

Student Name: _____

Biology

Written examination 1



2005 Trial Examination

Reading Time: 15 minutes
Writing Time: 1 Hour and 30 minutes

QUESTION AND ANSWER BOOK

Structure of Book

<i>Section</i>	<i>Number of questions</i>	<i>Number of questions to be answered</i>	<i>Number of marks</i>
A	25	25	25
B	8	8	50
			Total 75

Materials supplied

- Question and Answer book of 23 pages.

Instructions

- Print your name in the space provided on the top of this page.
- All written responses must be in English.

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

A correct answer scores 1, an incorrect answer scores 0. Marks are not deducted for incorrect answers. If more than 1 answer is completed for any question, no mark will be given. You should spend approximately 30 minutes on this section.

Select the most appropriate alternative for each of the following 25 questions

Question 1

Animal cells are viewed through a light microscope in a school laboratory. Structures visible could include:

- A. ribosomes
- B. nuclei
- C. lysosomes
- D. chloroplasts.

Question 2

Chlorophyll is present in:

- A. the palisade mesophyll cells of leaves
- B. the upper epidermal cells of leaves
- C. the lower epidermal cells of leaves
- D. the phloem cells of leaves.

Question 3

A major function of roots in terrestrial plants is to take up water and dissolved materials. The process involved in taking up the water is:

- A. diffusion
- B. active transport
- C. facilitated diffusion
- D. osmosis.

Question 4

Enzymes are molecules composed of sub-units of:

- A. fatty acids
- B. glucose
- C. glycerol
- D. amino acids.

Question 5

Glycolysis occurs in the following part(s) of the cell:

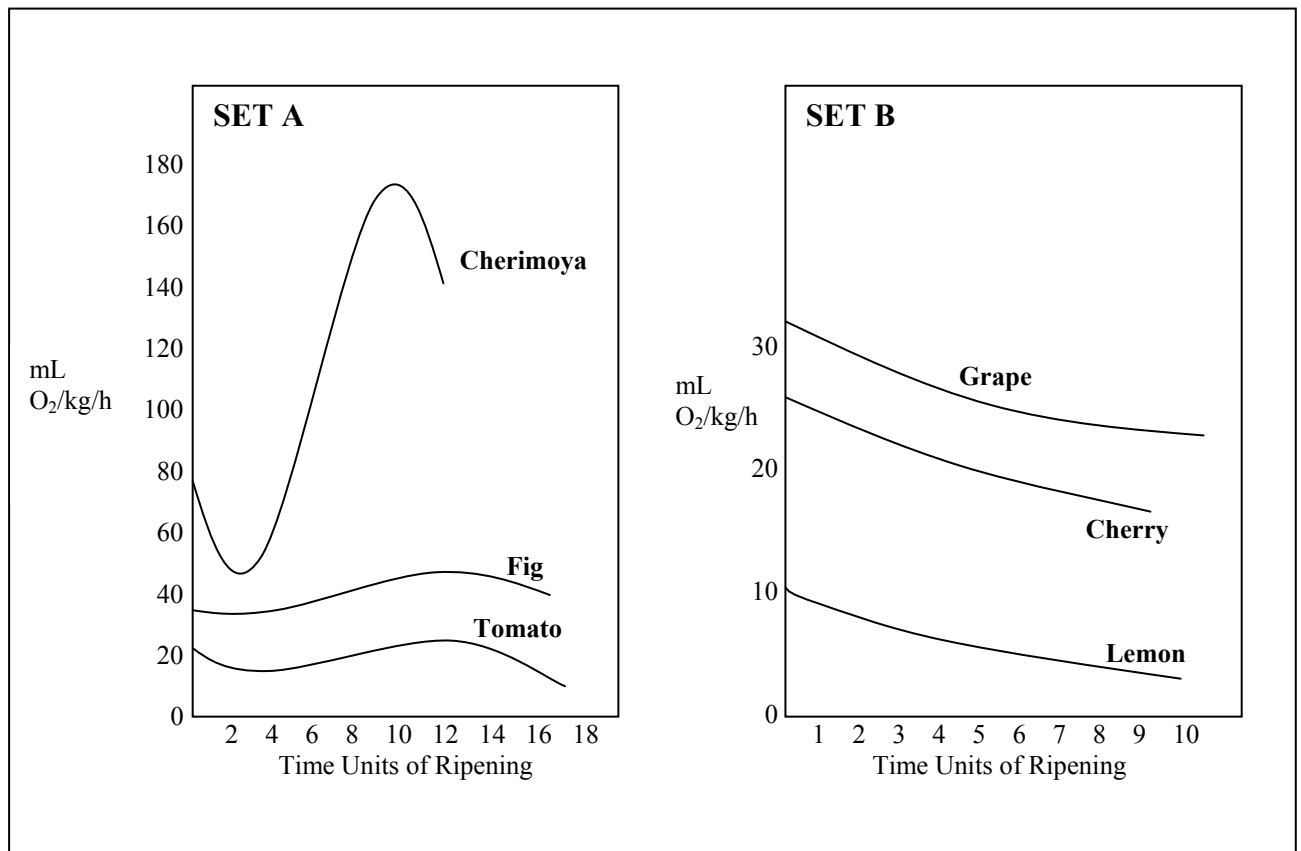
- A. ribosomes
- B. mitochondria
- C. nucleus
- D. cytosol.

