

DIRECTORATE FOR QUALITY AND STANDARDS IN EDUCATION
Department for Curriculum Management and eLearning
Educational Assessment Unit
Annual Examinations for Secondary Schools 2012

BIOLOGY – FORM IV
TIME: 1H 30MIN

NAME: _____ CLASS: _____

Question No.	Section A							Section B					
	1	2	3	4	5	6	7	1	2	3	4	5	
Max mark	5	7	10	6	9	10	8	15	15	15	15	15	
Actual mark													TOTAL MARK

85% Theory Paper	15% Practical	100% Final Score

Answer ALL questions in this section.

1a. Name the acid:

(i) produced in muscles after heavy exercise _____

(ii) produced in the stomach _____

(iii) contributing to acid rain formation. _____ (1, 1, 1 mark)

b. Explain how the stomach is protected from attack by gastric juices.

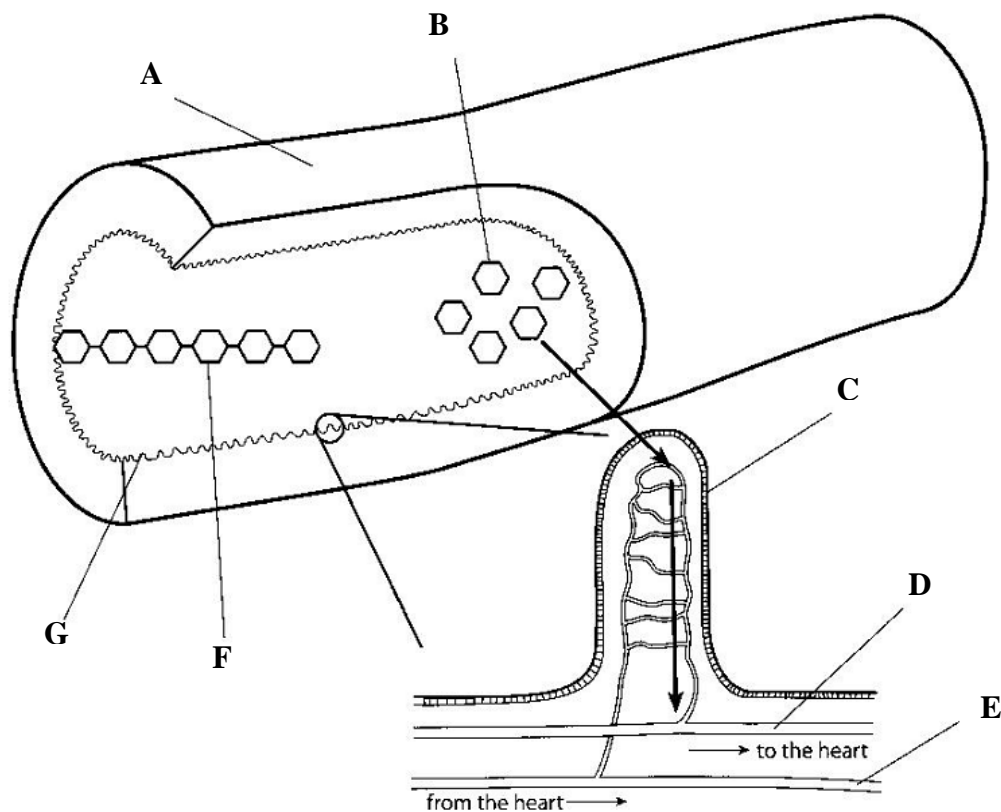
_____ (1 mark)

c. Name the substance present in pancreatic juice that gives an alkaline environment for the action of enzymes in the small intestine.

_____ (1 mark)

Total: 5 marks

2. The following diagram shows part of the process of digestion.



a. From the diagram write the letter of the part showing the:

(i) starch molecule _____

(ii) glucose molecule _____

(iii) villus _____

(iv) artery. _____

(1, 1, 1, 1 mark)

- b. Coeliac disease causes the villi in the small intestine to get smaller. Explain why those suffering from this disease become weak.

_____ (1 mark)

- c. Coeliacs are advised to follow a gluten-free diet. Gluten is a protein found in wheat, barley and oats.

(i) Name the building blocks of proteins.

(ii) Name the elements that make up proteins.

(1, 1 mark)

Total: 7 marks

3. The following table lists seven arctic organisms and the food of each organism.

Arctic organism	Food
Wolf	caribou, musk oxen, arctic hares, lemmings, arctic fox
Caribou	arctic plants
Lemming	arctic plants
Arctic fox	lemmings, arctic hares
Polar bear	lemmings, arctic fox
Arctic hare	arctic plants
Musk oxen	arctic plants

- a. Use the information given in the table above to construct a food web of the coastal arctic region.

