Neap

Trial Examination 2022

VCE Biology Unit 1

Written Examination

Question and Answer Booklet

Reading time: 15 minutes
Writing time: 1 hour 30 minutes

Student's Name: _____

Teacher's Name: _____

Structure of booklet

Section	*Number of questions*	*Number of questions to be answered*	*Number of marks*
A	25	25	25
B	6	6	50
			Total 75

Students are permitted to bring into the examination room: pens, pencils, highlighters, erasers, sharpeners and rulers.

Students are NOT permitted to bring into the examination room: blank sheets of paper and/or correction fluid/tape.

No calculator is allowed in this examination.

Materials supplied

Question and answer booklet of 22 pages

Answer sheet for multiple-choice questions

Instructions

Write your **name** and your **teacher's name** in the space provided above on this page, and on the answer sheet for multiple-choice questions.

Unless otherwise indicated, the diagrams in this book are **not** drawn to scale

All written responses must be in English.

At the end of the examination

Place the answer sheet for multiple-choice questions inside the front cover of this booklet.

Students are NOT permitted to bring mobile phones and/or any other unauthorised electronic devices into the examination room.

SECTION A – MULTIPLE CHOICE QUESTIONS

Instructions for Section A

Answer **all** questions in pencil on the answer sheet provided for multiple-choice questions.

Choose the response that is **correct** or that **best answers** the question.

A correct answer scores 1; an incorrect answer scores 0.

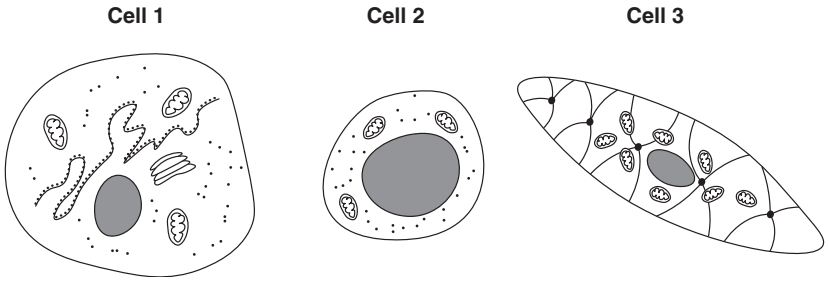
Marks will **not** be deducted for incorrect answers.

No marks will be given if more than one answer is completed for any question.

Unless otherwise indicated, the diagrams in this booklet are **not** drawn to scale.

Use the following information to answer Questions 1 and 2.

The following diagram shows three different animal cells. The diagram includes some of the features that are visible when the cells are observed under an electron microscope.



Question 1

All three cells must be eukaryotic cells, not prokaryotic cells, as they have

A. a plasma membrane.

B. ribosomes.

C. cytosol.

D. mitochondria.

Question 2

Which one of the following statements about the cells is correct?

A. Cell 1 is most likely to be found in smooth muscle tissue because it has the best shape for muscle contraction.

B. Cell 2 is most likely to be found in smooth muscle tissue because it is spherical, which provides a greater surface area to volume ratio for exchange.

C. Cell 3 is most likely to be found in smooth muscle tissue because it can carry out a higher rate of cellular respiration.

D. None of the cells are likely to be found in smooth muscle tissue because they all lack a nucleus to control cell contraction.

Question 3

Transport of hydrophilic substances through a cell's plasma membrane is restricted to some regions in the membrane because