Question 6

Animals that are able to maintain their body temperature within a narrow range are said to be:

- A. endothermic
- B. ectothermic
- C. homeothermic
- D. poikilothermic.

Refer to the graphs below to answer Questions 7, 8, and 9



Question 7

From the graphs, it would be reasonable to conclude that:

- A. Set A represents fruits whose respiration rate gradually declines during ripening
- B. Set B represents fruits that produce carbon dioxide at a greater rate as they ripen
- C. Figs peak in respiration rate during ripening
- D. The lowest respiration is shown by cherries.

Question 8

Ripening bananas have a higher respiration rate than green bananas. This means that:

- A. bananas would be placed with Set B
- B. bananas would be placed with Set A
- C. bananas would produce more carbon dioxide when they are green than when they are ripening
- D. bananas would take up more oxygen when they are green than when they are ripening.

Question 9

If water inside cells freeze, cells become damaged and die because

- A. the very low temperatures denature enzymes
- B. the anti-freeze produced by cells can be toxic
- C. as the water freezes it contracts and the organelles shrink
- D. as the water freezes it expands and cell membranes rupture.

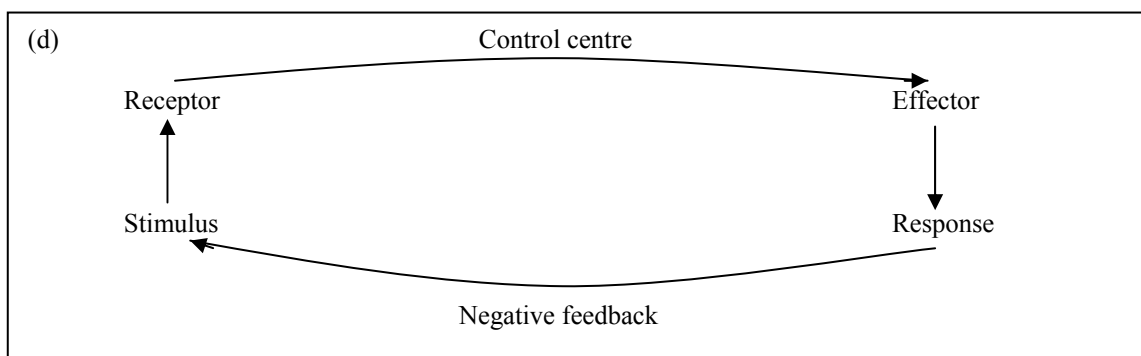
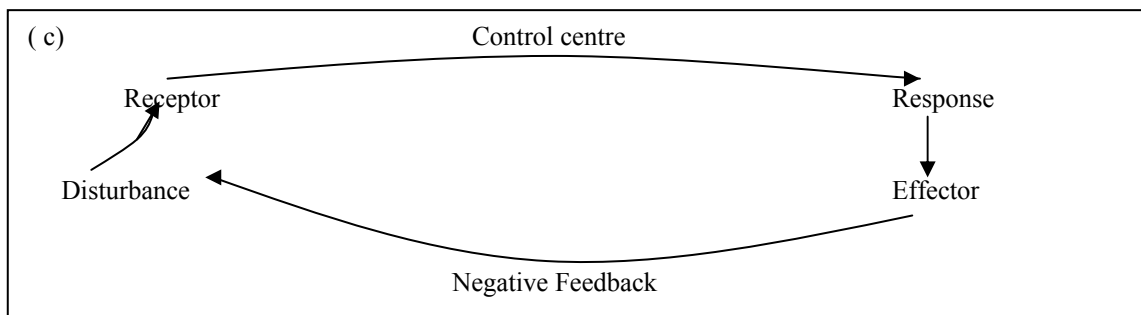
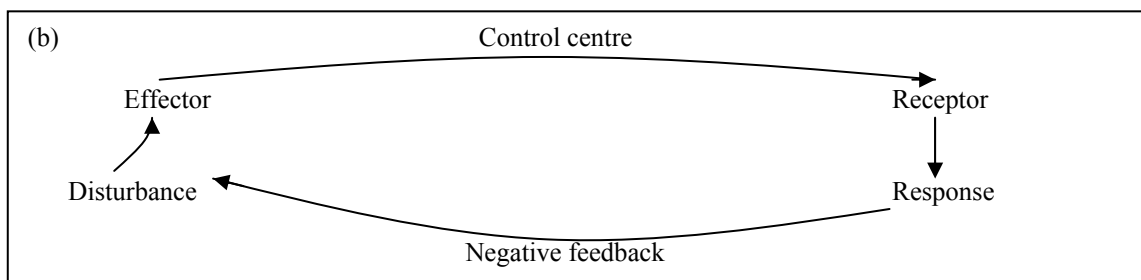
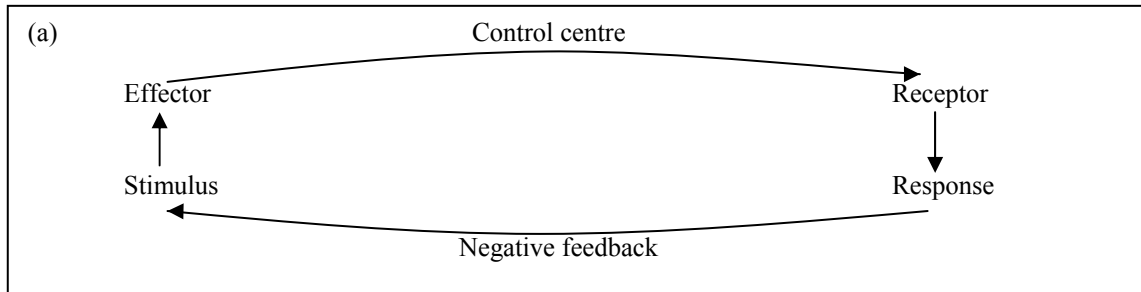
Question 10

