



General Certificate of Education

Biology 2410

BIOL2 The variety of living organisms

Report on the Examination

2010 examination - June series

Further copies of this Report are available to download from the AQA Website: www.aqa.org.uk

Copyright © 2010 AQA and its licensors. All rights reserved.

COPYRIGHT

AQA retains the copyright on all its publications. However, registered centres for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to centres to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales (company number 3644723) and a registered charity (registered charity number 1073334). Registered address: AQA, Devas Street, Manchester M15 6EX

General Comments

This unit test produced a good spread of marks and overall the paper seemed accessible with no evidence of any general misinterpretation of questions. There were some very impressive answers with candidates displaying an excellent understanding of the unit content covered on the examination paper. However, one general area of concern was the poor responses in question 4 relating to using a potometer. It was clearly evident that some candidates had little or no understanding of how this apparatus is used to measure the rate of water uptake by a plant. Generally, questions involving straightforward recall were well answered but there was also evidence of a complete lack of preparation by some candidates. A number of the longer questions proved to be effective discriminators and often gave better candidates the opportunity to show their understanding of a topic or to demonstrate their analytical skills. Questions involving the interpretation of data presented graphically caused problems for many candidates. This was not as clearly evident when data were provided in tables. As in the January test on this unit, there was considerable variation in the ability of candidates to express their ideas clearly and logically. Weaker candidates often failed to gain credit due to the use of imprecise or inappropriate scientific terminology.

Question 1

- (a) Most candidates obtained at least one mark, often for indicating that starch is insoluble or has a coiled structure. Approximately a third of candidates obtained a second mark for explaining how a particular feature of starch enables it to act as a storage substance. However, a significant minority of candidates scored zero, often by failing to provide sufficient details or by describing the structure of a protein.
- (b) (i) Just over half the candidates correctly named part **A** as beta glucose. Glucose on its own as an answer was not credited. Common incorrect responses included alpha glucose, deoxyribose and amino acid.
- (b) (ii) Most candidates correctly named bond **B** as glycosidic. A common incorrect response was hydrogen.
- (c) Very few candidates failed to gain at least one mark on this question. Almost a third of candidates gained all three marks. Most candidates mentioned that the cell wall provides strength and support with many also referring to the presence of hydrogen bonds. Better candidates included reference to the long, straight chains of glucose and described how microfibrils or macrofibrils are formed.

Question 2

- (a) Just over half the candidates correctly identified layer **C** as the endothelium or epithelium. Common incorrect responses included elastic layer, endodermis and epidermis.
- (b) Most candidates scored the principle mark by dividing a measured diameter by eight (the magnification). Over half the candidates gained both marks. A significant minority of candidates measured the diameter of the blood vessel across the outer walls rather than the diameter of the lumen. These candidates usually gained the principle mark.

-
- (c) (i) Compared with responses to a similar question on the June 2009 paper, it was pleasing to note that fewer candidates mentioned elastic fibres contracting or relaxing. There were more correct references to 'stretch and recoil' and to the role of elastic fibres in smoothing blood flow. However, some weaker candidates did refer to elastic fibres contracting and suggested that the aorta pumps blood around the body.
- (c) (ii) Surprisingly, a significant percentage of candidates did not obtain a mark in this question. Candidates often referred to muscle fibres constricting and dilating and to arterioles contracting and relaxing. The importance of muscle fibres in arterioles was often related to the prevention of arterioles bursting. Nevertheless, over half the candidates were able to obtain at least one mark. Only a relatively small percentage, however, was able to describe precisely how muscle fibres regulate blood flow.
- (d) (i) Most candidates gained this mark by referring to the increase in the total cross-sectional area from the aorta to the capillaries.
- (d) (ii) Only a third of candidates gained this mark. Candidates often referred to the decrease in the rate of blood flow in the capillaries but did not link this with more time for efficient exchange of substances.