(4 marks)

- b. As the ice in the Arctic regions continues to melt, there has been a noticeable decrease in the number of the Arctic fox that are surviving the harsh winters. Describe the effect of a decrease in the arctic fox population on the Arctic hare population:
- (i) after 3 years
- _____
- (ii) after 25 years.
- _____
- (1, 1 mark)
- c. Describe how a low lemming population affects the number of Arctic hares.
- _____ (2 marks)
- d. Ice crust formation results from freeze-thaw events in the Arctic region. Explain how ice-crust formation affects the primary consumers in the food web.
- _____
- _____ (2 marks)
- Total: 10 marks**

4. Explain the biological significance of **each** of the following cartoons used in different health campaigns.

a. _____



(2 marks)



b. _____

(2 marks)

Get ironed like Popeye!

Start your day with cere

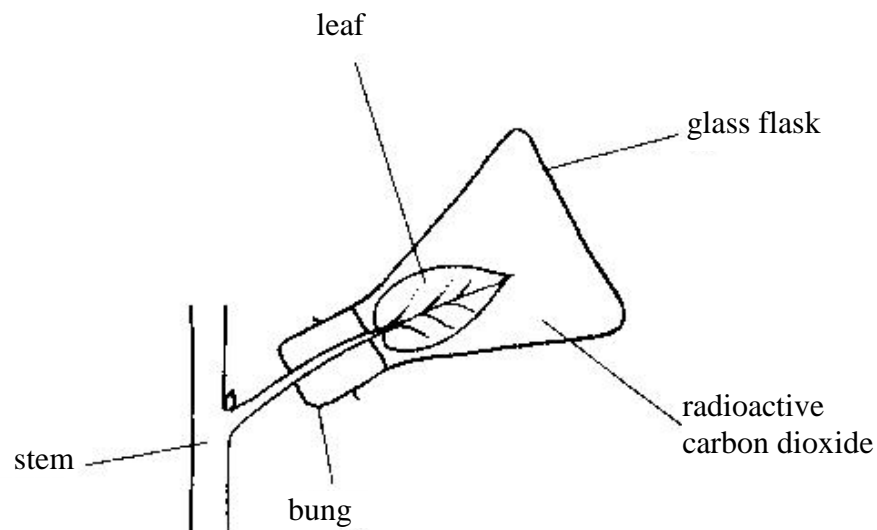
- c. _____

(2 marks)



Total: 6 marks

5. The following diagram shows the experimental set up used to investigate the amount of radioactive carbon dioxide that enters different parts of a plant after 24 hours. The amount of carbohydrate transported to other parts of the plant can be found by measuring the amount of radioactivity.



- a. Name

(i) the process that uses carbon dioxide to make carbohydrates

(ii) the tissue that transports the carbohydrate along the plant.

(1, 1 mark)

- b. Sucrose is the main carbohydrate transported in leaf tissues. Sucrose is composed of glucose and fructose. What type of carbohydrate is sucrose?

_____ (1 mark)

- c. The following table shows the amount of radioactivity in different parts of the plant after 48 hours.

Plant part	Amount of radioactivity in counts per minute
Shoot tip	1123
Leaf exposed to radioactive carbon	11325
Other leaves	234
Stem	819
Seeds	9055
Roots	842

- (i) What evidence in the table above shows that carbohydrate is transported both up and down the plant?

- (ii) Explain why the 'other leaves' contain only small amounts of radioactive carbohydrate.

(1, 1 mark)

- d. Describe how carbon dioxide gets into the leaf.

_____ (1 mark)

- e. Explain the benefit of:

- (i) the leaf mosaic arrangement in plants

- (ii) flat leaf blade

- (iii) thin leaf.

(1, 1, 1 mark)

Total: 9 marks

6. During exercise, when muscular activity increases, several changes take place in the body.

- a. Explain why the arteries supplying blood to muscles dilate during exercise.

_____ (3 marks)

- b. Many athletes have low pulse rates.

- (i) What measure does the pulse rate indicate?

(ii) Explain why athletes have a lower pulse rate than non-athletes.

(1, 2 marks)

c. On the last day of the 2002 Winter Olympics, three cross-country skiers were excluded from the games for blood doping. Blood doping is a method of increasing the number of red blood cells in the body in order to promote athletic performance. Explain how blood doping helps athletes to promote their athletic performance.

(1 mark)

d. The sweat excreted during heavy exercise contains a high concentration of urea. Name:

(i) ONE other fluid that contains the excretory product urea

(ii) the body organ where urea is produced.

(1, 1 mark)

e. Give ONE reason why athletes are advised to avoid smoking.

