



**Annual Examinations for Secondary Schools 2014**

**FORM 4**

**BIOLOGY**

**MARKING SCHEME**

**Section A**

- 1a. i. Protein  
ii. Vitamin D  
iii. Iron 1 mark each – 3 marks
- b. Balanced diet 1 mark
- c. A diet high in junk food contains high amounts of fats and carbohydrates that lead to obesity and heart disease. Therefore reducing junk food from the diet can help to reduce obesity and coronary heart disease. 2 marks
- d. A Mediterranean diet is high in fibre that serves to reduce constipation and bowel/colon cancer. 2 marks
- Total: 8 marks**
- 2a. Breathing rate increases to supply the muscles with the extra oxygen needed to supply the energy required for muscles to work using aerobic respiration. 2 marks
- b. i. B  
ii. C (*Accept D*) 1 mark each – 2 marks
- c. Intercostal muscles contract during breathing in and relax during breathing out. 1 mark  
*Award the mark ONLY if comparison is correct.*
- d. Oxygen (*Accept O<sub>2</sub>*) 1 mark
- e. Heart beats more quickly (increase in heart beat) and more deeply (stronger). 2 marks
- Total: 8 marks**
- 3a. i. Oxygen-poor blood flows from the heart out of the body and back to the heart. 1 mark  
ii. Oxygen-rich blood flows from the heart to the lungs and back to the heart. 1 mark
- b. i. Bicuspid valve 1 mark  
ii. Increase in strength of the heart beat; leading to a thicker left ventricle muscle wall. 2 marks
- c. i. Blood flows back to atrium instead of being pumped to lungs. 1 mark  
ii. Between right atrium and right ventricle. 1 mark  
*Do NOT accept in the right side of the heart.*

- d. Large number of mitochondria enables continuous aerobic respiration and a good supply of blood provides nutrients and oxygen. 3 marks

**Total: 10 marks**

- 4a. i. Produced in the liver; excreted in the kidney/skin 2 marks  
ii. Produced in the liver; stored in the gall bladder 2 marks  
*Do NOT accept* stored in the bladder.  
iii. Stored in the urinary bladder/bladder; carried to the outside via the urethra. 2 marks

- b. Protein and glucose. 2 marks

- c. Concentrated urine and very dry faeces. 2 marks

**Total: 10 marks**

- 5a. Sucrose 1 mark

- b. Glucose and Galactose 1 mark each - 2 marks

- c. To neutralise the potentially harmful acid entering the intestines from the stomach.  
(*ACCEPT*: to create optimum pH for intestine enzymes to work in.) 1 mark

- d. They can be used over again. 1 mark

- e. Specific enzymes 1 mark

- f. Mechanical digestion: Chewing  
(Accept: grinding and crushing)  
Chemical digestion: saliva moistens food and the enzyme salivary amylase starts digestion of starch. 1 mark each – 2 marks

- g. To increase the surface area for absorption of nutrients. 2 marks

**Total: 10 marks**

- 6a. Leaf from Jar A stains brown while leaf from Jar B turns blue black/dark blue. 2 marks

- b. Same type of plant; same duration of time; same place/temperature 1 mark  
*Any ONE*

- c. release of oxygen. 1 mark

- d. The coloured water travels up the xylem to the (peduncle of the) flower. The water is absorbed by the petals. 2 marks

- e. The palisade cells that contain chloroplasts are near the surface of the leaf on the side that receives most light. 3 marks

**Total: 9 marks**

## Section B

- 1a. Near the backbone on either side of the heart; in thorax. 2 marks  
*Accept*: On either side of the heart.