The production of ethylene gas is likely to be greatest in

- A. a germinating seed
- B. a new flower bud
- C. a ripe banana
- D. an autumn leaf.

Question 11

Some VCE students decided to draw a model to show how the components of a negative feedback loop achieve homeostasis. Which model best represents the process?



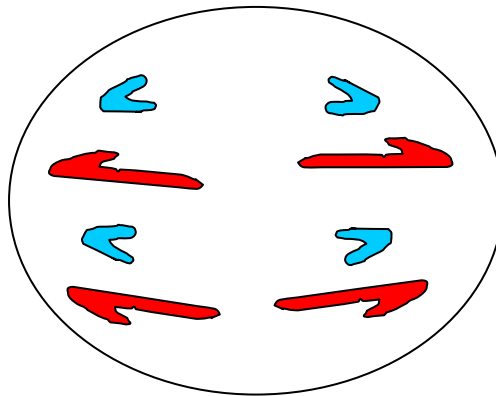
Question 12

A counter-current heat exchange system in mammals living in cold environments involves:

- A. heat transfer from one blood vessel to another via convection
- B. net increase in heat gain to the body
- C. decreasing net heat loss from the body
- D. heat transfer from blood in vessels coming from the skin to blood in vessels coming from the core.

Question 13

A cell undergoing mitosis is represented below.



This cell is at:

- A. prophase
- B. metaphase
- C. anaphase
- D. telophase.

Question 14

When a plant is at its 'compensation' point it can be concluded that:

- A. there is no net uptake of carbon dioxide by the leaves
- B. respiration has stopped
- C. there is no utilisation of water by photosynthetic cells
- D. photosynthesis has stopped.

Question 15

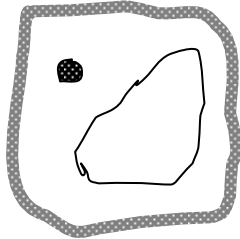
One would expect to achieve immunity as a result of:

- A. an injection of anti-venom after a snake bite
- B. the passage of antibodies across the placenta
- C. an injection of gammaglobulin after a family member is diagnosed with hepatitis
- D. an injection of toxoid.

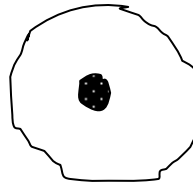
Question 16

The diagrams below illustrate the normal appearance of two different cells.

Cell A – Normal Appearance



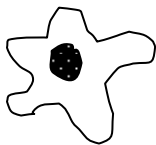
Cell B – Normal Appearance



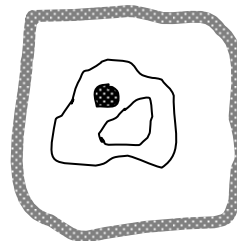
Cells of each type were placed in solutions of different concentrations.