(1 mark)

Total: 10 marks

7. Normally the right and left sides of the heart are completely separated by a wall called septum. The pressure in the left side of the heart is normally greater than that in the right side of the heart. Occasionally a baby is born with a hole between the right and left atria or between the right and left ventricles. An Atrial Septal Defect (ASD) is a hole in the part of the wall (septum) that separates the atria in the heart.

a. Explain why the pressure in the left side of the heart is normally greater than that in the right side.

(2 marks)

b. How does ASD affect the flow of blood in the heart?

(2 marks)

c. The coronary arteries supply oxygen-rich blood to the heart muscle. Coronary heart disease (CHD) is a condition where the coronary arteries become narrowed.

What is the effect of CHD on the blood flow to the heart muscle?

(2 marks)

- d. Heart valve disease occurs when one or more of the heart valves do not work properly. Describe the effect of **each** of the following heart defects:

(i) a heart valve does not close tightly

(ii) the heart flaps of a valve thicken, stiffen or fuse together.

(1, 1 mark)

Total: 8 marks

Section B

Answer any **THREE** questions from this section.

This section carries **45** marks. Write the answers for section B on a foolscap.

1. Read the following passage and answer the questions that follow.

Pectinases are important enzymes used in the fruit and textile industries. These enzymes break down complex polysaccharides of plant tissues called pectin into smaller molecules. A mixture of pectinases and amylases is used to clarify fruit juices. Pectinases have also been used in conjunction with amylases, lipases and cellulases in textile processing to remove sizing agents from cotton in a safe and eco-friendly manner.

- a. From the passage write the term that matches **each** of the following statements:
 - (i) a biological catalyst
 - (ii) the type of carbohydrate formed from many monosaccharide molecules
 - (iii) the enzyme necessary for herbivores to digest plant material. (1, 1, 1 mark)
- b. Name the **TWO** enzymes necessary for the complete breakdown of starch. (2 marks)
- c. Pancreatic lipase is secreted in the duodenum.
 - (i) Name the substrate and the products of lipase.
 - (ii) Explain how bile helps lipase in its action.
 - (iii) Name **ONE** other enzyme besides lipase present in pancreatic juice. (3, 2, 1 mark)
- d. Enzymes are specific in their action. Explain. (2 marks)
- e. Pectinases also play an important role in coffee and tea fermentation. Describe how the process of fermentation is used in bread making. (2 marks)

Total: 15 marks

2. Leukemia is a type of cancer of the bone marrow characterized by an abnormal number of white blood cells.
 - a. What change takes place in the number of white blood cells in case of disease? Give a reason for your answer. (3 marks)
 - b. Damage to the bone marrow in leukaemia patients results in lack of blood platelets. Give **ONE** consequence of this in a leukaemia patient. (2 marks)
 - c. Blood separates into three layers when centrifuged. White blood cells together with platelets settle in the middle layer.
 - (i) What type of blood cell is found in the bottom layer?
 - (ii) Name the straw-coloured fluid present in the top layer. (1, 1 mark)
 - d. Explain why blood in vertebrates is red. (1 mark)
 - e. Describe the transport function of blood. (4 marks)
 - f. Explain why a circulatory system is not required in small and flat organisms. (3 marks)

Total: 15 marks

- 3a. Give a biological reason for **each** of the following statements:
- (i) Many animal species that live in arid environments such as deserts have highly loops of Henle. (3, 3 marks)
 - (ii) The kidneys have an important role in homeostasis. (5 marks)
- b. Draw a diagram of the urinary system. (2 marks)
- c. Describe the function of the urinary bladder. (1, 1 mark)
- d. Name
- (i) the part of the kidney that surrounds the glomerulus
 - (ii) the process by which blood is filtered as it passes through the glomerulus. (1, 1 mark)
- Total: 15 marks**
4. Distinguish between:
- a. hepatic artery and renal artery (2 marks)
 - b. mechanical and chemical digestion (4 marks)
 - c. leaf epidermis and cuticle (3 marks)
 - d. nicotine and tar (2 marks)
 - e. aorta and vena cava. (4 marks)
- Total: 15 marks**
- 5a. Asthma is a disease of the lungs that causes the airways in the lungs to become narrower and inflamed.
- (i) List ONE typical effect of asthma on the body. (2, 1 mark)
 - (ii) Name the skeletal protection of the lungs. (2 marks)
- b. What changes take place in the diaphragm during breathing in? (2 marks)
- c. Explain how:
- (i) the trachea (windpipe) is always kept open
 - (ii) food is prevented from entering the trachea during swallowing. (2, 2 marks)
- d. Choking is the mechanical obstruction of the flow of air into the lungs. List ONE consequence of choking. (2 marks)
- e. Pulmonary embolism (PE) is a blockage of the main artery of the lung. Name the artery of the lung and give its function. (3 marks)
- f. Name ONE disease of the lungs caused by smoking. (1 mark)
- Total: 15 marks**