# Knowledge assessment 1

**Assessment event 1 of 6**

# Trainer & Assessor Marking Guide

## Criteria

### Unit code, name and release number

MSL974021 - Perform biological procedures (1)

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

MSL50118 - Diploma of Laboratory Technology (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: 23/09/2019

Date modified: 27/11/2019

For queries, please contact:

Innovative Manufacturing, Robotics and Science SkillsPoint

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 2. True or False questions 3. Short answer questions 4. Assessment feedback   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** | Pens |
| **Assessor must provide** | This assessment task, a timer and a suitable classroom for this assessment task |
| **Time allowed** | 1.5 hours |

## Part 1: Multiple choice

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

1. Taxonomy is the:

Table 2 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. classification system of all things |  |
| 1. naming system for plants |  |
| 1. classification system for all living things | X |
| 1. naming system for animals |  |

1. Gregor Mendel was responsible for:

Table 3 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. formulating the principles of inheritance | X |
| 1. creating gene expression |  |
| 1. demonstrating that evolution is real |  |
| 1. determining that gene expression is a function of environment |  |

1. Meiosis is the process of:

Table 4 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. cellular division |  |
| 1. gamete formation in animals | X |
| 1. chromosome division |  |
| 1. genotyping |  |

1. Recessive traits are those which are:

Table 5 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. always expressed |  |
| 1. require only one gene to express the trait |  |
| 1. requires both genes to express the trait | X |
| 1. never expressed |  |

1. A Punnett square assists you to determine:

Table 6 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. the probability of having a male or female offspring |  |
| 1. the probability of having a recessive or dominant gene expressed in offspring | X |
| 1. how many offspring you will produce |  |
| 1. the exact physical features of your offspring |  |

1. A pedigree chart is:

Table 7 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. a chart that shows the heritage of an individual |  |
| 1. a chart that shows the lineage of a related group of individuals |  |
| 1. a tool for genealogical or genetic research |  |
| 1. b) and c) | X |

1. A dominant trait requires:

Table 8 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. only one gene to express the trait | X |
| 1. is always hidden |  |
| 1. requires two genes to express the trait |  |
| 1. none of the above |  |

1. Genotypes are:

Table 9 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. the same as a karyotype |  |
| 1. the same as a phenotype |  |
| 1. the genetic constitution of an individual organism | X |
| 1. the physical expression of genetic material |  |

1. Mendelian genetics concludes that:

Table 10 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. each parent has a gene pair in each cell for each trait studied |  |
| 1. the hereditary determinants are genes |  |
| 1. one member of the gene pair separates into gametes, therefore, each |  |
| 1. gametes unite at random and irrespective of other gene pairs |  |
| 1. all of the above | X |

## Part 2: True or false

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

Table 11 True or false

| Question | Write *True* or *False* |
| --- | --- |
| 1. There are 5 kingdoms of life | T |
| 1. Prokaryotes include the phylum chordata | F |
| 1. Eukaryotes are multicellular organisms | T |
| 1. Prions are living organisms | F |
| 1. Classification of organisms is based upon shared characteristics | T |
| 1. Taxonomy is how things are named | F |
| 1. Karyotype means the number and appearance of chromosomes an organism has | T |
| 1. Chromosomes are the genetic material of an organism | T |
| 1. Meiosis is the process of cell division | F |
| 1. A pedigree is the knowledge of one’s ancestry | T |

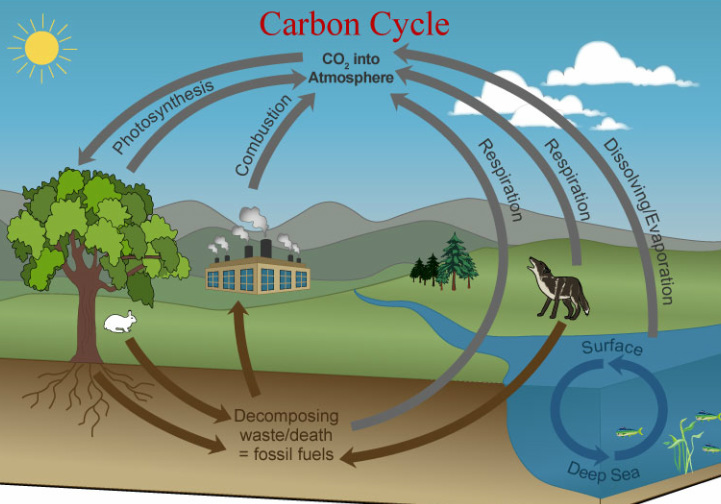
## Part 3: Short answer

Read the question carefully. Please refer to each question for the word count.

1. Draw a diagram of the carbon cycle in the box below. Make sure you label each component of the carbon cycle in your diagram.

