Trial Examination 2006

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 Multiple-choice	25	25	25
B Short-answer	10	10	50
			Total 75

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

Materials supplied

Question and answer booklet of 18 pages.

Answer sheet for multiple-choice questions.

Instructions

Please ensure that you write your **name** and your **teacher's name** in the space provided on the answer sheet for multiple-choice questions.

All written responses must be in English.

At the end of the examination

Place the answer sheet for multiple-choice section inside the front cover of this booklet and hand them in.

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

SECTION A: MULTIPLE-CHOICE QUESTIONS

Specific Instructions for Section A

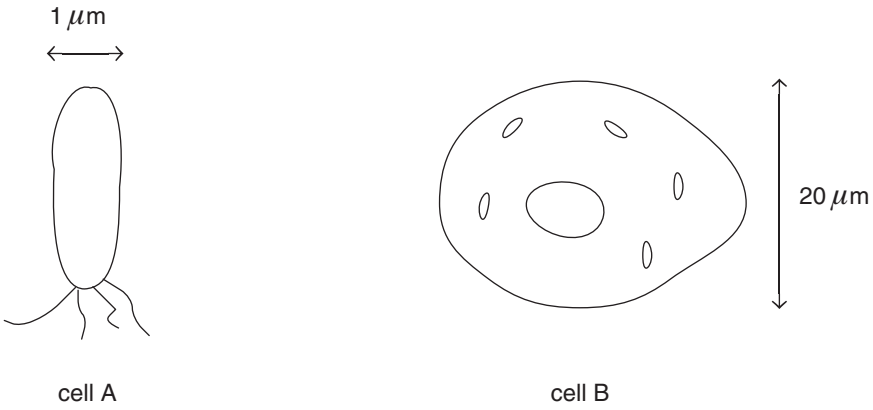
Section A consists of 25 multiple-choice questions, each worth one mark. You should attempt all questions. You should spend approximately 30 minutes answering this section of the paper.

Choose the response that is **correct** or **best answers the question**, and shade the square on the multiple-choice answer sheet according to the instructions on that sheet.

A correct answer is worth 1 mark, an incorrect answer is worth no marks. No mark will be given if more than one answer is shown for any question. Marks will **not** be deducted for incorrect answers.

You should attempt every question.

Use the following information to answer Questions 1 to 3.



cell A cell B

Question 1

The cell type represented by cell A

A. may be photosynthetic.
B. cannot respire aerobically.
C. does not contain any membranes.
D. is generally larger than the cell type represented by cell B.

Question 2

Both cells

A. could be part of a larger multicellular organism.
B. would have a cell wall.
C. can synthesise proteins.
D. have a nucleus.

Question 3

One feature which would be used to classify cells A and B into their respective domains would be the presence or absence of

A. DNA.
B. enzymes.
C. complex organic compounds.
D. membrane-bound organelles.

Question 4

An organelle was taken from a cell of a larger, motile, multicellular organism. An example of this organelle would be

A. cytoplasm.
B. a mitochondrion.
C. an enzyme.
D. a chloroplast.

Question 5

Aerobic respiration in all cells

A. occurs in the mitochondria.
B. liberates much less energy than anaerobic respiration.
C. is independent of glycolysis.
D. requires oxygen.

Question 6

Enzymes are an example of

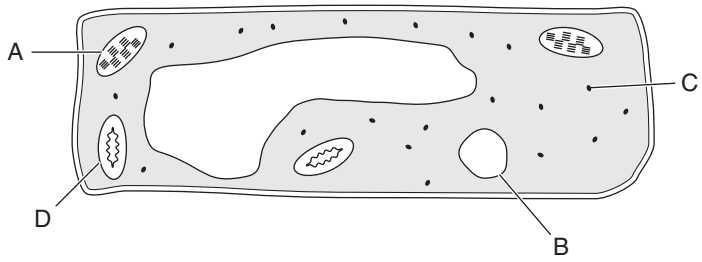
A. an amino acid.
B. a carbohydrate.
C. a protein.
D. a nucleic acid.

