# Knowledge assessment 2

**Assessment event 2 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\*\*

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For queries, please contact:

Innovative Manufacturing, Robotics and Science SkillsPoint

Hamilton Campus

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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 question 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, student workbook for this unit |
| **Assessor must provide** | This assessment task, a classroom suitable for an exam and a timer |
| **Time allowed** | 2 hours |

## Part 1: Multiple choice

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

1. The phases of the cell cycle are:

Table 2 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. prophase, metaphase, anaphase, telophase, cytokinesis |  |
| 1. interphase, mitosis, cytokinesis | X |
| 1. prophase, mitosis, cytokinesis |  |
| 1. all of the above |  |

1. Interphase is the:

Table 3 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. stage between successive cell divisions |  |
| 1. the phase before mitosis commences |  |
| 1. the phase after cytokinesis completes |  |
| 1. all of the above | X |

1. The basic function of a cell is:

Table 4 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. taking nutrients from food and converting them into energy |  |
| 1. carrying out specialised functions |  |
| 1. carrying hereditary material and making copies of themselves |  |
| 1. all of the above | X |

1. What is the purpose of procedures in a microbiology laboratory?

Table 5 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. To provide a safe working environment |  |
| 1. To ensure quality control of testing procedures and documentation |  |
| 1. To show staff how to conduct their job roles safely and adequately |  |
| 1. All of the above | X |

1. Workplace procedures demonstrate:

Table 6 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. how to perform a task safely and correctly |  |
| 1. what equipment should be used to complete a task |  |
| 1. how to maintain customer confidentiality |  |
| 1. all of the above | X |

1. Organic compounds always contain:

Table 7 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. carbon and oxygen |  |
| 1. carbon and nitrogen |  |
| 1. carbon and hydrogen | X |
| 1. carbon and sulfur |  |

1. The atoms in organic compounds are held together by:

Table 8 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. covalent bonds | X |
| 1. ionic bonds |  |
| 1. metallic bonds |  |
| 1. hydrophilic bonds |  |

1. What is the principal carbohydrate storage product in plants:

Table 9 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. glycogen |  |
| 1. starch | X |
| 1. cellulose |  |
| 1. glucose |  |

1. Carbohydrates are a good source of energy because they have:

Table 10 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. carbon-hydrogen bonds | X |
| 1. glycerol |  |
| 1. phosphate groups |  |
| 1. sulfur bonds |  |

1. Which statement about fats is false?

Table 11 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. Fats are part of the structural component of membranes |  |
| 1. Fats are responsible for the transport of oxygen to the tissues | X |
| 1. Fats help protect the body from shock |  |
| 1. Fats are also known as triglycerides |  |

1. How many naturally occurring amino acids are there?

Table 12 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. 20 | X |
| 1. 30 |  |
| 1. 10 |  |
| 1. 15 |  |

1. In any protein, the amino acid residue with the free COOH group is called:

Table 13 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. the C-terminal | X |
| 1. the amino group |  |
| 1. the M-terminal |  |
| 1. the carboxylic group |  |

1. What molecules are the building blocks of proteins?

Table 14 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. Sugars |  |
| 1. Amino acids | X |
| 1. Fatty acids |  |
| 1. Disaccharides |  |

1. The sequence of amino acids in a protein is said to be which structure of the protein?

Table 15 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. Primary | X |
| 1. Secondary |  |
| 1. Tertiary |  |
| 1. Quaternary |  |

1. The legal requirements specific to biological procedures could be:

Table 16 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. maintaining client confidentiality, running all samples through a LIMS and having a QMS for business management |  |
| 1. there are no specific legal requirements |  |
| 1. having NATA accreditation and participating in round robins |  |
| 1. a) and c) above | X |

1. Ethical behaviour when working with biological materials includes, but is not limited to:

Table 17 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. tracking samples, disposing of biohazardous materials correctly and not sharing confidential information about clients or the business | X |
| 1. ethics is a personal choice, so there are no formal requirements |  |
| 1. making the most money for the company by skipping controls and blanks and just getting the work done |  |
| 1. all of the above |  |

1. Requirements for storage of confidential documents and samples are:

Table 18 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. onerous and expensive, and not compulsory |  |
| 1. 4 years for documents, 7 years for reports and 2 days after final report for samples | X |
| 1. 10 years for all samples and documents |  |
| 1. none of the above |  |