The carbon cycle should be complete with arrows and labels. The student is being assessed for their knowledge, not drawing skills.

**NOTE: The student does not have to make the illustration below.** They just have to provide their own example of a carbon cycle, including the key components, as illustrated in the supplied image. You must use your professional judgement to determine that the student has covered the key aspects of the carbon cycle, as per the illustration below.

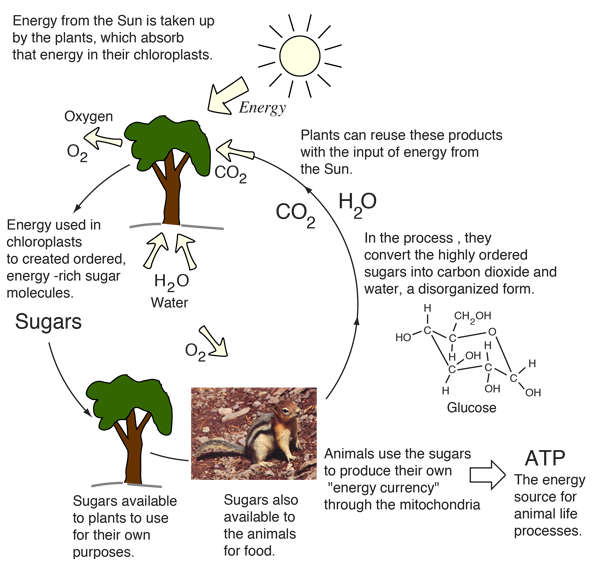


[The carbon cycle](http://upscjobsdesire.blogspot.com/2015/11/ecosystem.html) by [GSIAS Blogs](http://upscjobsdesire.blogspot.com/2015/11/ecosystem.html) copied under exam exemption accessed on 15 November 2019

1. Draw a diagram of the energy cycle in the box below. Make sure you label each component of the energy cycle in your diagram.

The energy cycle should be complete with arrows and labels. The student is being assessed for their knowledge, not drawing skills.

**NOTE: The student does not have to make the illustration below.** They just have to provide their own example of an energy cycle, including the key components, as illustrated in the supplied image. You must use your professional judgement to determine that the student has covered the key aspects of the energy cycle, as per the illustration below.

[](http://www.google.com.au/url?sa=i&rct=j&q=&esrc=s&source=images&cd=&ved=2ahUKEwjb6c_TltTiAhXbWisKHUcBA3cQjRx6BAgBEAU&url=http://hyperphysics.phy-astr.gsu.edu/hbase/Biology/enercyc.html&psig=AOvVaw3I7F0cM-bSWAatudVdhrVU&ust=1559887154199891)

[Energy Cycle in Living Things](http://hyperphysics.phy-astr.gsu.edu/hbase/Biology/enercyc.html) by [HyperPhysics](http://hyperphysics.phy-astr.gsu.edu/hbase/hph.html) copied under exam exemption accessed on 15 November 2019

1. Explain the term ‘bioaccumulation’, using mercury as an example, and draw a simple foodweb of the biomagnification of mercury in the food chain (10 to 50 words):

Bioaccumulation is the process of a chemical accumulating in the tissues of organisms. Mercury in water is taken up by plants, then lower order animals that eat those plants, then higher order animals that eat the lower order animals, and it accumulates more heavily in each successive organism, until it reaches the apex predators, including humans, who end up with the highest concentration of mercury in their tissues.

Mercury concentration

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1. List the seven main levels in the classification hierarchy (7 words):

Kingdom

Phylum

Class

Order

Family

Genus

Species

1. Describe the following words and give an example of each.
   1. Prokaryotes (4 to 10 words):

Unicellular organisms – true bacteria

* 1. Eukaryotes (4 to 10 words):

Multicellular organisms – student could provide a kingdom / phylum / class / order / genus / species here: i.e. fungi / chordata / carnivora / cat / human etc

* 1. Prions (5 to 15 words):

Prions are a protein-like infectious particle. They do not belong to any kingdom, as they are not an organism. An example would be mad cow disease

* 1. Parasites (10 to 25 words):

Parasites are organisms that live in/on a host organism and adversely affect the host, but rarely kills it. An example would be a tapeworm

1. Describe the basic characteristics of each of the kingdoms of life.
2. Bacteria (10 to 25 words):

Prokaryotes, no cell nucleus, cell walls made of peptidoglycan

1. Viruses (10 to 25 words):

Cannot self-replicate, have a capsid containing genetic material

1. Fungi (10 to 25 words):

Eukaryotic, decomposers, no chlorophyll, cell walls comprised of chitin

1. Plants (10 to 25 words):

Eukaryotic, cell walls comprised of cellulose

1. Animals (10 to 25 words):

Eukaryotic, no cell walls, reproduce sexually

1. A patient requires a blood transfusion. Using the following information, calculate the:
   1. Initial transfusion volume delivered in first 15 minutes
   2. Total length of time for the full transfusion to be completed
   3. The precision of the results, with the first two transfusions taking 130 and 132 minutes to complete

Dosage rates: 120mL/h for 15 minutes, then 240mL/h until bag is emptied

Transfusion bag is 500mL total volume

You must show your working, and use **appropriate units and precision**.

