GCSE

COMBINED SCIENCE: TRILOGY

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

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Question 1

01.1 Students had to link different types of cell to the organ system in which they are found. Almost all students scored at least 1 mark. Linking the sperm cell to the reproductive system being the most common correct response. Almost two thirds scored full marks, and over a quarter scored 2 marks. Common errors were to link the red blood cell with the respiratory system, or the brain cell to the circulatory system.

01.2 The question was answered well, with almost three quarters of students scoring both marks. Most students said the sperm cell has a tail so it can swim, and some said the cell has mitochondria to provide energy. A few students gave two adaptations, but did not explain the use of either, so were only awarded the first marking point.

01.3 Over half of the students scored the mark, usually for saying that the cell in the figure was not a plant cell because it did not have a cell wall, or it did not have a vacuole. Fewer students said the cell did not have chloroplasts.
There were many references to the oxygen molecules, or to the shape of the cell, which were ignored. Some said the cell was not a plant cell because it did not have ribosomes or mitochondria. Others said it did not have a nucleus. All these were incorrect.

01.4 Four fifths of students correctly identified the cell membrane as the structure that controls the movement of substances into and out of a cell.

01.5 Students had to interpret a diagram showing oxygen molecules in and around a cell to decide by which process the oxygen would enter the cell. Half the students correctly concluded that the oxygen would enter the cell by diffusion. Half of these also scored the second mark for explaining this was because the concentration of oxygen was higher outside the cell than inside the cell. Some students confused the process with osmosis. The marking points were independent, so a few students gained a mark for a correct explanation relating to the concentrations of oxygen inside and outside the cell, but had given an incorrect process.

01.6 Only a tenth of students correctly named two substances that move into most cells in the body from the blood. Half of the students named at least one substance. The most common correct substances given were glucose, sugar and water. Parts of the blood were very common answers which did not gain credit, as well as oxygen and carbon dioxide which were ignored.

Question 2

02.1 A third of students identified part C, the small intestine, as part of the digestive system that produces amylase. Almost half thought the stomach produced amylase.

02.2 Only just over a quarter of students knew that sugars are produced when starch is digested. Almost half thought starch is digested to form amino acids.

02.3 Over half the students knew that digested food is absorbed into the blood from the small intestine. Just over a quarter thought food was absorbed from the pancreas.

02.4 Half of the students correctly identified the pH of the amylase solution as the independent variable in the investigation.

02.5 A fifth of students scored both marks for interpreting the key correctly. They gave the colour of iodine solution as black when starch is present, and orange when starch is not present. A further

two fifths of students scored 1 mark, usually for saying iodine solution is black when starch is present. Some students got the two colours the wrong way round. Green and white were common incorrect responses.

02.6 Only a quarter of students realised that the results showed that all the starch had been digested by 3 minutes. The majority gave the answer 2.5 minutes, which was the time of the last test when starch was still present.

02.7 Two fifths of students identified pH 7 as being the optimum pH for amylase to work. The majority thought pH 5 was the optimum.

Question 3

03.1 Just over a quarter of students said plants obtain water from the soil or from the ground. Common responses that were ignored included from rain, from the air or from roots.

03.2 Three fifths of students knew that the evaporation of water from leaves is called transpiration. The most common incorrect response was respiration.

03.3 Almost three fifths of students scored both marks for calculating the mass of the plant on the balance after 5 hours. There were two ways to calculate the answer, both of which were seen. Some students subtracted the mass of water lost at 5 hours (9 g) from the starting mass (510.7 g), whilst others subtracted the difference in water loss between 4 and 5 hours (1.8 g) from the mass of the plant at 4 hours (503.5 g). Both gave the answer 501.7 grams. The answer of 507.1 g was often seen, which might have been due to a transcription error. However, some students showed that they added together the 5 values of mass for 0, 1, 2, 3 and 4 hours, and then divided the total by 5, giving a final answer of 507.1 g. Very few students scored only 1 mark, but over a third scored 0 marks.

03.4 Two thirds of students correctly worked out the rate of water loss from the plant as 1.8 grams/hour. They could have used the table of results or the graph to work out the answer. The most common incorrect response was 9.0 grams/hour.

03.5 Students were asked to draw a line on the graph to show how the results would be different if the investigation was repeated at a lower temperature. The rate would have been slower, therefore a less steep line should have been drawn. The reaction would still have started at 0 hours and finished at 5 hours, so a straight line, drawn using a ruler from 0,0 to 5 hours was needed. Almost two thirds of students scored at least 1 mark and over half of the students scored both marks. It was good to see a ruler being used by the majority of students.

03.6 The question asked for one change to the investigation that would increase the rate of water loss from the plant. A factor that would affect the rate did not gain credit unless it was clear whether the factor should be increased or decreased. Quite a lot of students said increase the time the plant was left for. This would not affect the rate so was ignored.
Only a tenth of students gave a creditworthy response. The most common correct response was to increase the light intensity. Those who just wrote light intensity did not gain credit. References to increasing the temperature were ignored. This idea had been tested in the previous question, and students were told not to refer to temperature in their answer. Quite a lot of students said remove the bag. They did not realise that transpiration is from the leaves and the bag was there to prevent loss of water from the soil.

Question 4

04.1 Just under a third of students identified blood vessel A as the vena cava. Despite the question saying that the vena cava carries blood into the heart, vessels B and C, the pulmonary artery and the aorta, were selected almost as often as the correct answer.