A. hydrophilic substances are large and lipid-soluble.

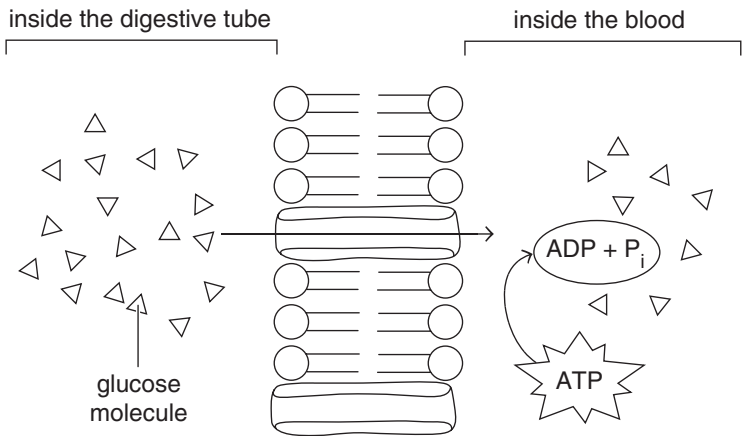
B. the plasma membrane contains lipids.

C. hydrophilic substances move along the concentration gradient.

D. the cell must provide energy to facilitate transport of the hydrophilic substances.

Use the following information to answer Questions 4 and 5.

The following diagram shows a process by which glucose from digested food is absorbed into the blood through the plasma membrane of a cell in the digestive system.



Question 4

The diagram above is **not** correct because it shows

A. energy in the form of ATP being used for the process.

B. the phospholipid molecules of the bilayer facing the wrong way.

C. the glucose molecules passing through protein channels using carrier proteins instead of the bilayer.

D. the glucose molecules moving down the concentration gradient.

Question 5

The section of the membrane shown in the diagram would most likely be present in a cell in the

A. microvilli of the stomach.

B. lining of the oesophagus.

C. villi of the duodenum.

D. microvilli of the colon.

Question 6

Which one of the following processes occurs during binary fission in bacteria?

A. the cell cycle

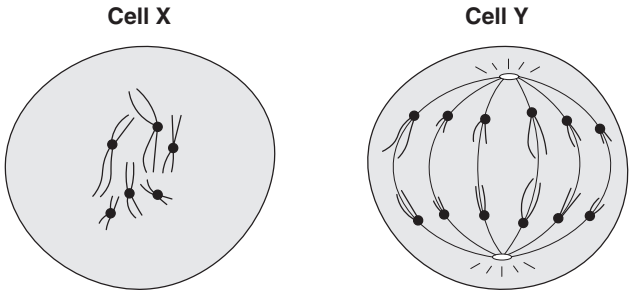
B. mitosis

C. spindle formation

D. DNA replication

Use the following information to answer Questions 7 and 8.

The following diagram shows two animal cells undergoing different stages of the cell cycle.



Question 7

During metaphase, there would be

A. 6 chromosomes.

B. 6 centrioles.

C. 6 chromatids.

D. 12 centromeres.

Question 8

The stage occurring in cell X would occur before the stage occurring in cell Y because

A. the chromosomes in cell X have replicated during this stage.

B. the chromosomes in cell X have not yet lined up along the equator.

C. cell Y is undergoing cytokinesis.

D. the nuclear membrane in cell Y has not broken down.

Question 9

Which one of the following statements does **not** correctly explain the process of apoptosis?

A. Apoptosis is a natural process.

B. Apoptosis is always caused by external factors.

C. Apoptosis is a regulatory process.

D. Apoptosis is a programmed process.

Question 10

Two types of genes play a major role in regulating the cell cycle and can cause cancers if they behave abnormally.

- The proto-oncogenes (POs) code for proteins that act as 'accelerators' to stimulate cell growth and division, resulting in normal growth and development of healthy organs and tissues.
- The tumour suppressor genes (TSGs) act as 'the brakes', slowing down or inhibiting cell division and repair and triggering cell death.

Based on your knowledge and the information above, which one of the following statements is correct for cancer cells?

A. The TSGs in cells that result in cancerous tissue are usually mutated or silenced, which means they are non-functional.

B. Changes in the POs of cells that result in cancerous tissue can enhance their function, which results in the controlled reduction of cell division.