The appearance of the cells after several minutes is shown below.

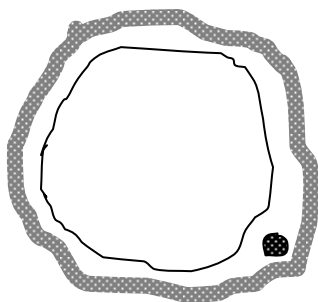
Cell in Solution 1



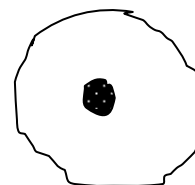
Cell in Solution 2



Cell in Solution 3



Cell in Solution 4

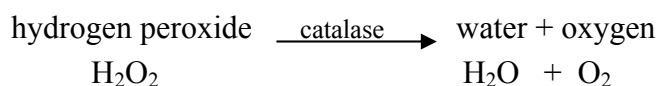


Analysis of the cells would suggest that:

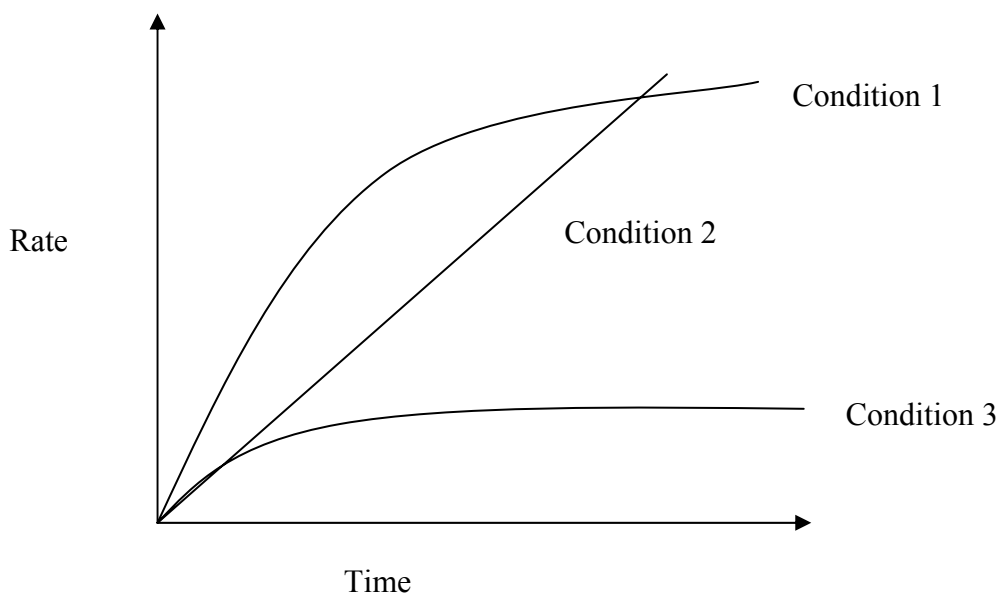
- A. Solution 3 was a strong salt concentration
- B. Solution 1 was distilled water
- C. Solution 2 was of a similar concentration to that of the cytosol concentration of the cell
- D. Solution 4 was of a similar concentration to that of the cytosol concentration of the cell.

Refer to the following information when answering Questions 17 and 18

In many cells, hydrogen peroxide is produced as a by-product of other chemical reactions. If allowed to accumulate, it will kill the cell containing it. To avoid this, the hydrogen peroxide must be changed into two less harmful substances, water and oxygen. The process is summarised in the equation below.



The rate of the reaction under different conditions is shown in the graph below.



Question 17

With regard to the conversion of hydrogen peroxide:

- A. the catalase is used up
- B. the hydrogen peroxide is the substrate
- C. the water and the oxygen are the reactants
- D. energy is required.

Question 18

Various different rates at which hydrogen peroxide can be converted to water and oxygen are shown in graph 1. The differing rates in all the experiments could be due to:

- A. differing quantities of water and oxygen in the experiments
- B. differing temperatures in the experiments
- C. differing light intensities in the experiments
- D. differing quantities of carbon dioxide in the experiments.

Question 19

B cells:

- A. are a form of bone cell
- B. are all identical to each other
- C. produce most of the antibodies
- D. are the precursors of plasma cells.

Question 20

Dirofilaria immitis or heartworm is a parasite found in dogs. The larvae are transmitted when an infected mosquito bites a dog. The larvae enter muscles or fat in the dog and then after three months they settle in the chambers of the heart. In this disease,

- A. infected dogs could be treated with antibodies
- B. infected dogs would show symptoms of lack of energy
- C. the chances of infection could be reduced by keeping dogs isolated from other dogs
- D. veterinarians could detect infected dogs by testing their blood.

