

Trial Examination 2017

VCE Biology Unit 1

Written Examination

Suggested Solutions

SECTION A – MULTIPLE-CHOICE QUESTIONS

1	☐ A	☒ B	☐ C	☐ D
2	☐ A	☐ B	☐ C	☒ D
3	☐ A	☐ B	☒ C	☐ D
4	☐ A	☐ B	☒ C	☐ D
5	☐ A	☐ B	☒ C	☐ D
6	☒ A	☐ B	☐ C	☐ D
7	☐ A	☐ B	☐ C	☒ D
8	☒ A	☐ B	☐ C	☐ D
9	☐ A	☐ B	☒ C	☐ D
10	☐ A	☐ B	☒ C	☐ D
11	☐ A	☐ B	☐ C	☒ D
12	☐ A	☒ B	☐ C	☐ D

13	☐ A	☒ B	☐ C	☐ D
14	☐ A	☒ B	☐ C	☐ D
15	☐ A	☐ B	☐ C	☒ D
16	☒ A	☐ B	☐ C	☐ D
17	☐ A	☐ B	☐ C	☒ D
18	☐ A	☐ B	☒ C	☐ D
19	☐ A	☒ B	☐ C	☐ D
20	☐ A	☐ B	☒ C	☐ D
21	☐ A	☒ B	☐ C	☐ D
22	☒ A	☐ B	☐ C	☐ D
23	☐ A	☒ B	☐ C	☐ D
24	☒ A	☐ B	☐ C	☐ D
25	☐ A	☐ B	☐ C	☒ D

Question 1 B

Vesicles bud off from the Golgi body to transfer the mucus glycoprotein to the plasma membrane for secretion. Ribosomes are involved in synthesis of protein, not secretion, so not **A**.

Question 2 D

The mucus glycoprotein is exiting out of the cells and is too large to pass through the plasma membrane, so the process must be exocytosis.

Question 3 C

The tissue fluid bathes all of the body cells and forms a very important part of the internal environment. Mucus and stomach fluid are in the external environment and cytosol is inside the cells, not surrounding them.

Question 4 C

The folded surface facing the inside of the stomach is a structural feature that increases surface area for mucus secretion out of the cells, not into the cells, so not **A**. The word adaptation is incorrectly spelt, therefore the answer cannot be **A** or **D**.

Question 5 C

A and **B** are correct statements, but cannot be deduced from the information in the diagram. The pH values on the diagram indicate the stomach fluid is very acidic so the cells would need the protective barrier of the mucus.

Question 6 A

Alcohol is lipid soluble so would readily pass through the phospholipid bilayer, not the protein channels. It would pass by diffusion from a higher concentration in the stomach fluid into the lower blood concentration.

Question 7 D

The hydrophilic ('water-loving') part of the membrane is important on the inside of cells as it faces the cytosol. It is important on the outside of the cell as it faces the external environment and needs to be moist for exchange of substances.

Question 8 A

Cholesterol makes the membrane less fluid, more firm and slightly less mobile, so **B**, **C** and **D** are incorrect. It does make the membrane more stable, so **A** is correct.

Question 9 C

The diagram shows only one of the phospholipid molecules, not the entire phospholipid bilayer. It consists of 1 glycerol/phosphate and 2 fatty acids, so **B** and **D** are incorrect as a triglyceride has 1 glycerol and 3 fatty acids.

Question 10 C

Both plant eukaryotic cells and bacterial prokaryotic cells have a cell wall and membrane, and must contain ribosomes (not surrounded by membrane) to be able to synthesise proteins. No nucleolus would be present in cyanobacterial cells as they have no nucleus.

Question 11 D

Green leaf cells can make their own complex organic molecules from simple inorganic molecules and are therefore classified as autotrophic. As they use light energy, not energy from chemical reactions, they carry out photosynthesis, not chemosynthesis.

Question 12 B

The classification into prokaryotic and eukaryotic cells is based on cell structure, specifically the presence or absence of membrane-bound organelles and nucleus. So although **A** and **D** are correct statements, they are not the basis for classification as a prokaryotic cell. **C** is incorrect as there is a cell membrane present in all living cells.

Question 13 B

Two of the steps in aerobic cellular respiration occur in the mitochondria. As cyanobacteria are prokaryotic cells and have no mitochondria, they cannot carry out aerobic cellular respiration.

Question 14 B

Green leaf cells would carry out photosynthesis during the day in the presence of light, but would also carry out cellular respiration all of the time (day and night) to obtain energy for cell use from glucose breakdown.