C. The activities of the POs and TSGs must be balanced so that cell division is appropriate for each region in the body.

D. If the POs were no longer functioning in the cells, apoptosis would no longer occur.

Question 11

Which one of the following statements about cancer cells is **not** correct?

A. Cancer cells have limitless replication potential.

B. Cancer cells can avoid apoptosis.

C. Cancer cells can move and invade other tissues.

D. Cancer cells are well differentiated.

Question 12

Stem cells are sometimes referred to as 'neutral cells'.

This term is used to describe stem cells because they

A. have the ability to divide over and over many times.

B. are unspecialised, but have the potential to develop into specific cell types.

C. can be induced to divide into specialised cell types for specific functions.

D. can replace cells damaged by illness or injury.

Question 13

Which one of the following is correct for totipotent and pluripotent stem cells?

	Pluripotent stem cells	Totipotent stem cells
A.	can only form a limited number of tissue types, depending on their origin	have the potential to become any of the cells in the three different embryonic germ layers
B.	have the potential to only become blood and bone cell types	have the potential to become an entire organism
C.	can form any of the three different embryonic germ layers, but cannot give rise to an entire organism	have the potential to become an entire organism
D.	is just a different name for totipotent cells; they both have the same potential for cell differentiation	is just a different name for pluripotent cells; they both have the same potential for cell differentiation

Question 14

What is the best source of stem cells that can be harvested from an adult human?

A. brain

B. teeth

C. finger and toe nails

D. bone marrow

Question 15

The components of the excretory system vary in shape. The Bowman's capsules are spherical, the kidney tubules are cylindrical and the cells of the capsules, glomeruli and tubules are flattened.

Which one of the following statements about the shape of these components is correct?

A. The Bowman's capsules are spherical so many of them can fit inside the small kidneys.

B. The kidney tubules are cylindrical to provide a greater surface area to volume ratio for exchange.

C. The cells of the capsules, glomeruli and tubules are flattened to provide a greater surface area to volume ratio for exchange.

D. All of the different shapes provide protection from the rapid fluid movement through the structures.

Question 16

Which one of the following is **not** a process of temperature control in the human body?

A. homeostasis

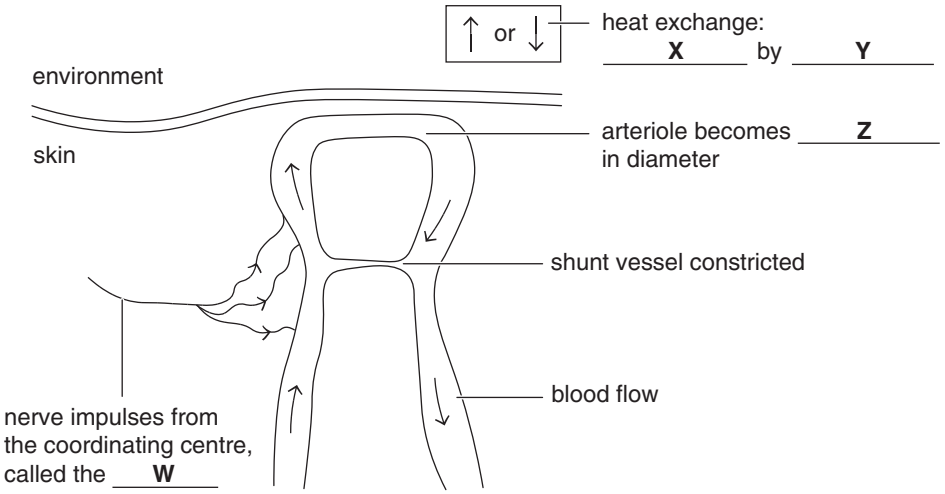
B. negative feedback

C. positive feedback

D. thermoregulation

Use the following information to answer Questions 17 and 18.

The following diagram illustrates one of the methods that helps to keep body temperature relatively constant. Four of the labels are incomplete.



Question 17

Which one of the following correctly completes the labels in the diagram?