Question 21

Programmed cell death is known as

- A. asphyxiation
- B. apoptosis
- C. abscission
- D. autophagia.

Question 22

Terrestrial mammals can regulate the amount of water lost in:

- A. urine
- B. sweat
- C. faeces
- D. expired air.

Question 23

In a reflex arc:

- A. sensory neurons transmit messages away from the central nervous system
- B. sensory receptors detect a change in a specific condition of the body
- C. synapses transfer information from efferent to afferent neurons in the central nervous system
- D. motor neurons carry messages to effectors which signal this information to the brain.

Question 24

The ABO blood grouping system is based on the antigen on the red blood cells and the antibodies in the plasma. This is shown in the table below.

Blood Group	Antigen on Red Blood Cell	Antibody in Plasma
A	A	Anti – B
B	B	Anti – A
AB	A and B	Neither anti – A nor anti – B
O	Neither A nor B	Anti – A and Anti - B

This means that in an emergency:

- A. people who have type AB blood can give blood to all other people because they have no A or B antibodies
- B. people who have type AB blood can give to people who have type A blood and to people who have type B blood because they have no A or B antibodies
- C. people who have type O blood can give blood to all other people because they have no antigens
- D. people who are type O can receive blood from all other people because they have no antigens.

Question 25

Aquatic mammals that spend long periods of time in water near Antarctica are able to maintain their body temperature by:

- A. a low metabolic rate
- B. a capacity to dive deeply
- C. a large surface area to volume ratio
- D. a thick layer of body insulation.

SECTION B- Short answer questions

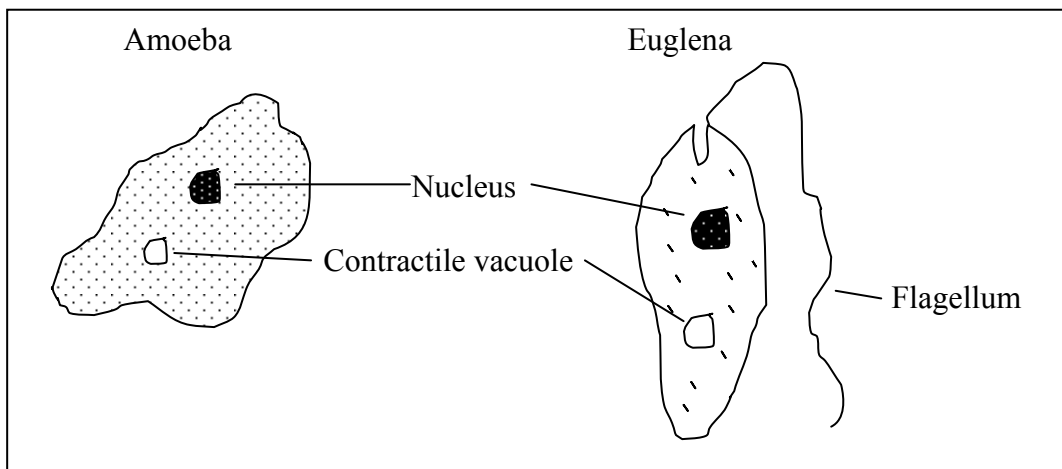
Specific Instructions for Section B

Answer all questions in the spaces provided.

You should spend approximately 60 minutes on this section

Question 1

All living things are composed of cells. Most of these cells are microscopic. *Amoeba* and *Euglena*, illustrated below, are examples of organisms which consist of one cell.



- a. i. Both these organisms require oxygen from their environment. Name the process by which oxygen enters these organisms.

1 mark

- ii. Describe the process that you named in part i.

2 marks

iii. Name a cellular reaction involving the use of oxygen and explain the biological significance of this reaction.

2 marks

b. Depending on their function, different kinds of cells have different sizes and shapes. Explain why most cells are limited to being microscopic in size.

2 marks

c. Look at the drawings at the beginning of the question. Choose one of the labelled organelles from either *Amoeba* or *Euglena* and explain how this organelle helps in the survival of the organism.

2 marks

d. *Amoeba* and *Euglena* are examples of eukaryotic cells. Give an example of a prokaryotic cell.

1 mark

e. Name a structural feature present in both eukaryotic and prokaryotic cells.

1 mark

f. The Golgi complex (also called body or apparatus) is an organelle present in many cells. State its function.