Question 7

An example of an inorganic substance is

A. carbon dioxide.
B. an amino acid.
C. DNA.
D. ATP.

Question 8



In the above diagram, the organelle which converts organic compounds to inorganic is

A. A.
B. B.
C. C.
D. D.

Question 9

Osmosis is a process which

A. moves water, carbon dioxide and oxygen through plasma membranes.

B. is dependent on solute concentration.

C. is active.

D. only occurs in living organisms.

Question 10

The role of chlorophyll in a photosynthetic cell is to

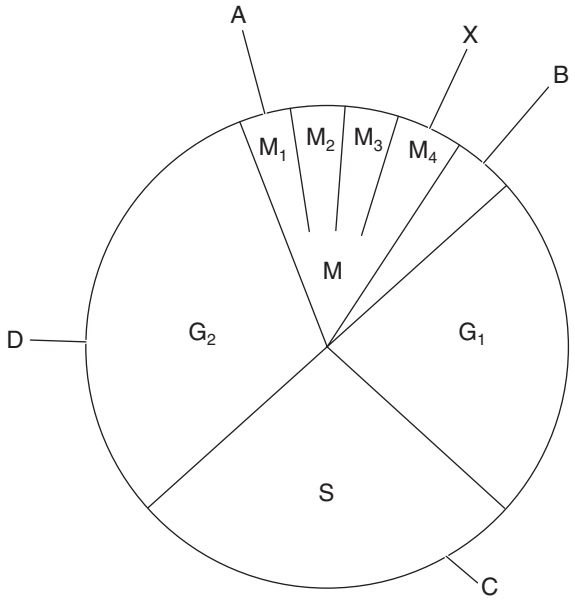
A. absorb green light.

B. convert inorganic substances into organic compounds.

C. absorb light energy and convert it into chemical energy.

D. reflect green light.

Use the following information to answer Questions 11 to 13.



The cell cycle

Question 11

Using the diagram above and your knowledge, it is reasonable to conclude that

A. M would represent meiosis as well as mitosis.

B. S would represent the separation of the two cells.

C. the cell would be replicating organelles in G_1.

D. in a eukaryotic cell the nuclear membrane would be present throughout the cell cycle.

Question 12

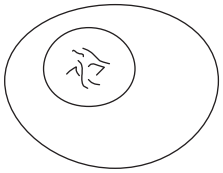
Cytokinesis would occur at

A. A.
B. B.
C. C.
D. D.

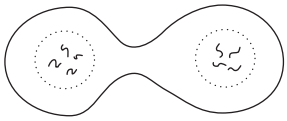
Question 13

It is reasonable to conclude that at stage X the cell would look like

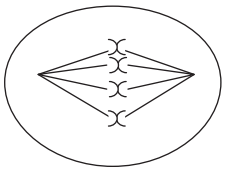
A.



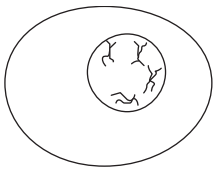
B.



C.



D.



Question 14

Organisms can be grouped as either heterotrophs or autotrophs, depending on their

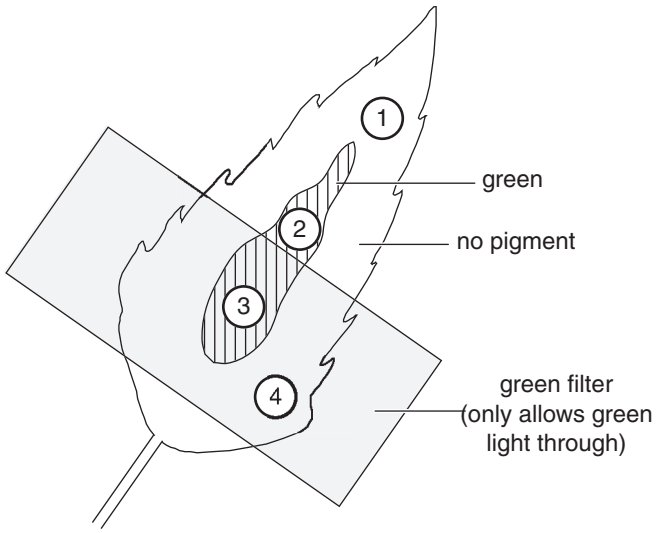
A. mode of nutrition.
B. method of gaining inorganic compounds.
C. organisation of cells.
D. mode of reproduction.

Question 15

Heterotrophs and autotrophs have identical cellular processes to obtain

A. organic nutrients only.
B. organic and inorganic nutrients.
C. gaseous nutrients, e.g. oxygen.
D. some inorganic nutrients, e.g. water.

