

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



Track

**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

<b>85% Theory Paper</b>	<b>15% Practical</b>	<b>100% Final Score</b>

**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.

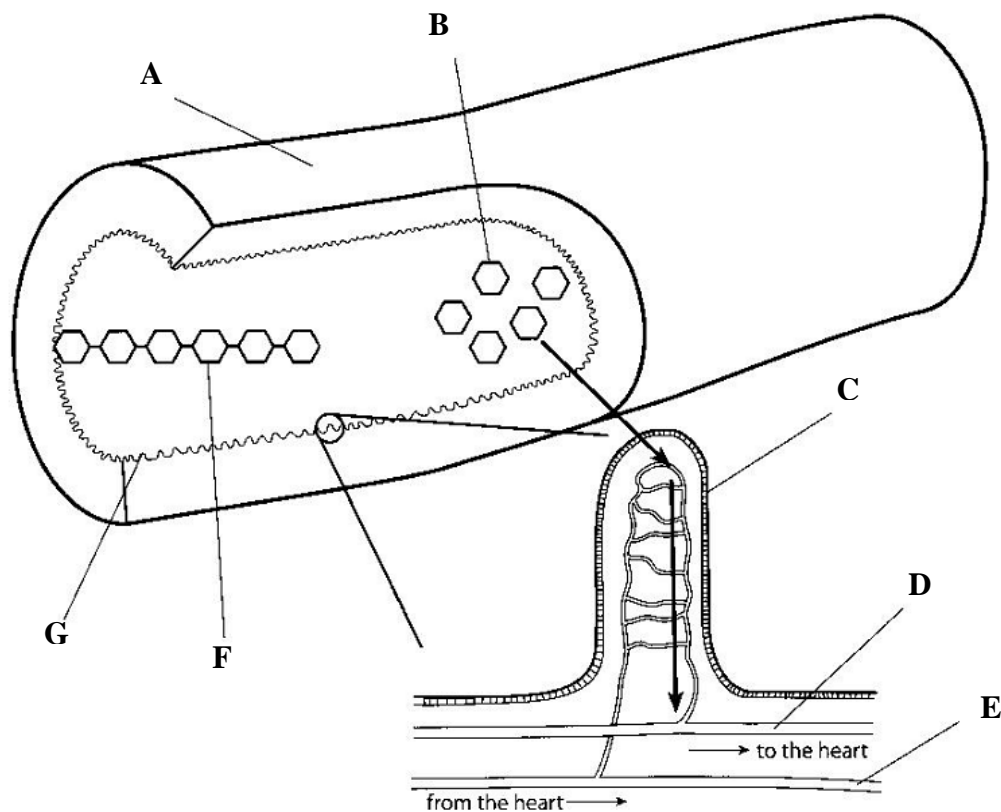
\_\_\_\_\_ (1 mark)

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

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(ii) after 25 years.

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(1, 1 mark)

- c. Describe how a low lemming population affects the number of Arctic hares.

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(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.

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(2 marks)

**Total: 10 marks**

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

a. 

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(2 marks)



b. 

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(2 marks)

**Get ironed like Popeye!**

Start your day with cere

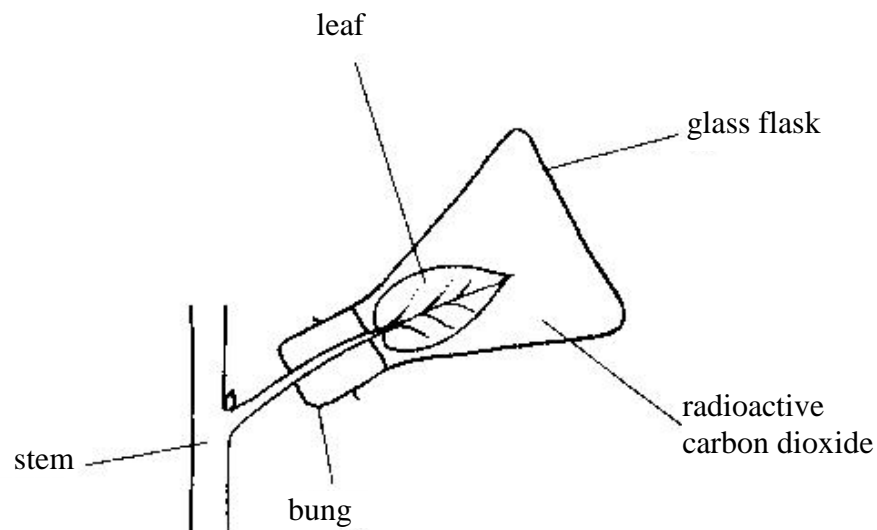
- c. \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

(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.