1 mark
Total 12 marks

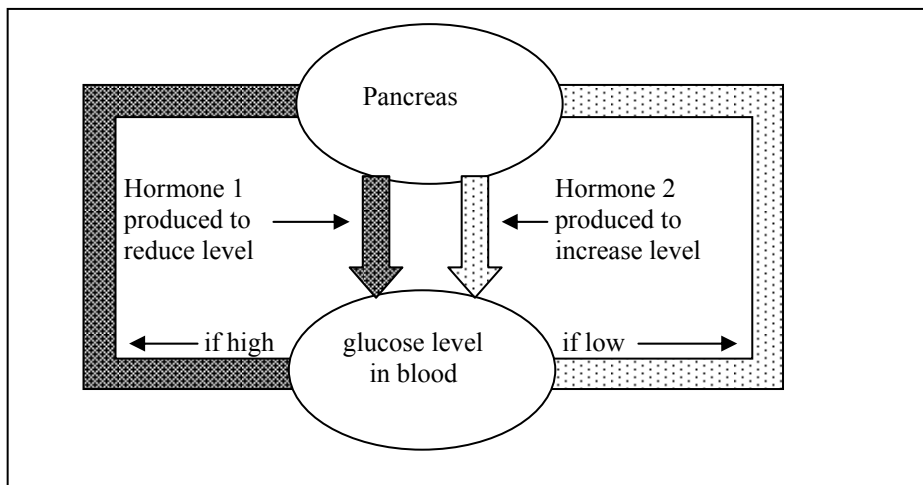
Question 2

In a multicellular organism, cells require a relatively stable internal environment.

- a. What is the internal environment of mammalian liver cells?

1 mark

The pancreas produces two hormones that help to regulate blood glucose levels. Their action is summarised in the figure below.



- b. i. Name hormone 1.

1 mark

- ii. How does hormone 2 act to increase the level of glucose in the blood?

1 mark

- c. Mammalian hormones, like plant hormones, can be produced in one part of an organism and act in another part.

List one other general feature of mammalian hormones.

1 mark

- d. Nervous control also involves chemical compounds. Explain why changes in the body that are under nervous control occur much more quickly than changes under the control of hormones.

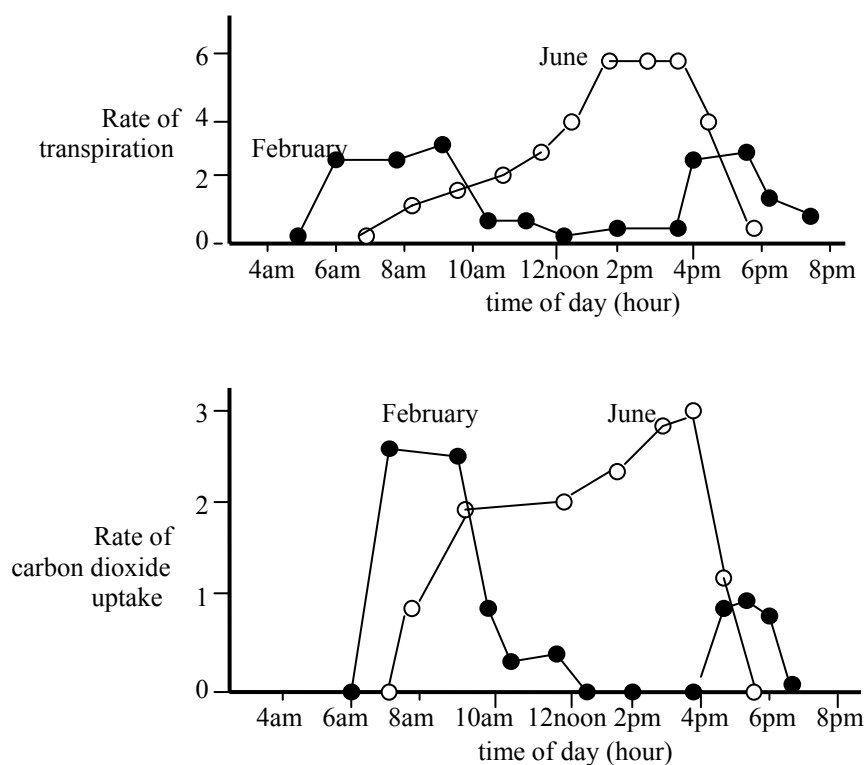
2 marks

Total 6 marks

Question 3

Rhagodia baccata is a plant found in the drier parts of southern and Western Australia. The rates of transpiration and carbon dioxide uptake were measured throughout daylight hours on a day in February, and a day in June.

The results are shown in the graphs below.



- a. Describe the difference in the rate of transpiration at 2pm in June, as compared to 2pm in February.

1 mark

- b. Explain why the monthly patterns of carbon dioxide uptake and transpiration are similar.

1 mark

- c. List three ways in which plants living in dry conditions could reduce water loss.

