GCSE

COMBINED SCIENCE: SYNERGY

8465/1F

Report on the Examination

8465
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General

Questions 9–11 are common with the Higher Tier.

Students scored lower in questions where they had to apply their knowledge to novel contexts. Questions designed to test AO1, AO2 and AO3 will be found in all GCSE Science papers. Please see the specification for assessment objective weightings across the papers.

Students need to recognise the command words used, and to answer accordingly. Frequently, students are giving descriptions when answering an 'explain' question, and vice versa.

Multi-step calculations were problematic for students, with many stopping part way through a calculation. Students must bring a calculator and ruler for this examination. The mathematical requirements that may be examined can be found in the specification.

Levels of demand

Questions are set at two levels of demand for this paper:

- **Low demand** questions are designed to broadly target grades 1–3.
- **Standard demand** questions are designed to broadly target grades 4–5.

A student's final grade, however, is based on their attainment across the qualification as a whole, not just on questions that may have been targeted at the level at which they are working.

Question 1 (low demand)

01.1 45% of students could identify DNA as the name of the chemical that carries genetic information.

01.2 49% of students could recall that sperm cells and eggs cells are gametes. Almost as many thought these cells were genes.

01.3 Slightly more students selected that fertilisation produces sperm cells, compared with the correct answer of meiosis.

01.4 75% of students knew that sperm cells contain half the number of chromosomes as body cells and could apply that concept to the scenario given.

01.5 This question was very well answered with 71% of students applying the word dominant correctly.

01.6 91% of students could correctly derive the missing genotype as Bb.

01.7 75% of students could identify which of the offspring would have brown fur.

01.8 Many incorrect answers were seen, including vague statements such as likely or not likely. The number of incorrect percentages and fractions given suggests that whilst students are learning how to complete a Punnett square diagram, they do not fully understand the meaning of these diagrams.

Question 2 (low demand)

02.1 This recall question discriminated well and an even distribution of marks from zero to three was seen. 73% of students achieved at least one mark.

02.2 66% of students gave the number of protons, neutrons and electrons from the diagram.

02.3 Students found this question difficult, with 57% achieving full or partial credit.

Question 3 (low & standard demand)

03.1 67% of students could identify the correct formula for carbon dioxide.

03.2 60% of students could name the molecule shown as carbon dioxide.

03.3 Students found it difficult to use a percentage calculation in this way. Many incorrect answers of 4620 were seen, rather than 46.2 or 46.

03.4 Few students used the term incomplete combustion or described the process. 5% of students achieved full marks. Many incorrect answers stated carbon monoxide comes from fuels unqualified.

03.5 74% of students realised that red blood cells would be the component of the blood most affected by carbon monoxide.

03.6 54% of students could identify two effects a decreased concentration of oxygen could have on body cells. Despite being asked to tick two boxes, 10% of students only ticked one box. The number of ticks required for a multiple choice question is given in bold font.

03.7 30% of students could give a problem caused by acid rain. Vague answers regarding harms the environment, or pollutes, were not awarded the mark.

Question 4 (low & standard demand)

04.1 17% of students could name the hole in the leaf a stoma or stomata.

04.2 10% of students could name a guard cell. Many students incorrectly named cell components.

04.3 49% of students could correctly use the term osmosis or transpiration, with few being able to achieve both marks.

04.4 Students were asked to tick two boxes but nearly 20% of students only ticked one box. 19% of students got both answers correct, and 65% of students achieved one mark. More students were aware that increasing temperature increases water loss from stomata, rather than increasing wind speed.

04.5 23% of students could give a reason why the movement of water in plants is important. 'For photosynthesis' was the most common correct answer. Those who did not gain the mark often gave vague answers, such as 'to keep the plant alive'.

04.6 Students found this question difficult with 9% of students answering correctly. Many referred to leaves taking in water or blocking water from reaching the roots. Few referred to less water loss or decreased transpiration.

04.7 69% of students could calculate the real width of the cell, given the equation in the question. Fewer could convert from millimetres to micrometres, with many dividing by 1000.

Question 5 (low & standard demand)

05.1 75% of students could not give an example of an internal condition controlled by homeostasis. Many repeated the example given in the stem of the question.

05.2 This question was answered well with 60% of students achieving credit. There were instances of students reading from the scale of the graph incorrectly.

05.3 45% of students could interpret the graph to suggest at what time the person ate lunch.

05.4 52% of students could identify the hormone injected by the person with diabetes as insulin. A variety of reproductive hormones were incorrectly stated for this question.

05.5 Students found this very difficult with 10% answering correctly. Most students gave incorrect statements regarding insulin, glucose and glycogen. Many referred to glucagon in incorrect contexts.

05.6 51% of students could apply their knowledge to the graph to suggest the person injected too much hormone.

05.7 Many students stated that blood glucose concentration would increase during a run. This was allowed if it was linked to glucagon release. Few students made that link. Many students stated that exercise gives us energy, so glucose increases, highlighting several misconceptions. The usual misconceptions of glucose making or producing energy were also seen. 54% of students achieved any credit for this question.

05.8 26% of students suggested how the graph would differ for a person who does not have diabetes.

Question 6 (low & standard demand)

06.1   45% of students knew that the term community is all the organisms in an ecosystem.