Question 16

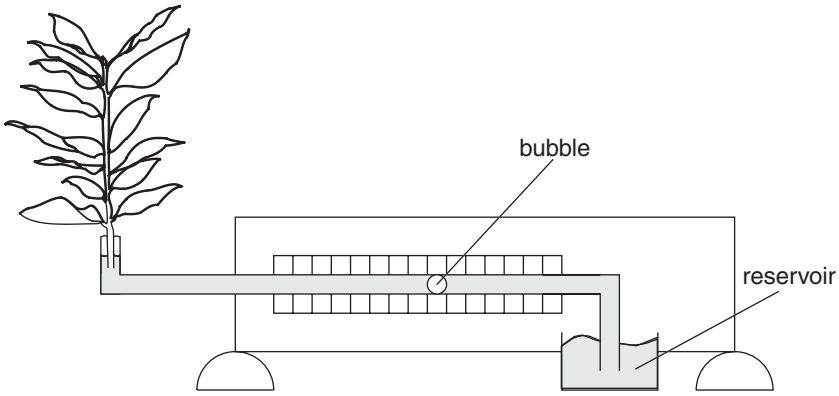


variegated leaf

The leaf above was placed in a strong light source and supplied with all the necessary requirements for photosynthesis. After one hour, the production of starch was tested for using iodine. Where starch was present the iodine turned purple, indicating that photosynthesis had occurred. Starch would only be expected to be found in

A. 1 and 2.
B. 2.
C. 2 and 3.
D. 1 and 4.

Use the following information to answer Questions 17 and 18.



A potometer is used to measure the movement of water through a plant.

Question 17

It is reasonable to conclude that

A. the water would move through the phloem of the plant.
B. the water lost by transpiration is dependent on the salt concentration in the reservoir.
C. the water lost from the leaves is replaced from the reservoir.
D. the vessels transporting water are alive.

Question 18

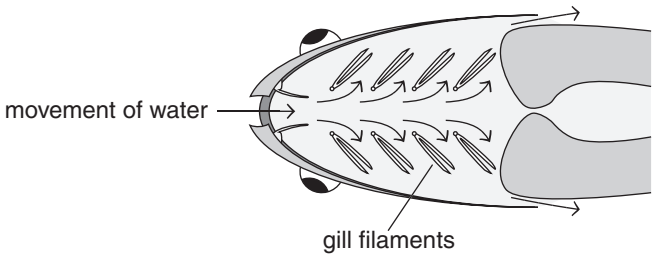
An experiment was carried out at 25 °C and constant humidity. The results for different conditions are set out below.

Condition	Air	Light	Transpiration rate (mL/hour)
1	still	dark	0.5
2	moving	dark	0.9
3	still	light	1.8
4	moving	light	2.4

From the above information it can be concluded that the

A. variable light has a greater effect on transpiration rate than air movement.
B. variable air movement has a greater effect on transpiration rate than light.
C. temperature has the greatest effect on transpiration rate.
D. humidity has the greatest effect on transpiration rate.

Question 19



Using the above diagram of the respiratory surface of a fish and your knowledge, answer the following question.

For gas exchange to work efficiently, the gills would have

A. a large volume to surface area ratio.
B. a closed circulatory system to maintain diffusion gradients.
C. muscles to draw water in.
D. a waterproof coating to prevent too much water entering by osmosis.

