W |  |
| 1. Z, Y, W, X |  |

1. ‘Right first time’ is about:

Table 13 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. effective planning |  |
| 1. organisation |  |
| 1. minimising mistakes and errors |  |
| 1. all of the above | X |

1. AllSci laboratory runs daily microbiology tests on the city water supply. E.coli are used as a measure of faecal contamination of the water supply. The specification is 10 ± 1 colonies/1 mL water maximum. The following table shows results from samples collected from eight locations.

|  |  |
| --- | --- |
| **Location** | **E Coli/ 1 mL water** |
| 1 | 25 |
| 2 | 3 |
| 3 | 9 |
| 4 | 11 |
| 5 | 12 |
| 6 | 10 |
| 7 | 8 |
| 8 | 16 |

The set of locations that show outside of specification E.coli results are:

Table 14 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. 1, 4, 5, 6, 8 |  |
| 1. 1, 5, 8 | X |
| 1. 2, 3, 7 |  |
| 1. 3, 4, 6 |  |

1. Xanda wanted to implement sustainable energy work practices in his laboratory. He called a meeting to discuss what practices should be changed. Which of the following is ***NOT*** an example of a sustainable work practice?

Table 15 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. Shredding waste paper and putting it in a recycling bin |  |
| 1. Switching off computers when not in use |  |
| 1. Running the fume cupboards for an entire shift, rather than as required | X |
| 1. Using test materials within expiry dates |  |

1. Which of the following would **not** be expected to form part of the Quality Control ( QC) system in a testing laboratory?

Table 16 Multiple choice

|  |  |
| --- | --- |
| Answer choices | Put X next to your answer |
| 1. Undertaking replicate analysis |  |
| 1. Using uncalibrated instruments | X |
| 1. Analysing trends in data |  |
| 1. Comparing your test results with other laboratories |  |

## 2: True or false (Questions 16 – 25)

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

Table 17 True or false

| Question | Write *True* or *False* |
| --- | --- |
| 1. Wasted time, effort and materials are all costs to a business | True |
| 1. The purpose of a performance review is to evaluate an employee’s overall work performance against organisational values and standards | True |
| 1. ‘Job ownership’ means taking charge of your work task and completing all associated tasks. An example would be cleaning glassware and returning it to its right place once a test has been completed | True |
| 1. Scheduling of tests and procedures helps to ensure quality results | True |
| 1. Total Quality Management is the philosophy that management have total responsibility for quality | False |
| 1. A pipette is calibrated to deliver 20.00 mL at 20oC. If the pipette is used at 30oC it will have expanded. The amount will be small so there would be no need to run a calibration at 30oC | False |
| 1. Calibrations must be carried out by authorised and/ or properly trained laboratory staff and the results of the calibration recorded | True |
| 1. It is important before reporting results to ask yourself ‘does that result make sense’ | True |
| 1. A ‘right first time’ philosophy, is one way of contributing to sustainable work practices | True |
| 1. Customer service is only an expectation of those in the front office | False |

## 3: Short answer (Questions 26 – 38)

Read the question carefully. Your answer should be a minimum of 10 words but no longer than 150 words unless the question asks for a list or complete a table.

1. ‘Chain of custody’ and ‘traceability of results’ are important in any laboratory quality management system. Explain how each of these terms could provide a mechanism for maintaining good customer relationships, particularly if there has been a problem:

A good quality system will have associated with all testing, from sampling through to reporting chain of custody and traceability procedures. These would provide valuable information if there is an issue raised by a customer re a reported value.

Together these forms provide information on when, where and how a sample was taken. How it was prepared, the particular tests completed, the methods followed and at all stages it is possible to follow who had control of the sample, equipment/instrumentation for sampling and testing, calibration data and control sample/standard values obtained and how results were calculated and reported. All this information would be available if there was a query from a customer re a result.

1. What is the process for suggesting improvements in your laboratory?

The response will depend on the particular laboratory. Assessor will need to be familiar with the particular site information.

Some or any of the following may be in place:

\* written submission

\*discussion within work group

\* presentation to peers

1. Explain how you, the Laboratory Assistant, could minimise:
2. the amount of electricity consumed
3. the amount of waste water produced
4. the amount of waste chemicals

General responses provided. Assessor should consider all responses provided by the student.

1. Switch lights off when leaving, turn off computer screens when not in use, only run instruments for the required warm-up, not leave on all day.
2. Use laboratory dishwasher when full, saving water (but using electricity). Not leaving the tap running at the sink if not in use.
3. Determining the amount required for the ‘batch’ being analysed.

Not taking more than required as the ‘excess’ cannot be returned to the original containers.

1. Why is a quality system that is based on ‘getting it right first time’ better than a quality system that is based purely on ‘inspection’ for defects or poor workmanship?