06.2   53% of students could identify a secondary consumer from the food web.

06.3   78% of students could identify that algae are producers.

06.4   Few students applied their knowledge of algae to the need for light for photosynthesis. 32% of students achieved any credit for their answer. The question had included a prompt that algae photosynthesise. Many students referred to algae being safe from predators near the surface, or sometimes even, nearer the prey of algae near the surface.

06.5   Most students could recall that animals compete for mates or territory.

06.6   59% of students could interpret the food web. Common mistakes involved reading the arrows on the food web the incorrect way, such as fish eat seals.

Question 7 (low & standard demand)

07.1   77% of students knew gamma rays are a type of electromagnetic radiation.

07.2   66% of students knew that a thick sheet of lead would be the best absorber of gamma radiation.

07.3   Over half of students knew that bacteria on food are killed to decrease the rate of decay of food. Fewer knew that this helps prevent food poisoning, with many believing it removes dirt from food.

07.4   19% of students knew that gamma rays kill bacteria by causing mutations. Most students responded that gamma rays decrease the size of bacterial cells.

07.5   34% of students could select both choices describing how food producers could increase the level of radiation that the food is exposed to.

07.6   3% of students understand that for food to be radioactive, the source needs to be within the food itself.

Common misconceptions and incorrect answers seen include:

- bacteria / viruses / pathogens are affected by the gamma radiation, but the food itself isn't
- irradiation is the opposite of radioactivity
- it is impossible for food to be radioactive
- the food was not exposed to the gamma rays for long enough to become radioactive.

Question 8 (low & standard demand)

08.1   50% of students gave one safety precaution the students should take. Most of these students gave the idea of safety goggles. Gloves was an insufficient answer, as were general safety measures such as wearing safety clothing, lab coats, or keeping away from fire.

08.2   50% of students knew that iodine solution is used to test for starch.

08.3   61% of students knew the positive result of a test for starch.

08.4   32% of students could correctly select both words from the box add to the sentences to describe chromatography.

08.5   This question discriminated between students well. 24% of students achieved a mark for showing the correct working, but then incorrectly rounded, or could not give their answer to two significant figures. 45% of students achieved full marks.

08.6   81% of students could identify carotene from the R_f value and Table 3.

Question 9 (standard demand)

09.1   83% of students gave the incorrect answers of fat, protein or fibre, demonstrating a lack of understanding of digestion. Glucose, sugars and carbohydrates were also frequently seen, which did not score a mark, given the way the question was phrased.

09.2   28% of students could calculate the mass of sugars in 180 g of sweet potato, when given the mass of sugars in 100 g of sweet potato.

09.3   'Level descriptors' are used to mark 'extended response' questions such as this. Level 2 and level 3 answers require students to make unprompted links between aspects of an explanation. For example, responses that only referred to processes in the leaf rarely contained relevant links to answer the question. 3% of students were able to answer sufficiently to enter level 2 or level 3.

Many students incorrectly refer to carbon dioxide mixing with water in an attempt to describe photosynthesis. Major misconceptions were frequent, such as carbon dioxide being taken into the roots from the soil, and photosynthesis occurring in the roots.

Question 10 (standard demand)

10.1   Most students made a good attempt at selecting a linear scale and labelling the *x*-axis. The label should include the unit.

Plotting was generally correct on major gridlines, but many plotting mistakes were seen. The line of best fit was a smooth curve in this instance. Straight lines of best fit and dot-to-dot did not gain the fourth marking point.

This question discriminated well with 82% of students achieving some credit, and 42% achieving three or four marks.

10.2   2% of students could calculate the gradient of the graph. Students need to ensure they bring a calculator to the exam so as not to be disadvantaged in these calculation questions. When attempted, a single value was often read from each axis, and then divided.

Students did not appear to notice that the *y*-axis does not begin at zero, requiring a difference between two points on each axis to be determined before dividing.

10.3 Many students used the final temperature, rather than calculating the temperature change. Three out of four marks were still available for subsequent stages if the correct method was used. Answers frequently used the time in seconds, rather than the temperature change. Again, subsequent marks were available.

Most students did not attempt the unit conversion from joules to kilojoules. Of those who attempted the unit conversion, as many multiplied by 1000, as divided by 1000.

10.4 Students could generally give one control variable (29% of students), but few (11%) gave two correctly. Many incorrect answers of 'temperature' unqualified were seen. At this level, simple statements to keep it a fair test, or to use the same equipment, with no detail given, are insufficient.

Question 11 (standard demand)

11.1 80% of students could link one or two methods of contraception to how it works, but few could correctly link all three methods

11.2 32% of students could describe that a low dose of a new drug would be given because there may be harmful side effects.

11.3 This was an 'extended response' question, asking students to evaluate the use of three contraceptive methods. Students should know that marks will not be awarded for repeating information given in the question. Evaluate means students should use the information supplied, as well as their knowledge and understanding, to consider evidence for and against. Guidance regarding command words can be obtained from the AQA website.

Some students misinterpreted the percentages in the table as referring to the percentage use of each method of contraception. The strongest answers evaluated aspects from the table, and students own knowledge, such as prevention of sexually transmitted infections.

60% of students were able to give level 2 or level 3 answers.

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.