1. Security requirements for a microbiological laboratory might include:

Table 19 Multiple choice

| Answer choices | Put X next to your answer |
| --- | --- |
| 1. storage of confidential records behind a two-factor login |  |
| 1. only having authorised people permitted access to confidential records |  |
| 1. a securely locked and monitored records storage location |  |
| 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 20 True or false

| Question | Write *True* or *False* |
| --- | --- |
| 1. Plasmolysis is a state in which the cell membrane has detached from the cell wall during hypertonic conditions. | T |
| 1. Tonicity is the ability of a solution to make water move in or out of a cell by osmosis. | T |
| 1. Both plants and animals have vascular tissues | T |
| 1. Both plants and animals have xylem and phloem | F |
| 1. Cells are the basic building blocks of all living things | T |
| 1. Procedures are implemented to maintain workplace quality standards | T |
| 1. Organic molecules that contain two sugar units are called oligosaccharides | F |
| 1. Fats are capable of generating twice the amount of energy than proteins | T |
| 1. A chain of many amino acids is referred to as a polysaccharide | F |
| 1. Amino acids and proteins are not stored within the body and must be consumed | T |
| 1. Each chromosome is made of protein and a single molecule of DNA | T |
| 1. Alcohols are polar because of the length of the carbon chain | F |
| 1. Alkanals and Aldehydes undergo oxidation-reduction reactions | T |
| 1. Aromatics all have one or more a benzene rings within their structure | T |
| 1. All organic molecules are non-toxic | F |

## Part 3: Short answer

Read the question carefully, then answer in the space provided. The word count is listed at the end of each question.

1. Explain the process of osmosis, and provide one example for plant and animal cells. (20 to 30 words)

Osmosis is the movement of water across a selectively permeable membrane from a more dilute to a more concentrated solution.

Either of:

Plants – absorption of water by plant roots

Transfer of solutes across cellular membranes

Either of:

Animals – absorption of water by the alimentary canal

Transfer of liquids across cellular membranes

1. Explain the meaning of the following types of diffusion, and provide an example of each:
   1. Passive (25 to 40 words)

Diffusion is the net movement of particles from a region in which they are in a higher concentration to regions of lower concentration. Diffusion continues until both regions are uniform in concentration.

Either of:

Plants – gas exchange for photosynthesis, CO2 from air to leaf, and O2 from leaf to air

Animals – gas exchange for respiration (at the alveoli), O2 from air to blood, CO2 from blood to air

* 1. Facilitated (10 to 20 words)

The movement of specific molecules down a concentration gradient.

Selection is by size, shape and charge

Either of:

An example would be the movement of **glucose** or **amino acids** into cells

1. Active (10 to 20 words)

This is when a molecule is transported against a concentration gradient.

Any of:

An example would be the transportation of sodium out of the cell and potassium into the cell by the sodium-potassium pump.

Exocytosis

Endocytosis

1. Explain the terms:
   1. Hypotonic (5 to 15 words)

Hypo – less than, the solution will be less concentrated than the cell

* 1. Isotonic (5 to 15 words)

Iso – the same as, the solution and cell will be equally concentrated

* 1. Hypertonic (5 to 15 words)

Hyper – more than, the solution will be more concentrated than the cell

1. What are the four main tissue types in animals (4 words)?

Epithelial

Connective

Muscular

Nervous

1. What are the three main tissue types in plants (3 words)?

Vascular

Epidermal

Ground

1. Describe the basic structure of a chromosome (3 to 15 words).

Chromosomes are made up of DNA tightly coiled around proteins called histones

1. Describe the basic structure of a nucleic acid (4 to 15 words).

Any of:

Nucleic acids are polynucleotides

Molecules composed of a series of nucleotides

Each nucleotide consists of a nitrogen-containing aromatic base attached to a pentose sugar, which is in turn attached to a phosphate group

1. Describe the basic structure of a protein, and list the four types (10 to 20 words).

Proteins are built from amino acids linked by a peptide bond

Primary, secondary, tertiary and quaternary

1. What are the functional groups for the following organic molecules (1 functional group per answer)? You can write or draw your answer.
   1. Alkanes

CH3(CH2)nCH3

* 1. Alkanols (Alcohols)

R-OH

* 1. Alkanals (Aldehydes)

R-COH

* 1. Carboxylic acids

R-COOH

* 1. Alkanones (Ketones)