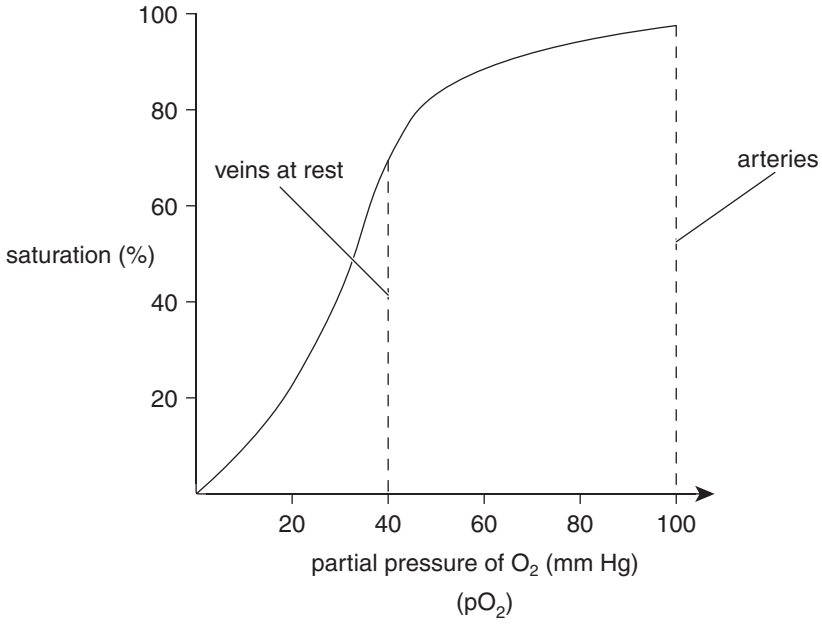
Question 20

If the water temperature in an aquarium rises, fish will move to the surface and 'gulp' air. If the temperature continues to rise, the fish will permanently float on the surface.

The reason for 'gulping' the air is that

A. the increased temperature decreases the diffusion of oxygen.
B. air is a more efficient medium for gas exchange than water.
C. less oxygen is held by the water as the temperature increases.
D. the amount of carbon dioxide increases in warmer water.

Question 21



The amount of O_2 unloaded at tissues is determined by the difference in percentage of saturation of haemoglobin in the veins compared to that of the arteries.

It would be expected that during exercise the partial pressure of O_2 in the veins would halve. Using the above information and your knowledge, one would expect

A. a smaller amount of O_2 being unloaded at tissues due to lower pO_2 in the veins.
B. a higher amount of O_2 being unloaded at tissues due to higher pO_2 in the arteries.
C. a greater difference in the percentage saturation and hence greater unloading.
D. more oxygen being delivered to tissues at rest than during exercise.

Question 22

Urea is less toxic than ammonia, but still soluble. Urea is the primary substance of excretion by

A. reptiles.
B. mammals.
C. birds.
D. fish.

Question 23

When considering asexual reproduction,

A. it does not occur in sexually reproducing organisms.
B. meiosis is the primary type of cell division occurring.
C. it primarily occurs in higher plants and animals.
D. it ensures continuity in offspring.

Question 24

When classifying an organism into class mammalia, an important consideration would be

A. where it was found.
B. the presence of a backbone.
C. the presence of hair.
D. behavioural features such as a constant body temperature.

Question 25

Ants, beetles and grasshoppers are all classified into class Insecta. They would also be classified into the same

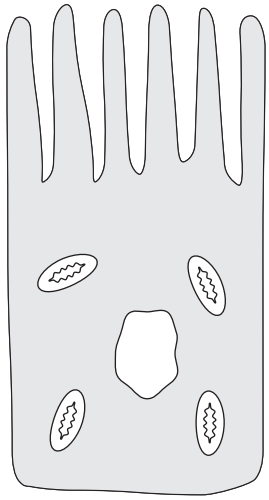
A. order.
B. family.
C. genus.
D. phylum.

SECTION B: SHORT-ANSWER QUESTIONS

Specific Instructions for Section B

Section B consists of six questions. You should attempt **all** questions. The marks allotted to each question are shown at the end of the question. You should spend approximately 60 minutes answering this section of the paper. You must answer this section with pen or biro.

Question 1



a. **i.** What function would this cell perform?

_____

ii. What feature, of the cell illustrated, assists it to perform this function?

_____

_____

1 + 1 = 2 marks

b. **i.** Is this cell prokaryotic or eukaryotic?

_____

ii. Give one reason for your choice.

_____

_____

1 + 1 = 2 marks
Total 4 marks

Question 2

Sugar	Concentration of sugars recorded in the lumen (inside) of the intestine (mmol/L)		Concentration of sugars recorded in the blood of the intestinal wall (mmol/L)	
	No cyanide	**Cyanide solution**	**No cyanide**	**Cyanide solution**
A	20	20	20	0
B	20	20	10	10
C	20	20	20	10

An experiment was set up to observe the passage of different sugars through an intestinal wall. The sugars were added to the lumen of the intestine and after 10 minutes their concentrations were measured in the blood in capillaries in the intestinal wall. The results are set out above. Cyanide solution, added to the intestinal wall, prevents the intestinal cells making use of the energy stored in energy-rich compounds within the cells.

a. **i.** Which of the sugars moved into the wall of the intestine by active transport?

