AQA

GCSE

COMBINED SCIENCE: SYNERGY

Foundation Tier Paper 2 Life and Environmental Sciences
Report on the Examination

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Question 1

01.1 Two-thirds of students knew that the endocrine system produces hormones. The digestive system was selected by most other students.

01.2 Over half the students knew that hormones are transported around the body in the bloodstream. A third of students thought hormones are transported through the nerves.

01.3 Two-fifths of students identified the position of the pituitary gland on the diagram. Almost a third selected the pancreas instead.

01.4 Three-fifths of students identified the correct organ on the diagram that produces oestrogen.

01.5 Almost half of the students knew that body temperature is controlled by homeostasis.

01.6 Almost three-quarters of students correctly interpreted the graph showing blood glucose concentration to identify the time when the person started eating a meal. Most other students thought it was when the sugar concentration had increased, at position Q on the graph.

01.7 Four-fifths of students knew that insulin is produced by the pancreas.

01.8 Four-fifths of students identified the correct part of the graph when the concentration of insulin in the blood would the greatest.

01.9 Approximately a third of students suggested a valid cause for the fall in blood glucose concentration. This mark was usually awarded for stating the person had exercised, or that they had not eaten enough. References to sleep, and insulin unqualified, were ignored. Over-production of insulin scored the mark.

Question 2

02.1 Three-fifths of students interpreted the melting point and boiling point data to conclude that sodium is a solid at 90 °C. Most other students thought it was a liquid.

02.2 Over half of the students stated that sodium is a liquid at 1000 °C.

02.3 More than two-thirds of students scored full marks for determining the difference between the boiling points of two different solutions. The most common error was to make one incorrect graph reading.

02.4 More than three-quarters of the students scored at least 1 of the 3 marks. This was usually for stating the simple pattern that the boiling point increases as the mass of sodium chloride added to the solution increases. Just under a third scored 2 marks. The marking point referring to the boiling point remaining constant was the one less frequently scored.

02.5 A third of students scored all 3 marks for the calculation of energy for the change of state, giving the correct unit. Almost three-quarters of students scored at least 2 marks. The main error was giving the unit of energy as J/kg rather than J.

02.6 Most students knew that water particles will move faster as the temperature of water increases.

02.7 Most students stated that the boiling point of water increases as the pressure in the pressure cooker increases. Stating that the boiling point gets hotter was ignored.

02.8 Only a third of students scored a mark, usually for stating that an advantage of using a pressure cooker is that the food will cook more quickly. Few students could explain why this would happen. Incorrect suggestions included that the water would boil faster or the temperature of the water would be higher.

Question 3

03.1 More than two-thirds of students knew that water moves into the root hair cell by osmosis.

03.2 Fewer than a quarter of students scored any marks. Most students did not use a comparator. A reference to absorbing more water or minerals, or absorbing them faster was needed for the second marking point.

03.3 Fewer than a fifth of students gained 1 or more marks for explaining why root hair cells do not have chloroplasts. The following statements were ignored:

- root hair cells do not need chloroplasts
- root hair cells do not need to photosynthesise
- they are not green
- they do not contain chlorophyll.

03.4 Half of the students knew that water is an abiotic factor that affects plant growth. The most common incorrect answer was fungal disease.

03.5 More than half of the students stated that chlorophyll contains magnesium.

03.6 In order to enter Level 2, at least one advantage and one disadvantage of one of the fertilisers, plus a judgement, was required. Fewer than a fifth of students achieved this. Over half of the students scored 2 marks. Comparative statements were needed, not just statements lifted directly from the table – value had to be added. The most common responses were that fertiliser A was cheaper and it would not need to be used as often as fertiliser B.

Question 4

04.1 Four-fifths of students knew that a water wave is a transverse wave.

04.2 Few students scored any marks on this question. Reference to both the bar and the up and down, or vibrating, motion was required. Many students stated the motor vibrated, or the bar hit the water, both of which were ignored.

04.3 Few students knew that a measurement of time was needed to calculate the frequency of waves.

04.4 Four-fifths of students identified wave pattern B as having the greatest frequency, and two thirds of students gave a correct reason for their choice. All of the reasons listed on the mark scheme were given.

04.5 Fewer than a third of students gave a correct control variable. The most common correct response was that the tray was lifted 5 cm. A few stated the temperature of the water. Incorrect answers included the volume or depth of the water, which was the independent variable, or the time which was the dependent variable.

04.6 Over half of the students drew a straight line of best fit, using a ruler that touched all the points. Straight line extrapolations of the line were allowed. Lines which were extended to zero, or extended horizontally from 30 cm, did not follow the pattern and so were not creditworthy.

04.7 The speed of the water wave had to agree with the line the student had drawn. Most students gave a correct reading to score the mark.

Question 5

05.1 Most students knew that a quadrat is a square frame.

05.2 Almost three-quarters of students correctly calculated the mean number of plants in field A.

05.3 Three-fifths of students scored at least 1 mark, usually for calculating the area of the field. Few students realised that they needed to multiply the area of the field by the mean number of plants in a 1 m^2 quadrat to estimate the total number of plants on the field.

05.4 Only a tenth of students suggested a valid reason why there were more plants in field A than in field B. Many students repeated the stem of the question, but did not give a reason, and others stated that field B is a sports pitch, which was ignored.

05.5 Over a third of students scored full marks by giving three conclusions. More than two thirds scored at least 1 mark. Most students who scored full marks considered each column of the table in turn. Some stated that there were more insects in area P, but there was no data to support this in the table.