R-CO-R

* 1. Aromatics
  2. Amino acids

COOH

R-CH-NH2

* 1. Sulfhydryl

R-SH

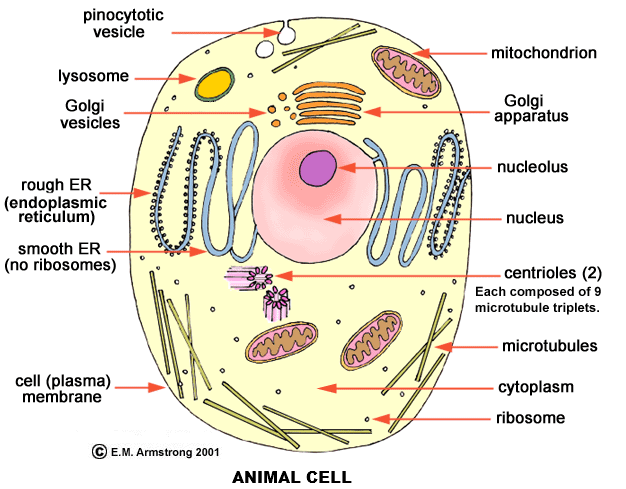
* 1. Fats

CH3(CH2)nCOOH

* 1. Carbohydrates

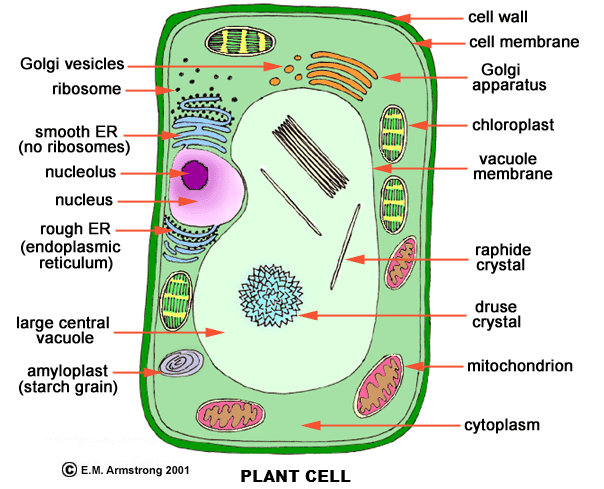
(CH2O)n

1. Label the animal cell diagram below. Ensure every arrow is labelled.



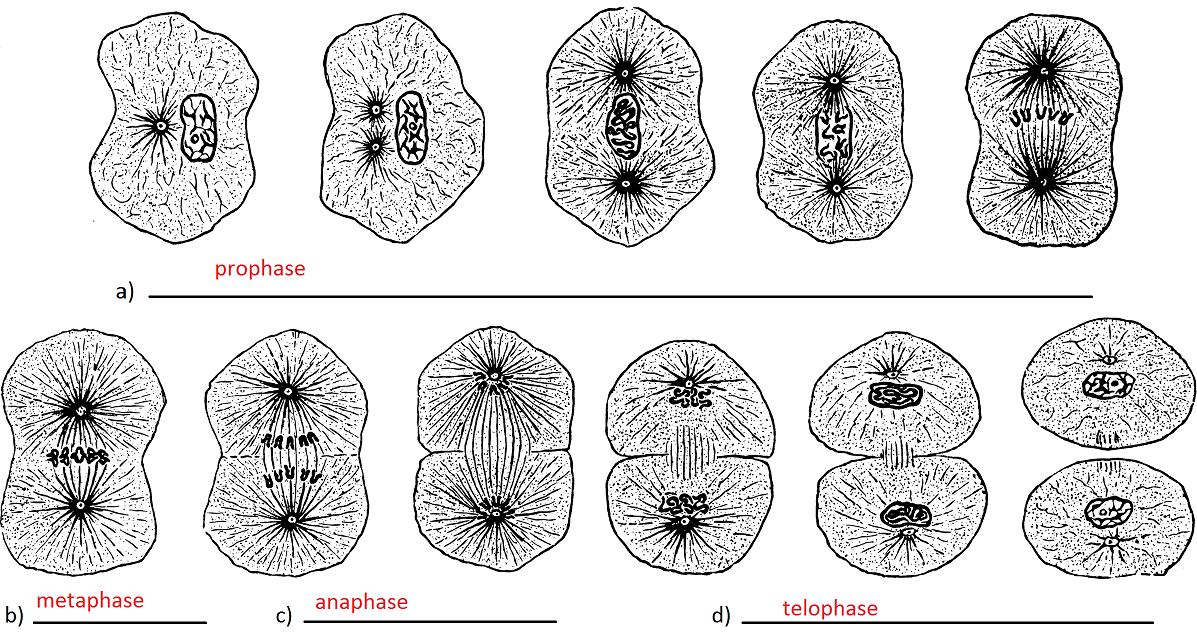
[Animal cell](https://www2.palomar.edu/users/warmstrong/lmexer1a.htm) by E.M. Armstrong copied under exam exemption accessed on 15 November 2019

1. Label the plant cell organelles in the diagram below. Ensure every arrow is labelled.



[Plant cell](https://www2.palomar.edu/users/warmstrong/lmexer1a.htm) by E.M. Armstrong copied under exam exemption accessed on 15 November 2019

1. Label the phases of mitosis on the diagram below (1 word per answer):



[Reproduction of cells](https://etc.usf.edu/clipart/54500/54597/54597_cells.htm) by Cunningham, D. J. copied under exam exemption accessed on 15 November 2019