There are three particular reasons why “Right first time’ is a better model than inspections for poor quality.

\*right first time saves time and money by cutting out inspections by making them redundant, thus making the process more efficient

\*’right first time’ model encourages the continued development of employees so they become more skilled at their jobs and more committed to quality, now that it is their responsibility.

\*it encourages honesty in the workplace, because employee mistakes are more important to report as they won’t be picked up in an inspection and honesty is a very important part of an ethical work culture

1. For a typical laboratory workplace:
2. Describe the products and services provided:
3. generally by the company
4. specifically the laboratory
5. construct a diagram that highlights:
6. the workplace structure, including divisions showing where the laboratory fits
7. the lines of communication

Will vary between workplace and Assessor will need to determine the acceptable response for individual workplaces. Results provided for fictitious workplace GENPATH.

a. i) AllSci provides a range of scientific evaluations for customers. It can provide expert collaboration in areas such as: analytical services, engineering, environmental, product development.

ii) AllSci laboratories provide routine analysis following customer sampling plans and also non-routine analysis as requested

Note: the diagram below identifies the workplace structure for the company (imaginery)

The blue arrows indicate the lines of communication within this imaginery company. Each local site will be different. The Assessor should have an idea of the structure of the laboratory/simulated laboratory.

AllSci ENTERPRISE

(General Manager)

Quality and Product Development

Engineering Services

Environmental Services

Laboratory Services

Shift Supervisors

Shift Supervisors

Shift Supervisors

Analysts

Diagram show communication as being linear up from Analyst through to General Manager. There is also direct communication between Environmental Services, Laboratory Services and Engineering Services and between the Shift Supervisors of the Laboratory. <-> indicates lines of communication, without the arrow head it is the basic structure.

1. A run control diagram is often used to indicate in real time what is occurring in a process.

Explain the meaning of each of these terms and how they are determined for a process:

* 1. centre line
  2. upper control limit
  3. lower control limit
  4. suggest a reason as to why there is a change apparent after time 8:15

a. Centre line (average or mean) is the expected value or the value aimed for.

b. Upper control limit is the highest value that is deemed acceptable.

c. Lower control limit is the lowest value that is deemed acceptable

d. the 8:15 value has fallen below the lower control limit and there most likely would have been an adjustment made to the process to bring it back into specification. By 8:30 the reading was back in the acceptable range.

1. AllSci tests for % alcohol. The standard operating procedure requires the standard to be tested each morning and after every 10 samples. The standard is expected to be 12.5% ± 1.5 SD. The standard deviation (SD) is 0.3%. Data produced from the standard test over 2 weeks is in the table below.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Test | Date | Std % alcohol | Test | Date | Std % alcohol |
| 1 | 1-May | 12.3 | 13 | 5-May | 12.3 |
| 2 | 1-May | 12.2 | 14 | 5-May | 12.4 |
| 3 | 1-May | 12.2 | 15 | 5-May | 12.4 |
| 4 | 2-May | 12.4 | 16 | 5-May | 12.3 |
| 5 | 2-May | 12.3 | 17 | 8-May | 12.9 |
| 6 | 2-May | 12.5 | 18 | 8-May | 13 |
| 7 | 3-May | 12.4 | 19 | 8-May | 12.9 |
| 8 | 3-May | 12.4 | 20 | 8-May | 12.8 |
| 9 | 3-May | 12.3 | 21 | 9-May | 12.9 |
| 10 | 4-May | 12.3 | 22 | 9-May | 13 |
| 11 | 4-May | 12.3 | 23 | 9-May | 13.1 |
| 12 | 5-May | 12.4 |  |  |  |

1. Plot the control chart using the chart below, indicate on the chart what each of the provided lines represent.
2. What is the standard’s maximum and minimum acceptable value?

Maximum =13.0% alcohol Minimum = 12.0%

1. Provide an interpretation of the chart and the quality of the results that may have been reported over the two week period.

Up until test 16 the standard value is within specification, however is travelling generally below the actual value. ie it is within the possible variation. This would indicate the results for samples done on tests between 1 May and 16 May could be regarded as acceptable. From the 17 May the trend in the standard value is upwards going out of specification on 9 May. This would indicate something has happened with the instrument or standard or is an operator fault. Results should be quarantined for samples from 9 May and an investigation carried out.

1. A collaborative study provides an indication of how laboratories are performing. AllSci took part in a collective study of the analysis of mercury levels in fish. The results below were the results reported by a number of laboratories. The value reported by AllSci was 0.09 mg/kg. The acceptable range was 0.08-0.10 mg/kg.

|  |  |
| --- | --- |
| **Analysis of mercury in reference samples in different laboratories** | |
| Result (mg/kg) | Number of laboratories |
| 0.05 | 1 |
| 0.06 | 1 |
| 0.07 | 3 |
| 0.08 | 7 |
| 0.09 | 6 |
| 0.10 | 4 |
| 0.11 | 2 |
| 0.12 | 1 |

* 1. How many laboratories were within this range?
  2. How did the AllSci result compare?
  3. Explain why inter-laboratory checks are a useful quality tool.