Question 15 D

The quolls and other animals benefit from the vultures as they are less likely to eat dangerous, infected food. However, the vultures are neither harmed by, nor benefit from, the quolls. So the relationship is one-sided and called commensalism.

Question 16 A

The kangaroos benefit from the shade of the trees to keep them cooler and therefore reduce heat gain and water loss. Furthermore, the trees benefit from the extra mineral nutrients from the faeces. As both organisms benefit from each other, this is called mutualism.

Question 17 D

The kangaroos are benefiting from acting in this way due to a feature of their behaviour, not from a structural or functional/physiological feature.

Question 18 C

Lying out of the sun will reduce heat gain by direct radiation. All other alternatives would need to be decreased, not increased, for heat loss to occur.

Question 19 B

Although **A** and **D** would contribute to heat loss from the kangaroo, most of the heat loss would be by evaporative cooling. This would occur when the saliva from licking changes from liquid water to water vapour using the kangaroo's body heat, as mentioned in the information at the start of the question.

Question 20 C

Although it is an example of homeostasis, this thermoregulation process is specifically called homeothermy. This is because the internal temperature of the kangaroo will be maintained relatively constant within a very narrow range, fluctuating around an optimum temperature.

Question 21 B

Foreleg blood vessels do not move/migrate in the skin, but dilate/expand in response to higher body temperature. This vasodilation will bring more blood nearer the surface so more heat is lost by conduction and radiation. **C** and **D** would increase, not decrease.

Question 22 A

B, **C** and **D** have all occurred in the last 200 years and had a major impact on mammalian extinction, and it has been a lack of planning and land management (**A**) that has contributed to each.

Question 23 B

The question information indicates that predation, especially by dingoes and foxes, has contributed drastically to the reduction in bilby population size. Monitor lizards do not compete, but rather eat bilbies, so **A** is incorrect.

Question 24 A

While feral camels' hard hooves trample the suitable grassland, they do not actually reduce the land area, so **C** is incorrect. They do not eat the same food as bilbies and bilbies drink very little water, so neither **B** nor **D** are correct, leaving **A** as the correct response.

Question 25 D

If the burning worked to provide more food for bilbies when Indigenous Australians lit fires, then regulated burns in arid grasslands today would be the most successful strategy. Furthermore, the other three alternatives are impossible or unreasonable.

SECTION B – SHORT-ANSWER QUESTIONS

Question 1 (8 marks)

- a. cell type X: chromosomes in cell separating to each end of cell 1 mark
 cell type Y: extension or 'root hair' elongation of cell 1 mark
- b. i. tissue 1 mark
 ii. xylem 1 mark
 iii. *Any one of:*
- Cells of region S are living, whereas cells of region R are dead.
 - Cells of region S are empty/hollow, whereas cells of region R have cell contents/cytoplasm/nucleus.
 - Cells of region S have thickened walls, whereas cells of region R have a thin cellulose cell wall.
- Or any other reasonable answer* 1 mark
- c. i. active transport 1 mark
 ii. protein channels/carriers in the plasma membrane: for sodium ions to attach to in order to aid in their movement against the concentration gradient into the cell 1 mark
 mitochondria: to provide energy in the form of ATP for the active process to occur 1 mark

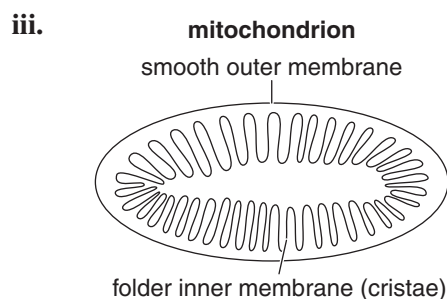
Question 2 (8 marks)

- a. *For example:*
 If rhubarb cells are placed in sucrose solutions of 2 M or more, then they will begin to plasmolyse. 1 mark
Note: Any appropriate hypothesis is acceptable.
- b. i. The independent variable is the different concentrations of sucrose solution used. 1 mark
 ii. *Any two of:*
- A range of different sucrose solutions were used.
 - All pieces of rhubarb were taken from the same piece of epidermal peel.
 - Several pieces of rhubarb were placed in each sucrose solution.
 - Pieces of peel were left in solutions for the same length of time.
- Or any other reasonable answer* 2 marks
- c. i. Plasmolysis does not occur in solutions isotonic to the cell sap, as the concentration of the solutions both inside and outside the cells are the same. Therefore, water movement occurs equally in both directions, so no shrinkage of the cell sap will occur; that is, no plasmolysis. 1 mark
 ii. Plasmolysis does not occur in solutions hypotonic to the cell sap as water moves into the cell from a higher water concentration outside the cell. Therefore, the cell sap will swell slightly, pushing against the cell wall; that is, it will not plasmolyse. 1 mark