05.6 Half of the students suggested how biodiversity in field A could be increased. Most of these suggested planting more hedges, plants, trees or flowers. Stating ‘keep the hedge’ was ignored. A few suggested removing the hedge, which was incorrect. Some students attempted to explain why their suggestion would work, but this was not asked for.

Question 6

06.1 Just under a third of students knew meristem tissue is found in plants.

06.2 Half of the students scored all 3 marks and most scored at least 1 mark.

06.3 This question was set at standard demand, and only a tenth of students could suggest why some people believe using embryonic stem cells in medical research is unethical. A reference to harm, damage or death of a potential life was needed. Stating an embryo is a potential life was insufficient. If students referred to religion they had to clearly say that it goes against religious beliefs or teachings, not just that it goes against God or religion.

06.4 A quarter of students said bone cells divide for growth. Many repeated the example given in the question, that bone cells divide to repair damage.

06.5 Only a quarter of students knew that a group of mice not given the drug were used as a control.

06.6 This question was set at standard demand. Half the students scored 2 marks for describing the effect of the different drug doses on the volume of the tumour. Data had to be used at least once to score all 3 marks. Marks were usually awarded for stating that when the drug was injected once a day the tumour grew bigger, or when the drug was injected twice a day the tumour reduced in size.

Question 7

07.1 Over two-thirds of students identified bb as the genotype of a tawny owl with grey feathers. Most other students thought the genotype was Bb.

07.2 Most students correctly completed the Punnett square.

07.3 Fewer than half of the students correctly derived the probability of the offspring having brown feathers.

07.4 Two-thirds of students gave at least one conclusion from the bar chart, and almost a third gave two conclusions. Some students mixed up the feather colours of the owls.

07.5 The question about the process of natural selection was set at standard demand. Fewer than a quarter of students scored 1 mark. Some confused the terms predator and prey. Others gave vague statements about being able to hide, but they did not go on to give the consequence of this. As the command word was explain, logical links were needed.

Question 8

Question 8 was common with the Higher tier, and was set at standard demand.

08.1 Just over half of the students correctly listed the heart, muscle cell and nucleus in order of decreasing size. Some students listed them in the reverse order of size.

08.2 Few students identified the correct route that blood travels through the heart to the lungs.

08.3 When explaining why the wall of the left ventricle is thicker than the wall of the right ventricle a comparative statement was needed. The only exception to this was to state that the left ventricle had to pump blood all around the body, and only a few students did this. Few comparative statements were seen on the Foundation tier. Many students thought the left ventricle pumped more blood, which was ignored.

08.4 Few students knew that the valve labelled in the diagram would prevent blood from flowing backwards through the heart. Incorrect responses included stating the valve opens and closes, pumps blood or is to let blood into the heart.

08.5 A third of students knew that the pacemaker is located in the right atrium of the heart.

08.6 A quarter of students knew that the function of the pacemaker is to control the heart rate. The weakest answer allowed was that the pacemaker keeps the heart beating. Stating it keeps the heart pumping or working was insufficient.

08.7 Students had to study data given in the table and then explain the effect of an exercise training programme on the cardiac output of a person. Quite a lot of students just described what happened to heart rate, stroke volume and cardiac output without attempting an explanation. For the first mark, stating cardiac output increased was ignored as some value had to be added. Few stated that the cardiac output was similar, but stating it increased by 2 cm^3 per minute, or only changed a little were allowed. A lot of students just referred to heart rate, in beats per minute, rather than to cardiac output in cm^3 per minute. Almost a third of students scored 1 mark.

08.8 Half of the students scored 2 or more marks, and a quarter of students just entered the bottom of Level 2. Some students gave information about healthy diets and lifestyles, which did not answer the question. Others did give risk factors, but often they were not clearly linked to poor health or diseases. The majority of Foundation students gave vague statements such as eating too much junk food leads to obesity, which was a Level 1 idea. Specific examples such as eating too much fat can cause heart disease, or smoking can cause lung cancer, were required for the higher levels.

Question 9

Question 9 was common with the Higher tier, and was set at standard demand.

09.1 Only a tenth of students scored this mark. When testing a leaf for starch, the green colour needs to be removed from the leaf before carrying out the test so that the colour of the iodine solution can be seen. There were many references to the mixing of green and black, green can mess up the result, or green can mix with iodine. All of these were ignored.

09.2 A quarter of students scored 1 mark. The first marking point for saying the white area of the leaf turned brown, or did not turn black, with iodine solution was the one most commonly awarded. Hardly any students went on to explain that this indicated that there was no starch present. The third marking point linking the lack of starch to an absence of photosynthesis was rarely seen.

09.3 Two-fifths of students scored at least 1 mark, but few scored both marks.

09.4 Half of the students demonstrated experience of carrying out chromatography and gained the mark for stating a start line drawn in ink would run or smudge, or that it would mix with the solvent.

09.5 Calculating the distance moved by the yellow leaf pigment was straightforward for those who could rearrange the equation. Almost half the students scored 3 or 4 marks for a correct calculation. Few scored either 1 or 2 marks. The last mark was for rounding their answer that had used values given in the question, to 2 significant figures. Where an incorrect calculation had been made, this final mark could only be awarded if working had been shown.

09.6 Just over half of the students correctly analysed information given in the two tables to conclude that phaeophytin is brown.

09.7 Just under a third of students realised that different Rf values for the same pigments would be the result of a different solvent being used. Most students thought it was because a greater volume of solvent was used.

Use of statistics

Statistics used in this report may be taken from incomplete processing data. However, this data still gives a true account on how students have performed for each question.

Mark Ranges and Award of Grades

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