04.2 Less than a third of students knew that the left ventricle is the chamber that pumps blood to the body.

04.3 Less than a third of students knew that the blood vessel that carries blood to the heart muscle is called the coronary artery. Most students thought it was the pulmonary artery.

04.4 Responses for identifying the blood vessel that has valves were evenly split between artery, capillary and vein.

04.5 Only a quarter of students knew the function of valves. The idea of preventing backflow of blood, or keeping blood flowing in the correct direction was required. Common incorrect responses included to pump blood, to control the flow of blood, to open and close or to prevent leaks.

04.6 Fewer than a fifth of students scored any marks. Of these most scored 1 mark, usually for saying capillaries have thin walls. Simply saying capillaries are thin was insufficient. There were many misconceptions about the structure of a capillary; some saying they had valves, a thick wall or a large lumen. Very few students understood the function of capillaries.

04.7 Over four fifths of students recognised how 5 000 000 is written in standard form.

04.8 Only a tenth of students scored both marks. Two fifths of students scored at least 1 mark which was usually for identifying Person X, who had the lowest concentration of platelets, as the person whose blood would not clot properly. Quite a lot of students thought Person X would also be most likely to have an infection.

04.9 Almost four fifths of students scored the first marking point for saying that more oxygen can be transported if there are more red blood cells. Knowing that oxygen is transported by red blood cells gained credit. Only a few students said oxygen is needed for respiration. Only a tenth of students scored 2 or more marks. This was usually for marking points 1 and 3, for example more oxygen can be carried so the athlete has more energy. If they said energy was made, produced or created the third marking point could not be awarded.

Question 5

05.1 Two fifths of students scored both marks for identifying the trachea and bronchus. Many students gave alveolus instead of trachea. A third of students scored 1 mark which was usually for the trachea.

05.2 Three fifths of students identified D, the alveoli, as where gas exchange occurs in the breathing system.

05.3 Two ways that the lungs are adapted for efficient gas exchange were needed. Just over a quarter of students scored 1 or more marks. Simply naming structures, such as the lungs have alveoli, was insufficient. A reference to many, or lots of alveoli was needed. The most common correct responses were many alveoli and large surface area. The small number of students who

scored 2 marks usually linked these together. Some students referred to the wall of the alveolus being thin or to the lungs having a good blood supply, both of which gained credit.

05.4 The question asked students to explain the differences between air breathed into the lungs and air breathed out of the lungs using data presented in a table. Students who only quoted values from the table, without describing how the gases changed, were awarded zero marks. Those who described differences for two or three of the gases, but did not give any explanations were limited to a maximum of two marks. Almost half of the students were awarded 2 or more marks.
Only a tenth of students gave a Level 2 response as differences and linked explanations were needed. The most common link was to say exhaled air contained less oxygen than inhaled air because oxygen is used by the body or is used in respiration.

05.5 A third of students gave a correct reason why the percentage of gases given in each column of the table did not add up to 100%. The most common reason was that there are other gases in the air.

Question 6

Question 6 was common to both tiers and was set at standard demand.

06.1 The vast majority of students selected cancer as a non-communicable disease. Only a tenth of students selected an incorrect disease, and these were evenly split across AIDS, gonorrhoea and malaria.

06.2 Three quarters of students scored the mark for naming a non-communicable disease that obesity is a risk factor for. Diabetes or heart disease, which are both listed in the specification were the most common responses. References to heart attack or heart failure were ignored as a named disease was required.

06.3 A quarter of 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.

06.4 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 Foundation tier well over half the students scored full marks. A tenth of students scored 2 marks. These were usually for a correct calculation, but then they did not give the BMI category. Just over a tenth scored 1 mark for identifying the correct BMI category for an incorrectly calculated BMI.

06.5 Over a third 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 see if she was healthy enough to have a baby, or to check the baby's health. Some described the harmful effects of smoking on a developing baby, which did not answer the question.

06.6 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. Half of the students scored at least 1 mark, and well over a tenth of students gave two correct conclusions.
The most common correct response was that non-smokers had heavier babies. Some students repeated this conclusion by also stating 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. Some students gave general recommendations to stop smoking and to eat a healthy diet, which did not answer the question.

06.7 The first marking point was for how the virus is transferred out of an infected person. Two fifths 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. Few students scored the second mark. Many thought the virus was transferred by direct contact or sexual intercourse. Some said the virus travels in the air, but they did not describe how it left one person and entered another.

06.8 Just over half the 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 attempted to calculate 1% of 67 961 900, then multiply this value by 17 to obtain their answer. Errors were often made when calculating 1%.

06.9 Only just over a tenth of students scored a mark for suggesting one way a person could reduce their chance of catching athlete's foot. References to washing feet regularly were very common which 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. Vague statements about wearing clean socks, or not wearing shoes and socks were common. 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 7

Question 7 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. Some students described how to prepare the slide, which did not gain credit as the students were told that they were provided with this.
On the Foundation tier most responses were in Level 1. Over half of the students scored at least 1 mark, and a fifth scored 2 or more marks. Some relevant points were given, for example, a correct equation to calculate the actual size of a cell, or a description of how to use a microscope. 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. Very few students on the Foundation tier gave Level 2 responses, and over a tenth did not attempt the question.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the Results Statistics page of the AQA Website.