



GCSE

COMBINED SCIENCE: TRILOGY

8464/B/1H Paper 1 Biology
Report on the Examination

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Question 1

Question 1 was common to both tiers and was set at standard demand.

01.1 Almost all students on the Higher tier identified cancer as a non-communicable disease.

01.2 Almost all students named a non-communicable disease that obesity is a risk factor for. Diabetes or coronary heart disease, which are both listed in the specification, were the most common responses. References to heart attack or heart conditions were ignored as a named disease was required.

01.3 Fewer than half the students suggested a national policy that could help people to lose weight. The most common suggestions related to increasing taxes on unhealthy foods. This was usually phrased as increase the cost of unhealthy foods. A few suggested decreasing the cost of healthy foods.

Quite a lot of students suggested providing free gym memberships, or more public sports facilities. Some referred to mandatory PE lessons in school. References to labelling the energy content of foods and meals on packaging and menus were also made.

A common mistake was to give lifestyle changes that an individual could make, rather than a policy that a national organisation or the Government could make. Exercise regularly and eat a balanced diet were often stated, but these did not gain credit. Saying increase the recommended amount of daily exercise a person should do would gain credit, as this suggests a national policy.

01.4 In this BMI calculation 1 mark was for the correct substitution into the equation. The second mark was for a correct calculation, which was usually given as 25.65. Most students did show their working, which was good to see. The final mark was for selecting the correct BMI category that matched their final answer. Therefore, if a student did an incorrect calculation, they could still score the third mark. This was sometimes seen if they didn't square 1.64, and gave an answer of 42.07 with the BMI category obese. On the Higher tier the vast majority of students scored full marks.

01.5 Three fifths of students scored the mark for saying that women gain weight when pregnant, or that their mass will increase due to the baby. A clear reference to the weight, mass or BMI of the woman increasing was needed, so saying the woman's weight would change was insufficient. Incorrect responses included saying the BMI category was calculated before the woman became pregnant to check on her health or the baby's health, to see the change in the woman's BMI during pregnancy or for comparison. Some described the harmful effects of smoking on a developing baby, which did not answer the question.

01.6 Two conclusions were needed, so smoking or BMI of the mother had to be linked to the birth mass, or weight, of the babies. Comparative statements were needed. Almost half the students scored both marks, and two fifths scored 1 mark. The most common correct response was that non-smokers had heavier babies. Some students repeated this conclusion, and also stated the converse, saying smokers had lower birth mass babies. These two statements could only score 1 mark. A reference to a healthier weight was often seen, which was insufficient. The main misunderstanding was that smoking affected the woman's mass, and not the birth mass of the baby.

01.7 The first marking point was for how the measles virus is transferred out of an infected person. Two thirds of students scored this mark for saying by coughing or sneezing. The second mark was for how the virus is taken in by a second person. Fewer than a fifth of students scored both marks. Many thought the virus was transferred by direct contact. Some said the virus is airborne, but did not describe how it left one person and entered another.

01.8 The majority of students scored full marks for the percentage calculation to estimate the number of people with athlete's foot. Some students incorrectly converted 17% to 0.017, rather than to 0.17. Other students calculated 10%, 1% and then 7% of 67 961 900, then added the values for 10% and 7% together to find 17%.

01.9 Fewer than a fifth of students scored a mark for suggesting one way a person could reduce their chance of catching athlete's foot. References to changing socks or washing feet regularly were ignored. Saying keep your feet dry was too vague, a reference to drying feet thoroughly, properly or between the toes after washing was required, which was rarely seen. Use talcum powder was seen occasionally, which was allowed. The idea of covering the feet when walking around at a public swimming pool was suggested by some students, but saying don't walk around barefoot, without qualification, was ignored.

Question 2

Question 2 was common to both tiers and was set at standard demand.

The question asked students to describe how a microscope, a transparent ruler and a prepared slide of onion cells could be used to estimate the mean length of onion cells on the slide. Many students described how to prepare the slide, which did not gain credit as the students were told that they were provided with this.

Students were not expected to know how to use an eyepiece graticule and stage micrometer. Full marks could be obtained from either of the methods detailed on the mark scheme.