120mL x 0.25h = 30mL delivered in 15 minutes

a) 30mL delivered in 15 minutes

500mL transfusion bag, 500mL – 30mL = 470mL remaining.

470mL / 240mL/h x 60 = 117 minutes

117 minutes + 15 minutes = 132 minutes

b) Total time for transfusion is 2 hours and 12 minutes, or 132 minutes

Average of results (130 + 132 + 132)/3 = 131.33

Deviation from average:

131.33 – 130 = 1.33mL

132 – 133.33 = 0.67mL

132 – 133.33 = 0.67mL

(1.33 + 0.67 + 0.67) = 0.89mL

c) The precision of my result is 132mL +/- 0.89mL

1. What are certified reference materials, and why is it important to use them in a laboratory environment (10 to 30 words)?

Certified reference materials arrive made up and ready to use and come with a certificate of authenticity. This certification means that the reference materials have been checked and tested and validated by the certifier. The use of these materials helps the technician to determine the accuracy of their analytical techniques and the precision of results of their analysis

1. Explain the meaning of controls in a laboratory setting and give two examples of how and when they might be used (10 to 30 words).

Some examples are below. Students may come up with many different ones. Use your professional judgement to determine if they are suitable responses:

Controls in this context are standardised reagents and chemicals of a known concentration. The controls are used when conducting analysis, and their results can be used to determine the accuracy of your results.

Might be controls in process, that stop or start specific steps at a point in time, or a point in concentration etc

Might be WHS controls

Might be a perfume standard that is used to check against new deliveries for scent

1. Explain the concept of environmental sustainability in a laboratory setting and give one example of how you might implement a sustainable process (10 to 50 words):

Some examples are below. Students may come up with many different ones. The bold words are different examples. Use your professional judgement to determine if they are suitable responses:

Environmental sustainability in a laboratory is where everything is **recycled** if it can be, and **legally** disposed of if it can’t be. It can be having **solar** power and **recycled** **water** for toilets etc

An example in a lab might be finding a new testing procedure to replace one that has a very toxic or environmentally hazardous reagent to a new procedure with a less hazardous reagent, for example, replacing CCl4 with CH2Cl2 or moving from a paper based LIMS to an online LIMS.

1. Complete the Punnett square below and answer the following questions (2 letters per empty cell).

|  |  |  |
| --- | --- | --- |
|  | G | g |
| G | GG | Gg |
| g | Gg | gg |

* 1. If G is the dominant gene, what is the probability that the offspring will express that gene (1 word)?

3:4 or 75%

* 1. If g is a recessive gene, how many offspring will have the recessive disorder (1 word)?

1:4 or 25%

1. Read the description below and using the key provided, key out this specimen to the species level.

To key out the specimen, write ‘Y’ in the correct box for each subset of information

When you have determined the species, write your answer in the space provided under the key (2 words).

***Specimen description:***

This specimen is a multicellular organism, of the kingdom Animalia. It has a tubular nerve cord, bilateral symmetry and milk glands. It has thin skull bones, grasping fingers and hair covering its body.

Table 12 Key to species

| # | Key to species | Ref # | Answer |
| --- | --- | --- | --- |
| 1a | Eukaryotic, no cell walls, reproduce sexually | 2 | Y |
| 1b | Eukaryotic, decomposers, no chlorophyll, cell walls comprised of chitin | 11 |  |
| 1c | Eukaryotic, cell walls comprised of cellulose | 12 |  |
| 1d | Prokaryotes, no cell nucleus, cell walls made of peptidoglycan | 13 |  |
| 1e | Cannot self-replicate, have a capsid containing genetic material | 14 |  |
| 2a | Notochord, dorsal tubular nerve cord, pharyngeal slits | 3 | Y |
| 2b | Marine animals, water vascular system, tube feet | 15 |  |
| 3a | Animals with a spinal column, bilateral symmetry | 5 | Y |
| 3b | Notochord, nerve cord, no vertebra | 4 |  |
| 4a | Embryo – bilateral symmetry, adult – radial symmetry | Crinoidea |  |
| 4b | Star shaped body, central disc and multiple radiating arms | Asteroidia |  |
| 5a | Chordates with fur or hair and milk glands | 6 | Y |
| 5b | Chordates with scaly water resistant skin, lay shelled eggs | 16 |  |
| 6a | Mammals with fur or hair, grasping fingers, opposable thumbs, five-digit hands | 7 | Y |
| 6b | Mammals with prominent canines, walk on four legs, cannot move jaw from side to side | 17 |  |
| 7a | Large eyes, reflective layer over retina, a tail, long lower teeth directed forward, covered in fur | 9 |  |
| 7b | Primates with relatively flat faces and three-dimensional vision | 8 | Y |
| 8a | Hominids with upright position and large brain, quadrupedal knuckle walking | 9 |  |
| 8b | Hominids with upright position and large brain, walk on two feet | 10 | Y |
| 9a | Average lifespan 40-45 years, covered in hair, intelligent, five-fingered hands | Pan troglodytes |  |
| 9b | Long legs, pink lips and dark face, covered in hair | Pan paniscus |  |
| 10a | Members of the genus homo with a high forehead and notably thin skull bones, walk on two legs | Homo sapiens | Y |
| 10b | Members of the genus homo, walk on two legs, thick skull, flat face, heavy eye ridges | Homo erectus |  |