Question 3

- (a) Less than half the candidates correctly named introns as the non-coding sections of a gene.
- (b) The vast majority of candidates correctly identified the amino acid sequence.
- (c) (i) Most candidates obtained at least one mark for stating that the amino acid sequence would not change. However, less than half the candidates gained the second mark by explaining that the new base triplet would still code for glycine.
- (c) (ii) Most candidates gained at least one mark, often by mentioning a change in the sequence of amino acids. However, a significant number of candidates incorrectly referred to 'different amino acids being formed'. Many candidates gained a second mark for explaining that the active site/ tertiary structure would be altered. The best candidates gained maximum marks either by linking this to enzyme-substrate complexes not being formed or to changes in hydrogen or ionic bonds.
- (d) (i) Almost two thirds of candidates correctly identified the part of the cell cycle as being interphase or the synthesis stage. Anaphase was a common incorrect response.
- (d) (ii) Most candidates obtained this mark, often by indicating that DNA replication occurs during interphase.

Question 4

- (a) The vast majority of candidates was able to give one correct environmental factor that the student should have kept constant during the investigation.
- (b) Answers to this question were generally disappointing with only a third of candidates appreciating that it was important to prevent air entering the shoot, xylem or potometer.
- (c) Approximately half the candidates obtained a mark for indicating that distance and time have to be measured. Very few candidates obtained a second mark by indicating that the radius, diameter or area of the capillary tube had to be measured.
- (d) Surprisingly, this proved the most difficult question on the paper. Seventy five percent of candidates scored zero with many candidates simply stating that not all the water is used in transpiration. Candidates obtaining one mark often referred to water being used in photosynthesis. Very few candidates obtained a second mark by indicating that water is used to provide support or that it may evaporate or 'leak' from the apparatus.
- (e) (i) Most candidates simply suggested that the reservoir would allow water to be added. Fewer candidates gained the mark by linking this to moving the position of the bubble.
- (e) (ii) Most candidates gained this mark by indicating that repeat measurements would enable the reliability of the results to be assessed.

Question 5

- (a) Approximately half the candidates obtained this mark. A common error was to suggest that an allele was part of a gene.
- (b) Most candidates gained at least one mark, usually for referring to sister chromatids. Many of these candidates referred to the centromere for a second mark. Very few candidates explained the presence of two chromatids in terms of DNA replication. Weaker candidates confused centromeres with centrioles, the latter not being a term required on the specification.
- (c) (i) Almost half the candidates gained both marks for this question. Candidates gaining a single mark often referred to crossing over but provided a poor explanation of the process. Weaker candidates often attempted to explain the new combinations of alleles in terms of random fusion of gametes or independent segregation.
- (c) (ii) Most candidates did not obtain this mark as they simply referred to crossing over being 'random' or occurring by 'chance'. Better candidates clearly indicated that crossing over was rare or infrequent.
- (d) (i) The vast majority of candidates gained one mark by showing three chromosomes. Approximately half the candidates obtained a second mark by clearly showing one member from each homologous pair of chromosomes.
- (d) (ii) Less than 10% of candidates obtained this mark. It was obvious from the vast range of answers that most candidates had no idea how to determine the answer.

Question 6

- (a) Most candidates obtained at least one mark for stating that humans are most closely related to chimpanzees. Approximately half the candidates also gained the second marking point by indicating that humans are least closely related to dogfish.
- (b) Many candidates used the stem of the question to state correctly that cytochrome is found in all eukaryotes. Incorrect responses usually referred to cytochrome being present in all species.
- (c) Many candidates did refer to the base triplet code and gained a single mark point. Better candidates referred to introns or to different base triplets coding for the same amino acid. However, a significant number of candidates failed to gain any marks, often describing a base triplet as a gene.

Question 7

- (a) Almost a third of candidates obtained maximum marks by clearly describing how haemoglobin loads and unloads oxygen in different parts of the body. Other candidates often lost marks by failing to refer to partial pressure of oxygen or to the percentage saturation of haemoglobin in the lungs and tissues. Weaker candidates tended not to use the graph and often demonstrated a lack of understanding of the terms dissociation and affinity.
- (b) (i) Most candidates gained this mark for correctly describing the relationship between the size of mammals and the oxygen dissociation curves of their haemoglobins.
- (b) (ii) Most candidates correctly related the size of mammal to a large or small surface area to volume ratio and appreciated that oxygen was required for respiration. However, weaker candidates had difficulty explaining the relationship between the surface area to volume ratio of mammals and the position of the oxygen dissociation curves of their haemoglobins. There was also some confusion between the size of a mammal and the amount of heat lost from its surface area.