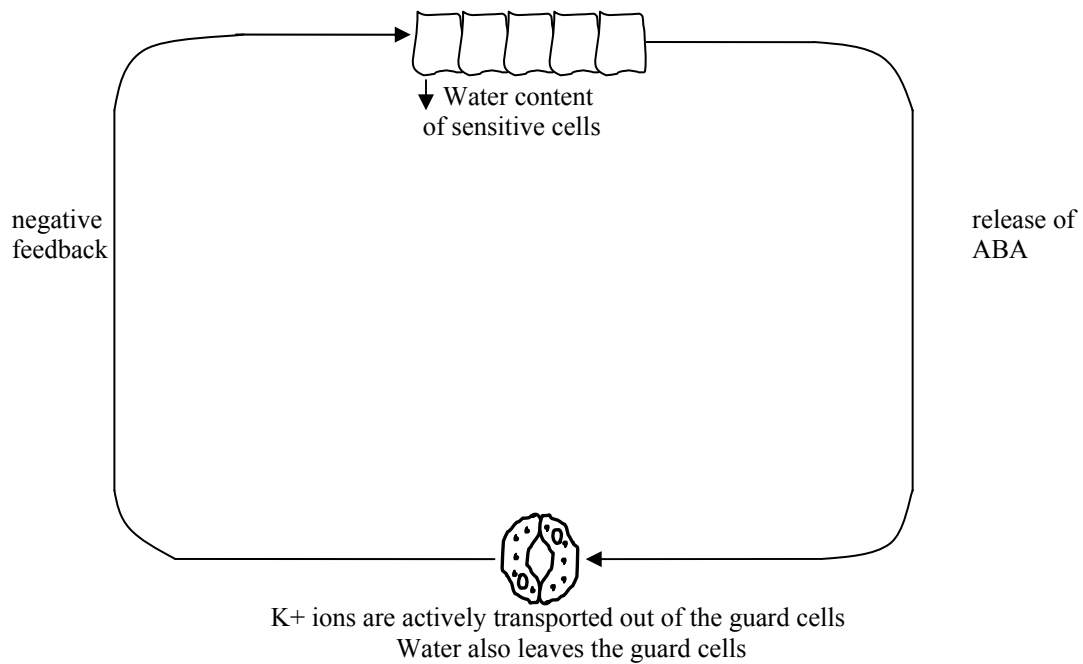
3 marks

Total 5 marks

Question 4

The plant growth regulator, Absciscic Acid (ABA), has been found to have an important role in the regulation of stomatal opening and closing. The diagram below illustrates this role of ABA.

Relationship between Absciscic Acid and Stomatal Opening and Closing



- a. In the diagram above, which cells can be described as receptors?

1 mark

- b. In the diagram above, what cells can be described as effectors?

1 mark

- c. What seems to be the stimulus which initiates ABA release?

1 mark

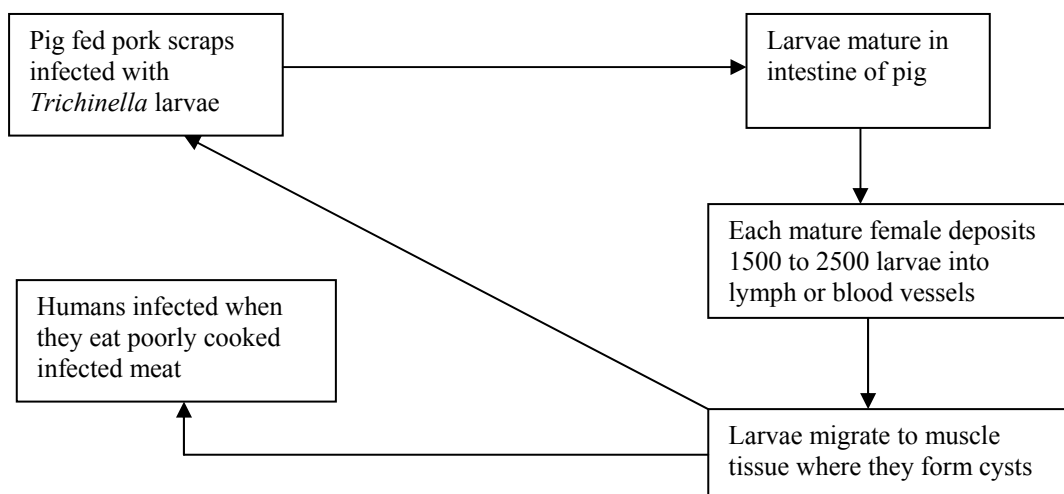
- d. Explain why this system of control by ABA can be described as negative feedback.

2 marks

Total 5 marks

Question 5

The following diagram outlines the life cycle of *Trichinella spiralis*, a small roundworm.