1. Complete the following table by describing the structure of each of the organelles listed and indicate plant or animal, or writing the correct name of the organelle in the space next to its description.
   1. Organelle column (1 word per cell)
   2. Structure column (4 to 15 words per cell)
   3. Plant or animal column (1 to 2 letters per cell)

Table 21 Complete the table

| Organelle | Structure | Plant (P) or Animal (A)? |
| --- | --- | --- |
| Nucleus | Large structure surrounded by double membrane, contains nucleolus and chromosomes | A/P |
| Nucleolus | Granular body within nucleus, consists of RNA and protein | A/P |
| Mitochondria | Sacs consisting of two membranes, inner membrane is folded to form cristae | A/P |
| Vacuoles | Membranous sacs | P |
| Ribosomes | Granules composed of RNA and protein | A/P |
| Lysosomes | Membranous sacs | A |
| Golgi complex | Stacks of flattened membrane sacs | A/P |
| Plasma membrane | Membrane boundary of a living cell | A/P |
| Cell wall | Rigid structure encasing plant cells, consists of multiple layers of cellulose fibres | P |
| Endoplasmic reticulum | Network of internal membranes extending through the cytoplasm | A/P |
| Chloroplast | Double membrane structure enclosing internal thylakoid membranes, chlorophyll stored in thylakoid membranes | P |
| Centrioles | Pair of hollow cylinders located near centre of cell, each centriole consists of nine microtubule triplets | A |

1. Complete the following table by describing the function of each of the organelles listed, or writing the correct name of the organelle in the space next to its description.
   1. Organelle column (1 word per cell)
   2. Function column (2 to 15 words per cell)

Table 22 Complete the table

| Organelle | Function |
| --- | --- |
| Nucleus | The control centre of the cell, contains the DNA |
| Nucleolus | Rewrite ribosomal (rRNA) and combine it with proteins |
| Mitochondria | Perform cellular respiration |
| Vacuoles | Support or rigidity, storage area for nutrients and waste, water storage and release |
| Ribosomes | Make protein |
| Lysosomes | Digestion and waste disposal |
| Golgi complex | Sorting and packaging of proteins for secretion |
| Plasma membrane | Protect and contain cell |
| Cell wall | Strength, structure |
| Endoplasmic reticulum | Manufacturing and packaging system |
| Chloroplast | Convert light energy into sugars |
| Centrioles | Cell division |

1. Complete the following table by describing three functions of each of the chemical compounds listed below (6 to 15 words per cell).

Table 23 Complete the table

| Chemical compound | Function |
| --- | --- |
| Carbohydrates | Any three of:  Energy production  Energy storage  Building macromolecules  Sparing protein  Assisting in lipid metabolism |
| Fats | Any three of:  Storing energy  Regulating and signalling  Insulating and protecting  Aiding digestion and bioavailability |
| Amino acids | Any three of:  Protein ‘building blocks’  Cell signalling molecules  Regulators of gene expression and the protein phosphorylation cascade  Precursors for syntheses of hormones and low-molecular weight nitrogenous substances |

1. Complete the following table by describing the significant functions of each of the biological molecules listed below (5 to 15 words per cell).

Table 24 Complete the table

| Biological molecule | Function |
| --- | --- |
| Chromosomes | All of the below:  Transfer of genetic material to offspring  Transfer of DNA to new cells during mitosis |
| Nucleic acids | Storage and expression of genetic material |
| Proteins | All of the below:  Structure and motion  Hormones  Enzymes – conduct specific cellular functions in body  Fluid and acid/base balance  Transport  Protection  Wound healing and tissue regeneration  Energy production |

1. Complete the following table by describing the significant roles of each of the biological ions listed below (10 to 25 words per cell).

Table 25 Complete the table

| Biologically significant ion | Role |
| --- | --- |
| Calcium | All of the below:  Bone and tooth formation  Nerve impulse transmission  Muscle contraction  Blood clotting  Release of insulin from pancreatic cells  Breakdown of glycogen in muscles |
| Sodium | All of the below:  Major positive extracellular ion  Nerve transmission  Muscle contraction  Fluid balance |
| Potassium | All of the below:  Major positive intracellular ion  Nerve transmission  Muscle contraction  Fluid balance |
| Iron | All of the below:  Assists in energy production  DNA synthesis  Required for red blood cell function |
| Magnesium | All of the below:  Component of mineral structure of bones and teeth  Energy production (ATP)  Enzymatic reactions  Synthesis of DNA and RNA, carbohydrates, and lipids  Muscle contraction  Nerve impulse transmission |
| Phosphate | All of the below:  Structural component of cell membranes, DNA, RNA, energy production (ATP), regulation of acid/base homeostasis  Component of mineral structure of bones and teeth |
| Chloride | All of the below:  Electrolyte  Digestive enzyme contributor  Assists with fluid regulation |