Question 8

- (a) The vast majority of candidates gained at least one mark often by describing a method to improve hygiene. The failure of many candidates to gain both marks was often due to providing two methods of improving hygiene rather than two distinct ways of reducing transmission of MRSA. Approximately a third of candidates did obtain a second mark, usually by referring to isolation of infected patients.
- (b) Approximately two thirds of candidates obtained at least one mark by suggesting that higher doses than the minimum inhibitory concentration of antibiotic would kill microorganisms. Better candidates referred to the need to prevent antibiotic resistant bacteria surviving. Weaker candidates often incorrectly referred to bacteria 'becoming immune'. There were few correct answers relating to some of the antibiotic not being absorbed or being broken down in the body.
- (c) (i) The vast majority of candidates, almost 90 %, correctly named drug **P** as being most effective against *Enterococcus faecalis*.

-
- (c) (ii) A similar percentage of candidates correctly named drug **S** as being most effective against all the species of bacteria used.
- (d) (i) The vast majority of candidates obtained at least one mark often by referring to the prevention of bias. Over a third of candidates gained a second mark usually by commenting on the 'placebo effect'.
- (d) (ii) This was well answered with almost 95 % of candidates gaining at least one mark and two thirds of candidates gaining both points. Age, sex and health were the most common responses. Failure to obtain both marks was often due to two health-related factors being provided.
- (e) (i) Conversely, this was not well answered with almost nine out of ten candidates failing to describe the results shown on the graph. Most candidates simply stated that there was an increase without referring to a gradual, followed by a rapid, increase.
- (e) (ii) This proved far more difficult than expected. A significant minority of candidates completely misinterpreted the graph and suggested that the bacteria were more resistant to drug X than to Norfloxacin. References to bacteria being immune were common and there was some confusion between horizontal and vertical gene transmission. Nevertheless, there were also some excellent answers demonstrating a full understanding of antibiotic resistance, gene mutation and vertical gene transmission.

Question 9

- (a) (i) Most candidates gained this mark by indicating that the response was more effective in children. However, a significant minority of candidates interpreted the graph as showing that adults had a more effective response to the treatment.
- (a) (ii) Considering a similar question was asked on the January 2010 paper it was disappointing to note that less than half the candidates gained both marks. Most candidates did refer to a line of best fit but many then failed to explain that the line should be extended to predict the haemoglobin content after 40 days. Credit was also given for detailed answers using the rate of increase per day to predict haemoglobin content.
- (a) (iii) Only a third of candidates clearly explained what is meant by a quaternary structure. Most candidates suggested that it meant four polypeptide chains or many proteins were present.
- (b) (i) Almost a third of candidates obtained zero on this question, suggesting these candidates had not revised relevant principles from unit 1. A significant number of candidates interpreted isotonic as meaning a constant pH. Candidates who did know what isotonic meant were often able to provide a suitable explanation to gain at least two out of the three marks. However, there was still some confusion over the term osmosis with weaker candidates referring to salt moving by this process.
- (b) (ii) Most candidates were able to describe one difference between the two blood samples, often in relation to the variation in diameters. Many incorrectly referred to a difference in number of red blood cells, or their descriptions were too vague to gain a second mark point.

- (c) The vast majority of candidates were able to name and describe at least one process that leads to a reduction in the genetic diversity of organisms. Many named at least two processes, often genetic bottlenecks and the founder effect, and described them in sufficient detail to gain four of the marks available. Better candidates, over 20 %, had little problem including a description of selective breeding to gain maximum marks. One general misconception shown across the ability range was to describe genetic diversity in terms of fewer alleles or fewer genes rather than a decrease in the variety of alleles. Candidates who failed to gain any marks often confused genetic diversity with biodiversity and provided answers relating to deforestation and monocultures.