On the Higher tier almost a third of students gave responses that were Level 2 or above, although very few were in Level 3. This was often because they mixed up the two methods, so the key steps were not logically sequenced. A common mistake was to describe how to measure the cells with a ruler using the microscope, but then they divided the measurement by 100.

In order to move into Level 2 an attempt at a method to measure the size of the cells was required, as well as a reference to how to calculate a mean. The latter was often not addressed, so more than a third of students only scored 2 marks.

Question 3

03.1 Very few students scored both marks for describing what is meant by a double circulatory system. More than a third scored 1 mark for saying the heart pumps blood to the lungs to be oxygenated, and then to the body, without reference to the sides of the heart. A few confused which side of the heart pumps blood to the lungs, and which side pumps blood to the body, so were limited to 1 mark.

03.2 Fewer than half the students correctly named the right atrium as where the pacemaker is located. Incorrect responses included the other chambers of the heart, as well as the blood vessels associated with the heart.

03.3 Three fifths of students identified the pulmonary artery as the vessel that carries deoxygenated blood. The pulmonary vein was the most common incorrect response chosen by a quarter of students.

03.4 More than two thirds of students scored 1 mark for saying that valves in veins prevent the backflow of blood. A quarter of students scored both marks by going on to explain why valves are present in veins but not in arteries. A comparative statement about blood pressure in the two types of vessel was needed to score the second mark.

03.5 When comparing the structure of a vein to that of an artery comparative statements were needed. Many students just gave a simple description of one of the vessels, such as an artery has a thick wall. Three fifths of students gained at least 1 mark, but only a fifth of students scored both marks. The most common correct responses were for saying a vein has a wider lumen and an artery has a thicker wall. There were very few references to muscle or elastic tissue in the walls. Quite a lot of students compared the blood pressure, direction of blood flow or gases dissolved in the blood of veins and arteries. As these are not structural differences they were not creditworthy. References to size or surface area of the vessels were ignored.

Question 4

04.1 Three fifths of students correctly identified Tissue A as the epidermis. A quarter of students thought Tissue B, the palisade mesophyll, was the epidermis.

04.2 Half of the students scored at least 1 mark, usually for saying that the spongy mesophyll is adapted for its function by having air spaces. A description of these was allowed, such as gaps or air pockets. Only a fifth of students went on to explain the function of the air spaces, to score 2 marks. There was quite a lot of confusion regarding how water enters a plant, many thinking that it entered via the leaves. Some students thought the spongy mesophyll was a storage tissue. Quite a lot of students gained the compensation mark for saying the cells of the spongy mesophyll have chloroplasts for photosynthesis.

04.3 Fewer than a third of students scored any marks on this question. An adaptation of xylem had to be described in order to gain any marks. If a correct adaptation was given, the reason had to match the structure. Quite a lot of students talked about long tubes, which was insufficient. A reference to them being hollow or empty was needed. Some students gained 2 marks for saying the cells are strengthened with lignin. Others said the xylem cells did not have end walls, but only a few explained why this was useful.

04.4 Students struggled to answer this question which was set at the highest level of demand. Very few scored any marks. The most common responses referred to the stoma needing to open to either allow the transfer of gases for photosynthesis, or to allow the excess glucose to leave the leaf. Some said the glucose would be used in respiration to transfer energy to open the stoma. Few attempted to describe what caused the stoma to open.

Question 5

Levels 1 and 2 were set at high demand, and Level 3 was set at the highest level of demand. Students who only described what the arrows on the diagrams showed, and did not attempt to explain the movement of gases into and out of the trees, did not score any marks. Almost half of the students gave a Level 1 response. These responses usually only referred to photosynthesis happening in bright light or not happening in the dark, and respiration was not mentioned. A third of students gave a Level 2 response. In order to access Level 2 references to both photosynthesis and respiration, as well as to both gases, were needed. A lot of students only mentioned respiration happening in the dark. In order to access Level 3 an explanation of the gas exchange in all three situations was needed. Realising that photosynthesis and respiration would be occurring at the same rate was key to explaining gas exchange in dim light. Those who said there would be no photosynthesis in dim light were limited to Level 2.