- a. List two features of *Trichinella spiralis* which ensure its success as a parasite.

2 marks

- b. Suggest two ways in which the incidence of *Trichinella* infections in humans could be reduced.

2 marks

- c. The death rate of humans infected with *Trichinella* is about five per cent. Explain whether you think *Trichinella* is a successful parasite.

2 marks

Total 6 marks

Question 6

The World Health Organisation (WHO) is quoted as saying “The world is in the gravest possible danger of a global pandemic of avian ‘flu.” (*The Age* Saturday 5 March, 2005)

The first fatal human case of avian ‘flu was recorded in 1997 prompting the slaughter of 1.4 million chickens. By September 2004 the first human-to-human transmission of the virus was recorded resulting from prolonged exposure in a family.

a. What is a pandemic?

1 mark

b. Suggest a reason why the WHO fears a pandemic of avian ‘flu.

1 mark

Initially the avian ‘flu was transmitted by eating infected chicken meat but it is now known that ducks can be silent carriers for 17 days, shedding the virus in their faeces.

c. What is a silent carrier?

1 mark

d. Suggest how the virus might be transmitted between members of a human community.

1 mark

e. Suggest how governments could prepare for a pandemic of avian ‘flu?

1 mark

Total 5 marks

Question 7

Transplantation of organs is common practice today in the modern hospitals of the world. The problem facing patients is not the surgery but rather the rejection of the donated organ by the immune system. The success of transplants has been increased with the development of anti-rejection drugs which suppress the recognition of antigens on the donated cells.

- a. The transplanted organs consist of cells which the body's immune system recognises as being non-self. Explain exactly what is meant by the biological term "non-self".

2 marks

Anti-rejection drugs such as cyclosporine help the recipient's body by suppressing the effects of helper T cells.

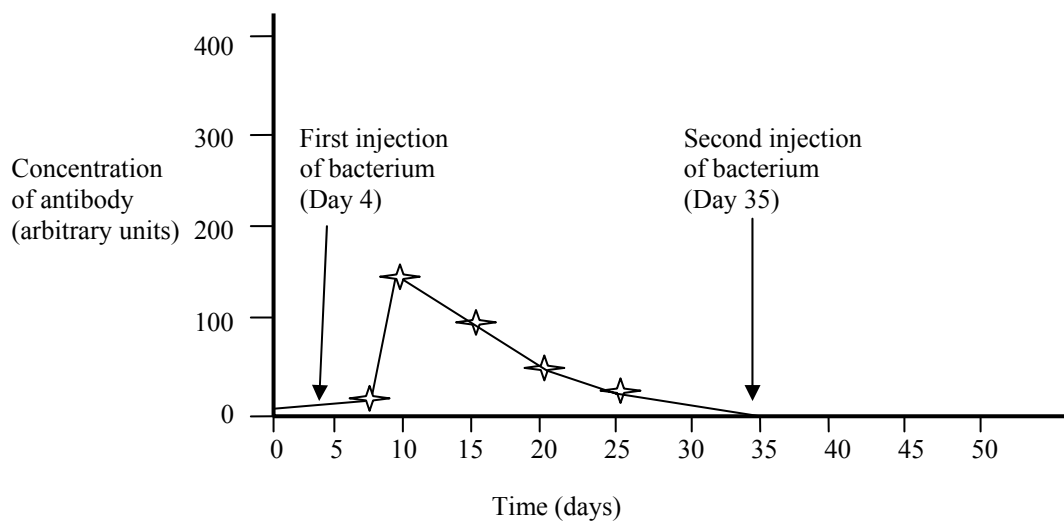
- b. Explain how the suppression of helper T cells can be a useful means of controlling the rejection process.

2 marks

Total 4 marks

Question 8

In an experiment to test the likely immune response of humans to the bacterium *Salmonella typhimurium*, a suspension of the bacterium was injected into mice. The bacteria were injected on Day 4 of the experiment. Blood samples were taken at regular intervals to measure antibody concentrations. A second injection of the bacterium was made on Day 35. The results are shown diagrammatically below.



Consider the events following the injection of the bacteria on Day 4.

- a. Identify two body cells involved in the response which occurs between days 4 and 10, and briefly describe their function.

Body cell type	Function
1	
2	

2 marks

Consider the events you would expect to occur following the second injection on Day 35.

- b. i. On the graph above, draw a line to show the timing and extent of response in antibody production expected.
- ii. Explain why you would expect such a response to occur.

1 + 2 = 3 marks

Suppose that the test mice were exposed to *Salmonella typhimurium* two months later.

- c. What do you think would occur in the mice? Explain.

2 marks

Total 7 marks

END