	W	X	Y	Z
A.	hypothalamus	more heat is lost	radiation	larger
B.	pituitary gland	more heat is lost	conduction	larger
C.	hypothalamus	less heat is gained	conduction	larger
D.	hypothalamus	less heat is lost	radiation	smaller

Question 18

Jim decided to go to the beach on a windy day with a temperature of 16°C. He went for a five-kilometre run along the beach, then went into the cold ocean water to float for five minutes. He dried himself with a towel while standing on the beach, then walked back to his car.

During which action was Jim's body most likely to carry out the process shown in the diagram above?

A. running along the beach

B. floating in the ocean water

C. drying himself with a towel

D. walking back to his car

Question 19

Antidiuretic hormone (ADH) is a hormone of the endocrine system involved in osmoregulation.

ADH must be

A. made of carbohydrate.

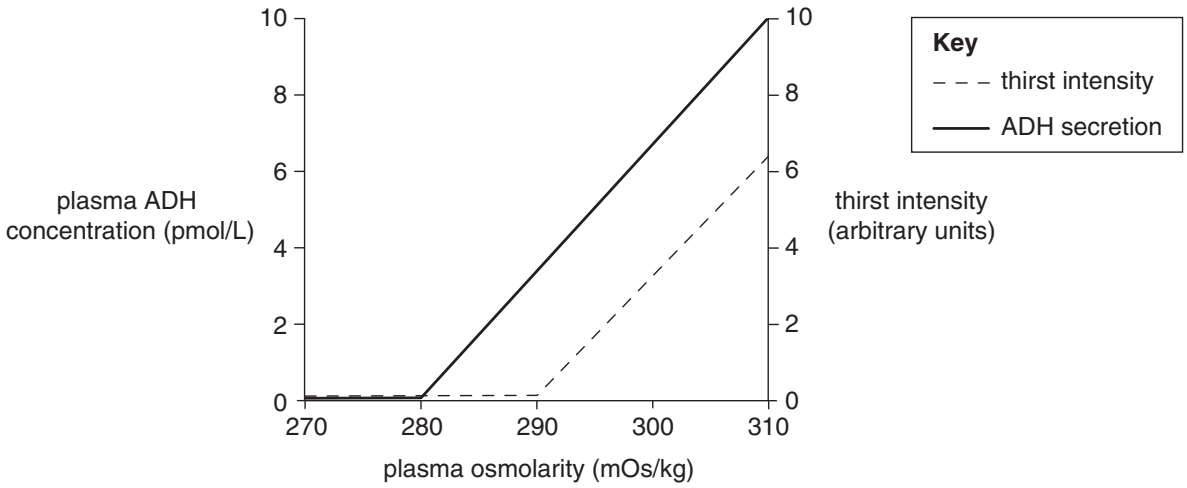
B. produced by a transmitter organ.

C. secreted by a ductless gland.

D. carried to the effector organ in the tissue fluid.

Use the following information to answer Questions 20–22.

The following graph shows two processes that change in the human body when the plasma osmolarity concentration increases. The set point is defined as the plasma osmolarity value at which hormone secretion begins to increase.



Question 20

Based on the information in the graph, the set point for ADH is

A. 270 mOs/kg

B. 280 mOs/kg

C. 290 mOs/kg

D. 320 mOs/kg

Question 21

Which organ in the body would be most active at the set point for ADH?

A. kidney

B. pancreas

C. hypothalamus

D. pituitary gland

Question 22

Nina plays tennis outside in the sun on a hot day.

Based on the information in the graph, it can be concluded that

A. Nina will feel thirsty and drink more water before her urine concentration increases.

B. changes in Nina's plasma osmolarity and thirst are not related to each other.

C. water reabsorption in the kidney increases before Nina feels thirsty.

D. thirst is not a sensation that is important for water balance in Nina's body.

Question 23

During transpiration in plants, water vapour passes out of the leaves through the guard cells of open stomata.