Question 6

06.1 Quite a lot of students simply stated that starch has to be digested to form sugar. Some went on to give uses of sugar, for example for respiration. These ideas were not creditworthy. A reference to the size of starch molecules, or that starch is insoluble, was needed for the first mark. A third of students scored at least 1 mark, usually for saying that starch molecules are big. Just over a tenth of students also gave a correct explanation in terms of absorption or diffusion into the blood. Some thought starch had to be digested because it is harmful.

06.2 Four fifths of students scored this mark for saying the control liquid for the investigation was water, which was allowed. A few gave the better answer of iodine solution.

06.3 Most students scored at least 1 mark for describing the pattern that the percentage of light passing through the liquid decreased with increasing starch concentration. Simply giving data was ignored, a clear pattern had to be described. Just over a quarter of students scored the second mark as well by explaining that this was because the iodine solution would be darker. The final mark which was set at the highest level of demand was rarely seen. A clear statement that a darker liquid would absorb more light was needed.

06.4 Half of the students scored the mark for explaining why the starch suspension and amylase solution were kept in the warm water bath for 10 minutes before being mixed together. Most said so they would be at the same temperature. Others gave a better answer saying that 37 °C was the optimum temperature for enzymes to work, or that it was body temperature.

06.5 The calculation of the mean rate of digestion was set at the highest level of demand, and involved the use of two graphs. Many students did not realise this, and only just over a tenth of students scored 1 mark. This was either for giving the concentration at zero time as being 6.6 g/dm³ or for giving the concentrations 1.8 g/dm³ and 0.8 g/dm³ for the concentrations at 1 and 2 minutes. These three values all required use of both graphs. Quite a lot of students gave the percentage of light passing through the mixture at 1, 2 and 3 minutes. This only involved the use of one graph, so was not creditworthy at the level of demand at which the question was set.

06.6 Almost two fifths of students scored at least 1 mark for saying that the enzyme would be denatured at pH1. Half of these went on to say that therefore the starch would not be digested, or that the reaction would be much slower, to score 2 marks. The final mark was set at the highest level of demand. Very few could explain how this would affect the percentage of light passing through the liquid.

Question 7

07.1 Half of the students knew where mutations happen in a bacterial cell. In plasmids or in DNA were the most common responses. DNA was often described as a strand, loop or ball of DNA. The most common incorrect response was in the nucleus.

07.2 Almost half the students scored both marks and more than a third scored 1 mark. The first mark was for describing the evidence in the diagram that *S. aureus* oteNwas resistant to antibiotics C and E. Quite a lot of students did not give this evidence, but just said that no bacteria were killed to score the second mark.

07.3 This question was set at the highest level of demand. Only a fifth of students scored any marks and very few scored both marks. A suggestion of a change to the method had to be made in order to access any marks, although the change did not have to be creditworthy in order to access the second mark. For example, many students said leave the Petri dish for longer, or incubate it at

a different temperature, which did not score marking point 1, but gave access to marking point 2. An increase in the concentration of the antibiotic was needed. The second mark was for how the change might show that *S. aureus* is not resistant to antibiotic E. A reference to a clear area then being seen, or that the bacteria would then be killed, was required. Simply saying the antibiotic would then work was insufficient.

07.4 Almost two thirds of students identified the independent variable in the investigation as the treatment injected around the implant. The most common incorrect response was the type of antibiotic used.

07.5 Two fifths of students gave a correct advantage of using stem cells from fat tissue, rather than from bone marrow. Saying the fat cells were easier or less painful to extract were common responses. Saying there was less risk was ignored, unless qualified. For example by saying less risk of damage to the patient. References to rejection were ignored.

07.6 The correct process for how the antibiotic entered stem cells was needed in order to score any marks. More than a third of students correctly identified diffusion as the process. A quarter of students scored 2 marks for also giving the reason, related to the concentration of antibiotic inside and outside the cells.

07.7 Three quarters of students interpreted the graph correctly and gave a range of 0.09 to 0.31. The most common error was to write 0.9 instead of 0.09.

07.8 Almost two thirds of students scored at least 1 mark. This was usually for one of the advantages of using stem cells containing antibiotic. A quarter of students scored 2 or more marks. The most common disadvantages given were that the stem cells might be rejected by the patient, or the bacterium might become resistant to the antibiotic.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the [Results Statistics](#) page of the AQA Website.