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(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.

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(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

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(ii) the body organ where urea is produced.

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(1, 1 mark)

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

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(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.

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(2 marks)

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

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(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?

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(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

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

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(1, 1 mark)

**Total: 8 marks**

## Section B

**Answer question ONE and choose any other TWO. This section carries 45 marks. Write the answers for Section B on a foolscap.**

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

Pectinases are one of the upcoming enzymes of fruit and textile industries. These enzymes break down complex polysaccharide of plant tissues called pectin into simpler molecules. The largest industrial application of pectinases is in the fruit juice extraction and clarification. 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. Pectinases also play an important role in coffee and tea fermentation.

- a. From the passage write the term that matches **each** of the following statements:
- (i) the enzyme necessary for herbivores to digest plant material
  - (ii) the type of carbohydrate formed from many monosaccharide molecules. (1, 1 mark)
- b. Explain **each** of the following statements:
- (i) Enzymes taking part in a reaction can be used again and again.
  - (ii) Two enzymes are necessary for the complete breakdown of starch. (1, 1 mark)
- c. Scientists working in industry often need to know the exact amount of substrate to add to an enzyme catalysed reaction. Explain why scientists do not add neither too little nor more substrate than is needed. (2 marks)
- d. Lipase is the enzyme that converts fats to fatty acids and glycerol.
- (i) Name the site in the gut where lipase is produced.
  - (ii) Explain how lipase is helped in its action to digest fats. (1, 1 mark)
- e. In human digestion, pectin goes through the small intestine more or less intact. What is the importance of indigestible portion of foods such as pectin in the digestion process? (1 mark)
- f. Explain how fermentation is used:
- (i) to make products that can be used as fuel
  - (ii) to produce yoghurt.
- (2, 2 marks)
- g. Yeast is used in bread making. Flour, sugar, water and salt are mixed with yeast to produce dough. Describe the structure of bread that results if the dough is:
- (i) not left to rise
  - (ii) left to rise for too long. (1, 1 mark)

**Total: 15 marks**



2. Leukemia is a type of cancer of the bone marrow characterized by an abnormal number of white blood cells. Bone marrow is a vital element of the lymphatic system and acts to prevent the backflow of lymph.
- What is the biological importance of the bone marrow? (2 marks)
  - Damage to the bone marrow by displacing the normal bone marrow cells with higher numbers of immature white blood cells results in lack of blood platelets. How does this affect a leukaemia patient? (2 marks)
  - Lymph has a composition comparable to blood plasma. Discuss. (3 marks)
  - Explain why large complex organisms require a transport system. (4 marks)
  - Describe the transport function of blood. (4 marks)

**Total: 15 marks**

3. Give a biological reason for **each** of the following statements:
- Many animal species that live in arid environments such as deserts have highly efficient loops of Henle. (2 marks)
  - Blood reaching the glomerulus is under high pressure. (3 marks)
  - Freshwater fish excrete dilute urine. (2 marks)
  - The kidneys play an important role in homeostasis. (3 marks)
  - Each day the kidneys produce about 180 litres of glomerular filtrate, however the daily production of urine is only about 1-2 litres. (2 marks)
  - Different factors affect the amount of urine produced in a human being. (3 marks)

**Total: 15 marks**

4. Distinguish between:
- palisade mesophyll and spongy mesophyll (4 marks)
  - trachea and epiglottis (2 marks)
  - aorta and vena cava (4 marks)
  - absorption and assimilation (3 marks)
  - nicotine and tar. (2 marks)

**Total: 15 marks**

5. On 8<sup>th</sup> May 1978 Peter Habeler and Reinhold Messner were the first to climb Mount Everest (8848 metres above ground) without an additional supply of oxygen.
- Explain the changes taking place in the rate and depth of breathing in response to a reduction in blood oxygen levels. Give a reason for your answer. (3 marks)
  - Asthma is a disease of the lungs that causes the airways in the lungs to become narrower and inflamed.
    - List TWO typical effects of asthma on the body.
    - Name the skeletal protection of the lungs. (2, 1 mark)
  - Restrictive lung diseases (RLD) are a category of respiratory diseases that restrict lung expansion.
    - What is the effect of RLD on the lung volume?
    - Describe the process of inspiration.
    - Describe the role of the nose in preventing the entry of micro-organisms into the body. (1, 3, 2 marks)
  - 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)

**Total: 15 marks**