What is the name of the species? \_\_\_homo sapiens\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. Read the description below and using the key provided, key out this specimen to the species level.

To key out the specimen, write ‘Y’ in the correct box for each subset of information

When you have determined the species, write your answer in the space provided under the key (2 words).

***Specimen description:***

This specimen is a multicellular organism, of the kingdom Fungi. It has a stipe that does not change colour when scratched. The stipe has rings of less than 35mm, and if the head of the fungi is larger than this, there are no warts on its lower side. The cap can be white, cream or brownish, and the stipe generally has a bulbous base, with the length of the stipe roughly equal to the diameter of the cap.

*Stipe:* Stalk of mushroom

Table 13 Key to species

|  | Key to species | Ref # | Answer |
| --- | --- | --- | --- |
| 1a | Stipe yellowing distinctly when scratched | 2 |  |
| 1b | Stipe reddening, browning or not changing colour when scratched | 4 | Y |
| 2a | Cap white, cream, or occasionally pale greyish-brown, cap yellowing when scratched, at least at margin | Agaricus xanthodermus |  |
| 2b | Cap covered in dark brown to grey brown small squamules or fibrils, only lower half of stipe strongly yellowing when scratched | 3 |  |
| 3a | Fruiting bodies almost black when young, radially splitting at maturity | Agaricus rotalis |  |
| 3b | Young fruiting bodies grey brown, only occasionally splitting at maturity | Agaricus moelleri |  |
| 4a | Stipe with a broad ring, >35 mms diameter with floccules or warts below | 5 |  |
| 4b | Ring < 35mms, or if larger then without floccules or warts on its lower side | 6 | Y |
| 5a | Cap covered with yellow brown to brown squamules on paler background | Agaricus augustus |  |
| 5b | Cap white discolouring yellowish brown with age or on handling, glabrous or covered with minute concolourous fibrils | Agaricus arvensis |  |
| 6a | Cap with purple, vinaceous or brown-vinaceous fibrils or squamules | 7 |  |
| 6b | Cap white, cream or brownish, fibrillose, squamulose or glabrous | 10 | Y |
| 7a | Cap fibrillose at centre, but elsewhere covered in broad, adpressed red brown to brown-vinaceous squamules, spores 7-9 µm long | Agaricus langei |  |
| 7b | Cap uniform fibrillose or covered in narrow squamules, spores < 7 µm long | 8 |  |
| 8a | Cap large, 50 – 100 mms diameter, plano convex, later applanate, flesh reddening or browning on cutting | Agaricus austrovinaceus |  |
| 8b | Cap smaller, 30 – 60 mms diameter, convex, flesh yellowing slightly or unchanging on cutting | 9 |  |
| 9a | Spores 5.3 × 3.5 on average | Agaricus dulcidulus |  |
| 9b | Spores 7 × 4.4 on average | Agaricus sp.1 |  |
| 10a | Stipe with bulbous base and height generally = or > cap diameter | Agaricus impudicus | Y |
| 10b | Stipe without bulbous base | 11 |  |
| 11a | Cap brownish, ring triangular, lamellar edge sterile, basidia 2-spored | Agaricus bisporus |  |
| 11b | Cap white to cream, ring thin, lamellar edge fertile, basidia 2 or 4-spored | 12 |  |
| 12a | Stipe height < cap diameter, ring thin, lamellar edge fertile, basidia 4-spored | Agaricus campestris |  |
| 12b | Stipe height > cap diameter, ring ephemeral, basidia 2 and 3 spored | Agaricus sp.5 |  |

What is the name of the species? \_\_\_\_\_\_\_agaricus impudicus\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

This key based on: <http://qldfungi.org.au/resources-2/fungi-keys/fungi-key-agaricus>