_____

ii. Explain your choice.

_____

_____

_____

_____

_____

_____

iii. Define active transport.

_____

_____

_____

1 + 2 + 2 = 5 marks

b. What processes, involved in the movement of substances, are unaffected by cyanide?

_____

2 marks

c. Name the process which provides cells with energy from energy-rich compounds.

_____

1 mark

Total 8 marks

Question 3

Protein, in the form of cooked egg white, when digested by pepsin, a clear liquid, is converted to polypeptides which are clear.

$$\text{protein} \xrightarrow{\text{pepsin}} \text{polypeptides}$$

The following experiment was set up and the corresponding results were produced.

Tube number	Contents	10 minutes	1 day
1	water + protein	white	white
2	water + acid + protein	white	white
3	water + acid + pepsin	clear	clear
4	water + pepsin + protein	white	slightly clearer
5	acid + pepsin + protein	clear	clear

a. Name two factors which would need to be kept constant in order to make valid conclusions.

_____

_____

2 marks

b. What conclusions can be made about the digestion of protein?

_____

_____

_____

_____

2 marks

c. **i.** In which tubes has digestion occurred? Explain.

_____

_____

_____

_____

ii. What is the purpose of tube 1?

_____

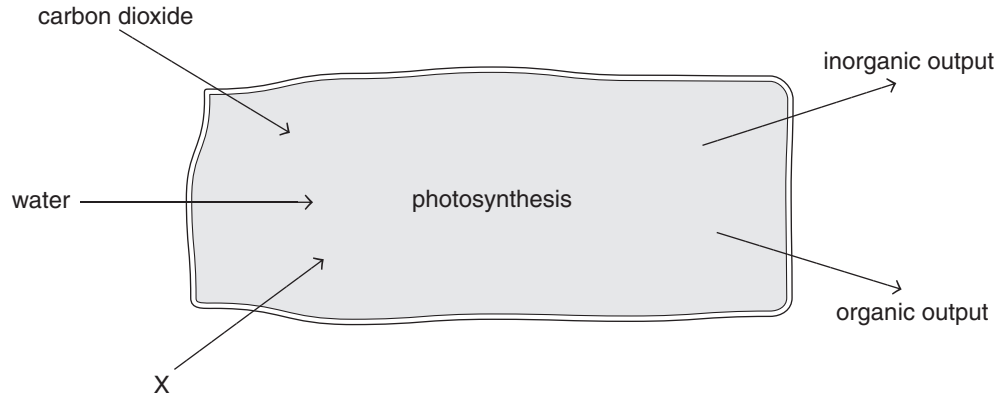
_____

_____

2 + 2 = 4 marks
Total 8 marks

Question 4

The diagram below shows a plant cell.



a. Name input X.

_____

1 mark

b. **i.** Name the inorganic output.

_____

ii. For what process do heterotrophs use this output?

_____

1 + 1 = 2 marks

c. Name the organic output.

_____

1 mark

d. Name and describe the process by which CO_2 enters the cell.

_____

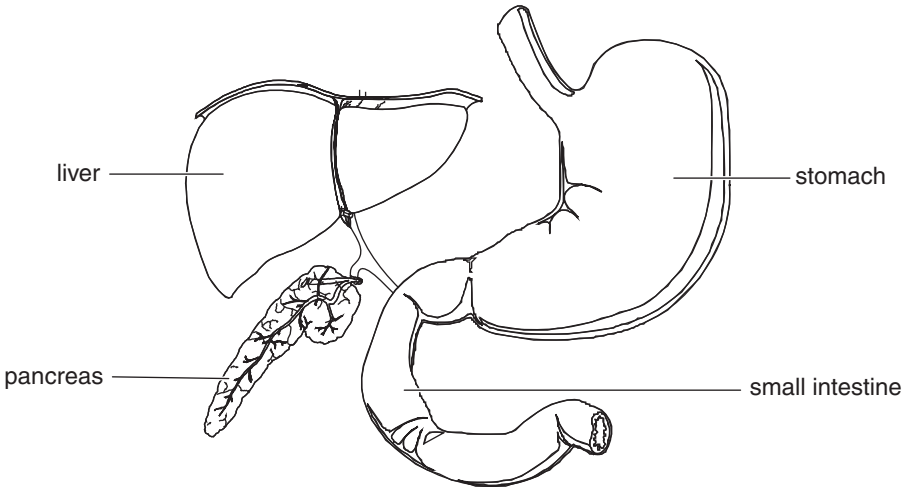
_____

_____

2 marks

Total 6 marks

Question 5



a. **i.** What substance does the liver produce to aid digestion?