Which one of the following correctly matches the name of the process occurring with the condition of the guard cells during this process?

	Name of process	Condition of guard cells
A.	evaporation	turgid
B.	diffusion	turgid
C.	osmosis	flaccid
D.	radiation	flaccid

Question 24

Which one of the following conditions increases the rate of transpiration?

A. high humidity

B. low wind velocity

C. low temperature

D. high light intensity

Question 25

Plants are more likely to die due to wilting when

A. the available light is reduced to half.

B. the xylem is blocked.

C. a few roots are broken.

D. the phloem is blocked.

END OF SECTION A

SECTION B

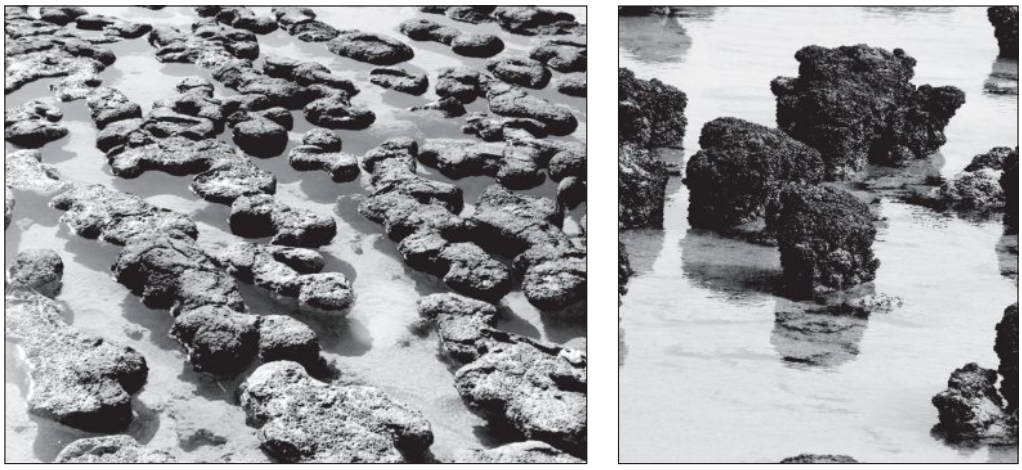
Instructions for Section B

Answer **all** questions in the spaces provided. Write using blue or black pen.

Unless otherwise indicated, the diagrams in this booklet are **not** drawn to scale

Question 1 (5 marks)

The following photographs show rock-like structures called stromatolites in the shallow water of Shark Bay in Western Australia. Shark Bay is one of only two places in the world where well-developed regions of stromatolites are still found. Stromatolites are not rocks; they are layered sedimentary formations created by photosynthetic cyanobacteria. These prokaryotic microorganisms produce mucus, which acts as an adhesive to stick sand and other rocky materials together to form 'mineral microbial mats' that build up gradually, layer upon layer.



Source: Reproduced with permission from Susan Ryan.

Stromatolites are the earliest fossil evidence of life on Earth and appeared along shorelines all over the world 3.5 billion years ago.

a. **i.** What basic structural feature do stromatolites have that is a characteristic of all life on Earth? 1 mark

ii. Why are stromatolites classified as prokaryotes? 1 mark

The cyanobacteria in stromatolites can carry out photosynthesis using water and carbon dioxide with sunlight to produce food and a gaseous product. Billions of years ago, the production of this gas aided in the evolution of multicellular life.

b. **i.** What must the cyanobacteria contain to be able to absorb the sunlight needed to carry out photosynthesis? 1 mark

_____

ii. Identify the gas produced during photosynthesis. 1 mark

_____

iii. Outline the process by which the gas identified in **part b.ii.** passes out of the organism and into the air. 1 mark