1. 17 laboratories were within the range 0.08 – 0.10 mg/kg
2. AllSci were within the accepted range
3. Inter-laboratory checks are a useful quality tool. They can be used to compare results using the same procedure, or to determine a standard value having it tested against different methods.
4. It is important to perform regular audits of a testing laboratory. Explain the difference between an ‘internal’ audit and an ‘external’ audit.

Audits are carried out to ensure compliance with the requirements laid down in the policies and procedures of the Quality Manual.

An audit will identify areas of non- compliance.

Internal audits- conducted by quality staff members or anyone who is responsible for quality or ensuring compliance within the organisation. Assessment against company standards and/or AS/ISO Standards

External audits – conducted by auditors with no link to organisation. May be conducted by customers/clients, certifiers against standards or government representatives, ex-auditors employed by the NSW Food Authority investigate food safety etc usually assessed against AS/ISO Standards or other industry standards such as accreditation requirements.

1. Number the order that you would perform the following tasks so that tests and procedures were scheduled to meet customer requirements. Explain your reasons for the choice. Imagine you were the only technician who had to perform all these tasks. (Number the highest priority as 1)

| Task | Order to be performed (1= first) | Reason for Order |
| --- | --- | --- |
| 1. QC check for alcohol in a reference sample | 3 | This should only take a short while and should be ‘slotted into the schedule as time permits. Results may be waiting on this to be reported. |
| 1. Microbiolgical testing for confirmation of Salmonella (food poisoning organism) in food sample due to food poisoning and product recall | 1 | Food recall is a serious quality issue and results will be required urgently. So even though other work is scheduled this should take precedence |
| 1. Fibre testing in cereal sample – has a number of steps and takes all day to complete. The result is due for a nutrition panel of new product due for release next month | 2 | This result is due shortly, the test is time consuming so it could be put on and conducted with the Salmonella testing |
| 1. Inventory of chemical store | 6 | This would not be urgent unless there is a likelihood of running out of stock |
| 1. Equipment maintence checks | 4 | This would be scheduled but a short delay of a day or two should not matter. It should be noted in the maintenance records that it has been delayed |
| 1. Place a stationery order | 5 | Pens and paper can wait until the next day |

1. Considering your experience to date in a laboratory:
2. List the three main work skills you have that you would be able to teach a new worker in the laboratory/simulated laboratory. Why would these be useful to a new employee? (you should consider all aspects of your work such as maintaining quality, keeping safe, following instructions etc.)
3. List three things you would like to do training on in the next 12 months and explain why.

a.These will be student based. Could include :

\* how to access or write SOP’s: useful as will be required each day

\*communicate the results with the internal customer: these need to be delivered by COB each day to the production department

\*who to go to if there is a problem: when new then everything seems like it will be a major obstacle

\* where equipment is stored: lots of different equipment is in use and it is good to know where to go.

b. will be student focussed. Could consider: additional instrumentation training, new software training, front line management training, WHS committee training. Answers that relate to the student and the workplace should be considered satisfactory.

1. List two common errors that may appear in the recording and reporting of results. Suggest methods of overcoming these:

Sample numbers could be mixed. This will result in the incorrect result being placed against a particular sample number. The chain of custody form should show clearly the sample ID and this should be matched at all stages of the sample passing through the system

When recording numbers, digits may be transposed eg 2345 may be recorded as 2354. This will make a difference to the calculations /Numbers should be recorded as soon as taken (mass, volume of sample, instrument reading) and analyst check the actual number recorded.

Where replicate analysis is done an outlier result may not have been disregarded prior to calculation. Analyst should look at the values and decide if they appear ‘in order’

1. What steps do you take when an unusual result occurs? Outline the reporting procedure:

Responses will vary depending on the particular student circumstances.

For a production process:

When an unusual result occurs the first step is to call the control room and ask if they were expecting an unusual result, and if they were not then asking if any changes in production were made recently If the answer doesn’t explain the unusual result then the next step is to inform the supervisor for his take on the unusual results. The net step is to run a check standard through the instrument to ensure that it is still giving accurate results. If it passes then the results is acceptable, if it fails the instrument is cleaned, the check standard is run again to ensure accuracy and the sample run again

For a general laboratory unless they can make comparisons against similar material being tested (from historical records) then the analyst would be relying on supplied specifications (if available) or using the standard values and if they are different then additional checking is required. In the first instance the sample should be rerun and the supervisor informed. It may be that a new sample is requested.