_____

ii. What role does this substance have in digestion?

_____

_____

1 + 1 = 2 marks

b. The small intestine of the digestive system, the respiratory surface of the respiratory system and the nephrons of the kidney, part of the excretory system, all have features in common to assist their function.

i. Name a feature they all have in common.

_____

ii. Outline how this feature assists the organs mentioned to function.

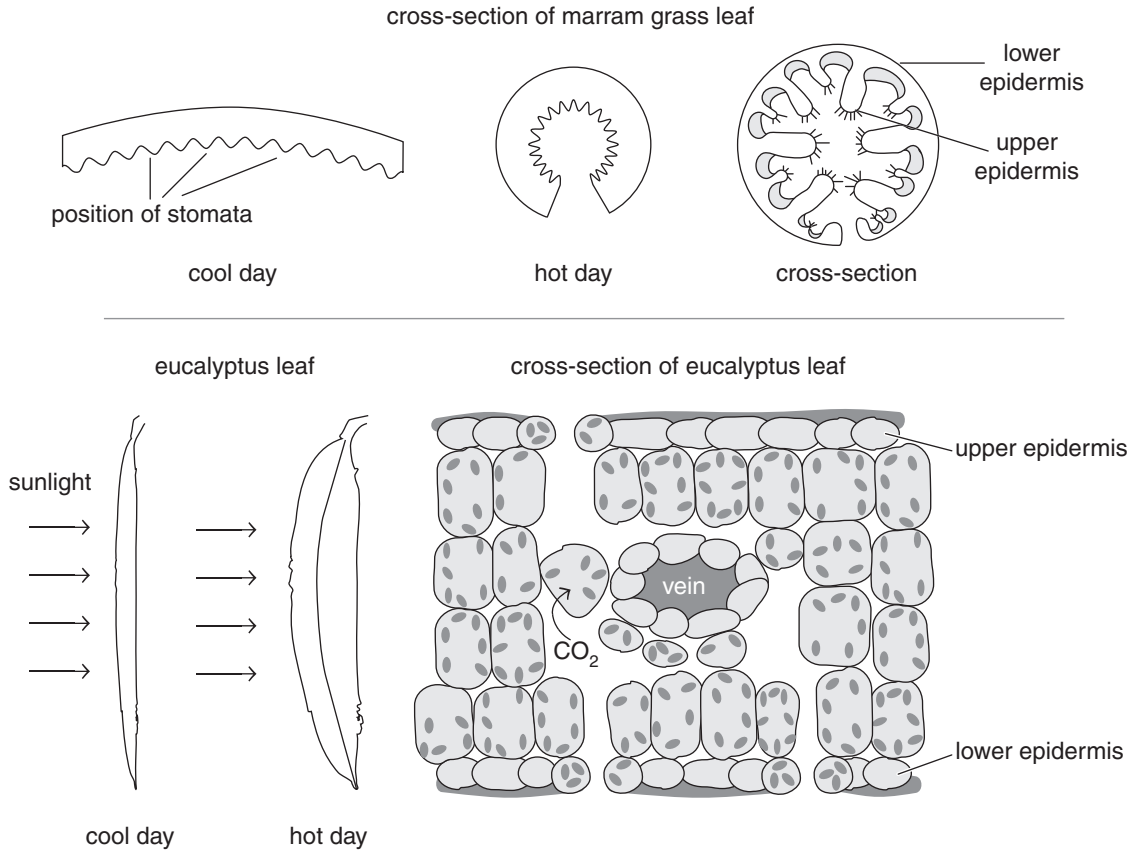
_____

_____

_____

1 + 1 = 2 marks
Total 4 marks

Question 6



a. Where are stomata found in

i. marram grass?

_____

ii. eucalyptus leaves?

_____

1 + 1 = 2 marks

b. What is the function of stomata?

_____

_____

1 mark

c. Name and describe a behavioural adaptation of the eucalyptus plant to conserve water.