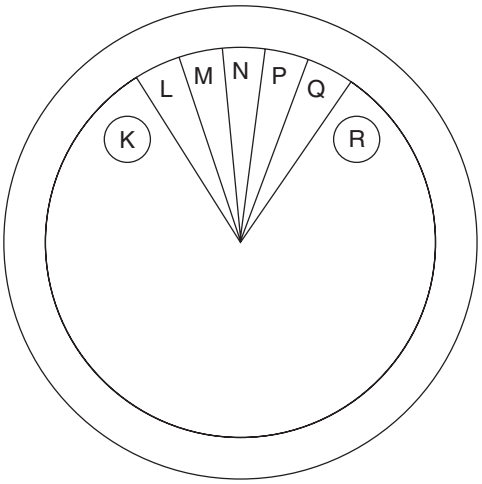
_____

_____

_____

Question 2 (11 marks)

The following diagram shows the cell cycle that occurs in eukaryotic plant and animal cells. The diagram is incomplete.



a. Complete the diagram above by drawing dividing lines to mark the regions of the missing stages and labelling them appropriately. 2 marks

b. On the diagram above, shade in the section of the outer circle that represents interphase. 1 mark

c. Outline **two** major structural differences between a cell at point K and a cell at point R. 2 marks

1. _____

_____

2. _____

_____

d. **i.** Why is the process that begins at point L and ends at point P essential for organisms? 1 mark

_____

_____

ii. Explain how the process occurring at point Q would be different in animal and plant cells. 2 marks

_____

_____

_____

_____

Important checks occur at different stages in the cell cycle.

e. Outline the check that occurs at point K. 1 mark

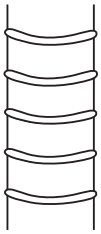
f. If an error occurs, the cell will come to a stop in the cycle and undergo one of two outcomes. Outline the two possible outcomes for a damaged cell at point K. 2 marks

1.

2.

Question 3 (10 marks)

The following table relates to three cell types in vascular plants involved in water uptake, transport and loss.

Cell type	Diagram of cell type showing key features for its function in water movement in plants	Explanation of how the cell type's key feature aids its functioning
Cell type I: Root hair cell		
Cell type II: _____		
Cell type III: Guard cell		The thickened inner wall of the cell swells outwards, pulling the inner walls of the stoma apart to allow gaseous exchange.

a. Complete the table above. 5 marks

b. **i.** Name a cell organelle present in cell type III that is absent from cell type I and explain why it is useless in cell type I. 2 marks

ii. Name a cell organelle that is present in cell type III but absent in cell type II and explain why it is useless in cell type II. Do **not** use the organelle from your answer to **part b.i.** 2 marks

c. What is the advantage of separate organelles with specific functions in the cell cytosol? 1 mark

Question 4 (9 marks)

In the human digestive system, there are various types of cells that are specialised to synthesise and secrete different substances. The cells of the salivary glands are specialised to synthesise and secrete the enzyme amylase for chemical digestion of starch in the mouth.

a. Name and outline the function of **one** important cell organelle involved in the following processes.

i. synthesis of amylase 1 mark

ii. secretion of amylase 1 mark

The stomach lining also contains secretory cells; however, they do not produce amylase. The amylase enzyme from the mouth continues to work inside the bolus (ball of food) that passes into the stomach for a short time then ceases its action.

b. Why does amylase action cease in the stomach? 1 mark

The secretory cells of the stomach produce other essential substances needed in this region.

c. Name **two** of these substances and outline their importance in the stomach. Do **not** use the substances from your answer to **part b.** 2 marks

1.

2.