- d. 1.1–1.2 M sucrose solution (not 1 M as no plasmolysis had occurred) 1 mark
- e. No, plasmolysis cannot occur in animal cells because when water moves out of the cells, the entire cell shrinks, as animal cells are surrounded by a cell membrane only and no cell wall. 1 mark

Question 3 (10 marks)

- a. i. Any two of:
- carbon dioxide
 - ATP
 - water
- 2 marks
- ii. $\text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 + 36 \text{ or } 38\text{ADP} + 36 \text{ or } 38\text{P}_i \rightarrow 6\text{CO}_2 + 6\text{H}_2\text{O} + 36 \text{ or } 38\text{ATP}$ 2 marks



2 marks

- b. Any two of:
- lower concentration of ATP
 - lower concentration of carbon dioxide
 - lower concentration of water
 - higher concentration of lactic acid
- 2 marks
- c. disagree 1 mark
- All the systems of the body are interdependent and work together to maintain body functioning. In this example, the muscle cell would require inputs for cellular respiration and would need to remove waste. These would be transported in the circulatory system to and from the digestive, respiratory and excretory systems. All of this would be coordinated and regulated by the nervous and endocrine systems. 1 mark

Question 4 (8 marks)

- a. The internal environment is made up of the tissue fluid (extracellular) bathing the cells of the body. 1 mark
- b. i. The effector is the thyroid gland. 1 mark
- ii. Any two of:
- increased heart rate
 - increased cell metabolism
 - higher body temperature
- 2 marks

- c. Homeostasis is important in the body to maintain a relatively constant internal environment, despite changes in the external environment. 1 mark
In this example, it would be to maintain body temperature and factors involved in cell metabolism to keep all cells functioning in optimum conditions. 1 mark
- d. In a person with Grave's disease, this would be called negative feedback, as the response produced reduces the size of the original stimulus 1 mark
In this case, an increased production of thyroid hormones will result in even greater inhibition of the hypothalamus and pituitary glands. 1 mark

Question 5 (9 marks)

- a. the sun 1 mark
- b. disagree 1 mark
Of the three types of plankton, only one, the phytoplankton, is photosynthetic and can convert light energy into chemical energy to provide food for the rest of the food web. It is called the producer. 1 mark
The other two types of plankton are zooplankton which feed on lower level organisms:
 - Herbivorous zooplankton feeds on the producers, the phytoplankton, so it is a consumer.
 - Carnivorous zooplankton feeds on herbivorous plankton, so it is a consumer.
1 mark
- c. The arrows point in the direction of energy flow in the food web. 1 mark
- d. There may be a number of different food chains in the food web that lead to the killer whale as a top order consumer. 1 mark
For example:
In the food chain: Phytoplankton → krill → adelic penguin → killer whale;
the killer whale is a third order consumer.
In the food chain: Phytoplankton → herbivorous plankton →
carnivorous plankton → fish → emperor penguin → leopard seal → killer whale;
the killer whale is a sixth order consumer.

1 mark

Note: There are many different food chains ending with the killer whale from which students could select two in support of their answer.

- e. i. Massive reduction in whale numbers could upset the balance of the ecosystem. Seal numbers could increase markedly, leading to a decrease in penguin numbers. 1 mark
- ii. An effective strategy that was probably introduced would have been strict control measures to limit the number of Sei whales that could be caught annually. This would allow greater numbers to survive and reproduce increasing the size of the Sei whale populations. 1 mark

Question 6 (7 marks)

- a.** This is called parasitism as it is a relationship in which one organism lives in or on another and benefits (the bacteria living on the shark's skin and gaining nutrients) while the other organism (the shark) is harmed. 1 mark
- b.** biomimicry 1 mark
- c.** **i.** binomial system of nomenclature 1 mark
ii. they all belong to the same genus 1 mark
- d.** **i.** free in the cytosol of the cell 1 mark
ii. A and C 1 mark
They both belong to the same genus and would therefore be more closely related and have more similar DNA in the sodA gene which was analysed. 1 mark