- b. i. trachea 1 mark  
ii. alveoli 1 mark

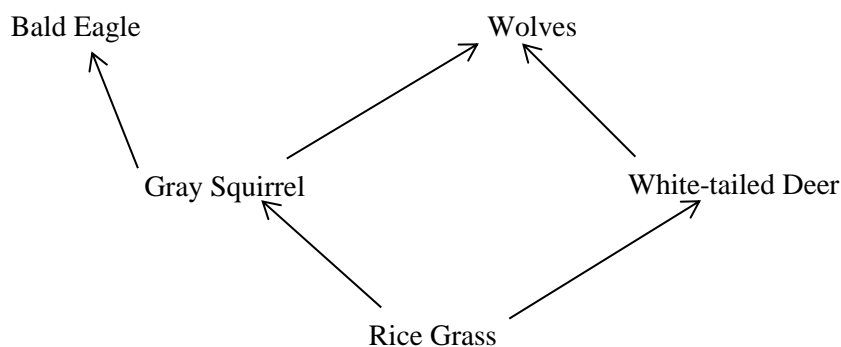
- c. Mucus aids in the protection of lungs by trapping foreign particles like dust and bacteria that enter it particularly through the nose during normal breathing. 2 marks
- d. i. Tar stops the cilia from wafting. Dust and pathogens remain in the lungs. 2 marks  
 ii. Pathogen remain longer or are not removed from the lungs; a person is more likely to develop an infectious disease. 3 marks
- e. i. muscle tissue 1 mark  
 ii. rib cage – moves up and outwards. Diaphragm – moves downwards 2 marks
- f. Carbon dioxide (CO<sub>2</sub>) 1 mark

**Total 15 marks**

- 2a. i. A long intestine is important for the digestion of cellulose found in cell walls in plants. 2 marks  
 ii. Little sunlight passes through the leaf canopy to reach the ground. Lack of sunlight reduces photosynthesis. Plants do not grow. 3 marks  
 iii. In the mouth, salivary glands secrete saliva containing salivary amylase which digests starch. The pancreas produces pancreatic amylase which also digests starch. 3 marks
- b. i. In anaerobic respiration in muscle cells lactic acid is a product which can be removed from muscle cells. Carbon dioxide is not produced in this reaction. 2 marks  
 ii. The mesophyll layer cells both palisade and spongy contain chloroplast. The epidermal layer has no chloroplasts and does not perform photosynthesis. 2 marks  
 iii. Protists are single cell organisms which use cell membrane for gas exchange. Plants do not have exchange organs in spongy layer of leaf. Complex animals such as fish and humans have gills and lungs respectively for gaseous exchange. 3 marks

**Total: 15 marks**

3a.



- Do NOT award marks if arrows are not pointing in correct direction. 5 marks
- b. i. Rice grass 1 mark  
 ii. Bald eagle; Wolves (*Any ONE*) 1 mark
- c. Respiration; excretion (*Any ONE*) 2 marks
- d. The population of white-tailed deer is drastically reduced because the cougar and wolves feed more on deer since the population of Gray squirrel is drastically reduced because of the viral disease. 2 marks

- e. Bacteria help in the digestion of plant material. 2 marks
- f. Wolves are carnivores and use canines for stabbing the prey and keeping hold of it as it struggles to escape. 2 marks

**Total: 15 marks**

- 4a. Fish breathe using gills while insects use the tracheal system. Fish extract the oxygen dissolved in water, while insects breathe the oxygen in air. 4 marks

- b. Haemoglobin is the red pigment present in red blood cells; oxyhaemoglobin is the product formed when oxygen binds to haemoglobin. Oxyhaemoglobin is transported to the cells. 3 marks

- c. Xylem vessels are long tubes made of the hollow remains of dead cells – they carry water and dissolved minerals up from the roots through the stem to leaves. Phloem vessels are living cells that carry dissolved food materials mainly sucrose and other soluble organic compounds from the leaves to other parts of the plant including the roots. 4 marks

- d. duodenum is the first part of the small intestine. Bile and juice from the pancreas are added to the food in the duodenum. The ileum is a tube about 6m long in humans. It makes enzymes to complete the digestion process. 4 marks

**Total: 15 marks**

- 5a. Biogas typically refers to the gas/methane produced by the breakdown of organic matter eg. vegetable peelings (out waste) in the absence of oxygen – by means of anaerobic bacteria. 3 marks

- b. Smoking causes emphysema that is a lung disease characterised by a smaller surface area at the alveoli; thus reducing the rate of gas exchange resulting in wheezing and shortness of breath. 4 marks

- c. Citrus fruits, including lemons, are good sources of Vitamin C that is necessary to prevent the deficiency disease of scurvy. 2 marks

- d. The leaves suffer from chlorosis/yellowing is due to lack of magnesium that is necessary for the formation of the green pigment chlorophyll. 3 marks

- e. Biological detergents are effective because they contain enzymes such as lipases, proteases and carbohydrases that act on different stains such as egg yolk (protein) and oil stains (lipids). Biological detergents are also effective because they work well in low temperatures thus reducing electric consumption. 4 marks

**Total: 15 marks**