The duodenum is the first region of the small intestine. The partially digested food enters the duodenum from the stomach. Cells of the duodenum secrete some of the enzymes essential for further digestion of the complex molecules in the partially digested food. However, much of the enzyme solution enters the duodenum in an inactive form from another organ.

d. Draw a labelled diagram of the organ that these additional enzymes come from and indicate how they enter the duodenum. 1 mark

e. The bile that performs its action in the duodenum is not made by the cells lining the duodenum.

i. Identify the organ that contains the cells that synthesise bile. 1 mark

_____

ii. Explain how the action of bile is different to the action of the enzymes in the duodenum. 2 marks

_____

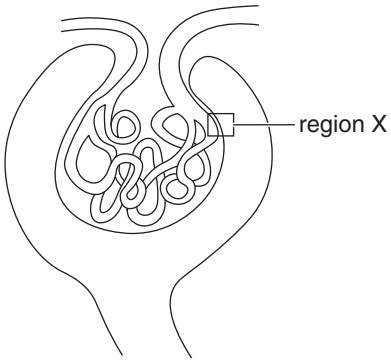
_____

_____

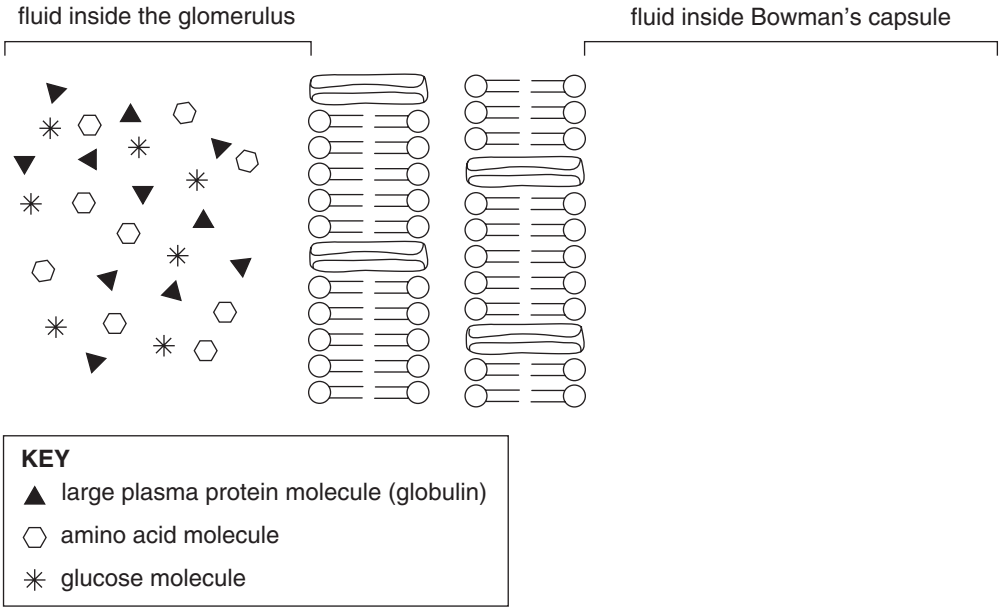
_____

Question 5 (6 marks)

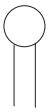
The following diagram shows the Bowman's capsule and the glomerulus in a nephron of the excretory system. In region X, the membranes of the two structures are close together.



Region X is expanded in the diagram below.



a. The diagram above contains the following image.



i. What does this image represent? 1 mark

ii. Why are there four rows of these images, with two rows facing in the opposite direction to the other two? 1 mark

b. Using the symbols shown in the key, complete the diagram above by filling in the column for the fluid inside the Bowman's capsule for protein and amino acids. Justify your response. 2 marks

In a Biology class, Jacob said that amino acids could cross the membranes from the blood in the glomerulus into the cavity of the Bowman's capsule because amino acids are hydrophilic.

c. Was Jacob correct to use the term 'hydrophilic' to describe the amino acids that move into the glomerular filtrate in the Bowman's capsule? Justify your response. 1 mark

d. Glucose is filtered into the Bowman's capsule, yet it does not appear in the urine of a healthy, non-diabetic person.