_____

_____

2 marks

d. Name and describe a structural adaptation of the marram grass to conserve water.

_____

_____

2 marks
Total 7 marks

Question 7

Cardiac output, the amount of blood pumped by the human heart in a minute, can be calculated using the following formula:

$$\text{cardiac output} = \text{stroke volume} \times \text{heart rate}$$

Stroke volume is the amount of blood pumped by each beat of the heart and heart rate is measured in beats per minute.

The following formula can be used to calculate blood pressure:

$$\text{blood pressure} = \text{cardiac output} \times \text{peripheral resistance}$$

Peripheral resistance is the amount of force provided by the blood vessels acting against the beating of the heart.

a. In which blood vessels would the blood flow have the greatest resistance and contribute to greater peripheral resistance: the arteries, the capillaries or the veins? Explain.

_____

_____

2 marks

b. Cholesterol can reduce blood flow in the arteries. What consequences could this have on blood pressure?

_____

1 mark
Total 3 marks

Question 8

Proteins which are ingested are digested to amino acids which are then absorbed. These amino acids are sometimes used as an energy source, but in the process produce nitrogenous wastes, which are toxic if allowed to accumulate.

a. Name the excretory organ responsible for the elimination of nitrogenous waste in mammals.

_____

1 mark

b. Mammals excrete urea which is soluble in water and less toxic than ammonia. Explain why fish are able to excrete ammonia.

_____

_____

1 mark
Total 2 marks

Question 9

Both oxygen and carbon monoxide combine readily with haemoglobin. Carbon monoxide bonds to the haemoglobin and does not readily dissociate from it. The bonds with oxygen are freely broken.

a. Where within the body would the bonds be broken?

_____

1 mark

b. Cigarette smoke and car exhaust both contain large amounts of carbon monoxide. The inhalation of these can have many consequences on the body, one of which is tiredness. Using the above information and your knowledge, explain the reason for this tiredness.

_____

_____

1 mark

c. Explain in terms of oxygen requirements why a fast-swimming fish such as a tuna would die in a small aquarium, even if the level of oxygen in the tank is adequate.

_____

_____

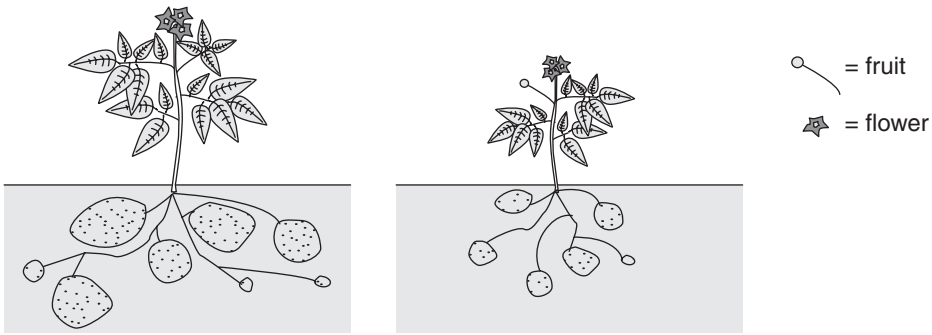
_____

1 mark

Total 3 marks

Question 10

	potato varieties	
	Coliban	**Royal Purple**
height	75 – 100 cm	30 – 50 cm
stems	green	purple
potatoes	300 – 900 g smooth white skin	50 – 200 g rough purple skin



A suburban gardener planted one each of the above types of potato in his vegetable garden. The potato plants grew, flowered and produced seeds. After this the plants died down and the new potatoes were dug.

A large crop of both varieties was produced. The next season's potato plants appeared in the same position, as a result of the gardener not finding all the potatoes produced. When these were later harvested, the two varieties were easily distinguished.

In another part of the garden, where the gardener had mulched the tops of the plant and the seeds had been deposited, more potatoes were growing. When these were harvested the potatoes were large but had a purple, smooth skin. These plants also produced seeds.

a. Explain why the potatoes produced from the seed did not breed true to the parents.

_____

_____

_____

2 marks

b. The potatoes left in the original site bred true to the parents and there were no obvious differences. What cellular process produced the new plants?

_____

1 mark

c. Both potato plants are different varieties. Are they in the same or different species? Explain.

_____

_____

_____

2 marks

Total 5 marks

END OF QUESTION AND ANSWER BOOKLET