Why is glucose absent from the urine of a healthy, non-diabetic person? 1 mark

Question 6 (9 marks)

Alloxan is a toxic chemical that has been used in laboratories to induce diabetes in rats. The chemical destroys important hormone-secreting cells in the pancreas, which induces diabetes. Absence of this hormone affects skeletal muscle tissue, urine production and energy levels in the treated rats.

a. Identify the important hormone that would **not** be produced and secreted by the pancreatic cells of the rats treated with alloxan. 1 mark

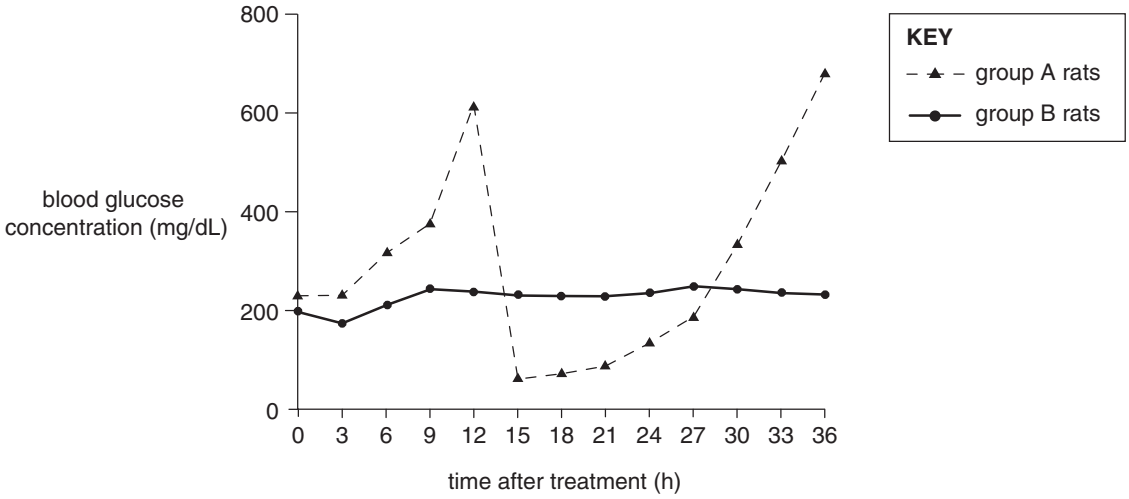
An experiment was set up in a laboratory with two groups of 20 male rats of the same species, size, age and health. Group A was given a volume of alloxan solution and group B was given the same volume of distilled water. Both groups were kept in similar environmental conditions and the rats' blood–glucose concentration was measured over the next 36 hours.

b. **i.** Suggest a hypothesis for this experiment. 1 mark

ii. Is this a controlled experiment? Justify your response. 1 mark

iii. Why were rats used in this experiment and not chickens? 1 mark

The following graph shows the results obtained from the experiment.



c. **i.** Which group of rats was treated with alloxan? Use the information from the graph to justify your choice. 1 mark

ii. The graph for group A unexpectedly and for no explainable reason decreased rapidly at 12 minutes, resulting in a low blood glucose concentration at 15 minutes. It remained low for about 5 hours.

What is the name of the condition suffered by the group A rats during this time period? 1 mark

iii. Are the results valid? Justify your response. 1 mark

iv. Are the results precise? Justify your response. 1 mark

d. Alloxan can be found in the flour used to make some popular Indian foods. Global health literature suggests that ingesting this flour may put consumers at risk.

Outline why there is concern about this type of flour being used for cooking. 1 mark

END OF QUESTION AND ANSWER BOOKLET

Neap

Trial Examination 2022

VCE Biology Unit 1

Written Examination

Multiple-choice Answer Sheet

Student's Name: _____

Teacher's Name: _____

Instructions

Use a **pencil** for **all** entries. If you make a mistake, **erase** the incorrect answer – **do not** cross it out. Marks will **not** be deducted for incorrect answers.
No mark will be given if more than **one** answer is completed for any question.

All answers must be completed like this example: [A] B C D

Use pencil only

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