



General Certificate of Secondary Education

Science A 4406

SCA1FP Unit 5

Report on the Examination

2012 examination – June series

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

Copyright © 2012 AQA and its licensors. All rights reserved.

COPYRIGHT

AQA retains the copyright on all its publications. However, registered schools / colleges 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 schools / colleges to photocopy any material that is acknowledged to a third party even for internal use within the school / college.

Set and published by the Assessment and Qualifications Alliance.

Science A
Foundation Tier SCA1FP**General**

There were 17 questions on the Foundation Tier paper. Questions 1–11 targeted grades E–G; Questions 12–17 targeted grades C–D and were common with the Higher Tier paper.

Some command words were not fully understood by significant numbers of students. ‘Explain’ generally means give the reason for. The answer should normally contain link words such as ‘because’ or ‘so that’. Full marks can only be gained for a full explanation. ‘Give a conclusion’ does **not** mean describe the data. Where questions ask for a difference between two items a comparison must be made in the answer, for example, by using terms such as ‘quicker’ or ‘more than’. A description of just one item would not gain credit. Where three or more items are being compared an absolute comparator should be used, for example, least, longest etc.

The Quality of Written Communication (QWC) question (question 17) was generally well attempted. Only a few students lost a mark for not using good English, or failing to organise information clearly.

Many students did not confine their answers to the spaces provided, instead writing in the margins or blank parts of other pages. These portions of the script are not scanned and the examiner may not be able to read what is written there.

Question 1 (Low Demand)

- (a) The most common error was for the seedlings in the dark. Many students thought they would not grow at all. Some students had the seedlings in light from one side bending in the wrong direction, away from the light.
- (b) (i) ‘Control in plants’ is a new topic to the specification and continues to cause problems. Only a fifth of students selected the correct response, phototropism, as the response of plants to light. The most common response was photosynthesis. Many students did not clearly indicate their selected response because they had not followed the instruction. Often more than one word was circled or changes to the answer were not clear.
- (b) (ii) Very few students knew that auxin controls the response of plants to light. Various human reproductive hormones were named as well as plant organs, cell structures and the words listed in question (b)(i). A tenth of students did not attempt this question.

Question 2 (Low Demand)

- (a) A general lack of knowledge about the three drugs was demonstrated. The most common correct answer was for anabolic steroids stimulating muscle growth.
- (b) The majority of students realised that the trial should be stopped because the majority of volunteers in the small sample had adverse effects, so scored the first mark. Not all were able to express in terms of side effects why the trial should be stopped giving general answers such as ‘people might die / be harmed’

Question 3 (Low Demand)

- (a) (i) This question was answered fairly well but a significant number of students still failed to add the numbers correctly.
- (a) (ii) Few students linked the extra energy to an increase in weight. There were many comments about the person being more or less tired, or having too much energy. There were many references to BMR.
- (b) (i/ii) Well over half of the students got both parts correct. The most common error made was indicating 'underweight' in the first part. Of the students who did this, the majority still picked up a mark in the second part by indicating 'eat more food'

Question 4 (Low Demand)

- (a) (i) Very few correct responses were given. Incorrect suggestions included water, sodium, energy, exercise and other activities, breath, blood and 8g.
- (a) (ii) Students need to take care when using numbers. Many answers of 15 g or 0.15 g were given.
- (b) (i) Many responses mentioned more sweat would be lost, but did not go on to say that the mass of sodium ions lost would therefore increase.
- (b) (ii) Many students stated that the boy should drink fluids or water. Some said eat sugary or healthy foods. Neither of these responses was enough to gain the mark as a reference to salt or sodium ions in the fluid or food was needed. A lot of students had not read the question properly and just described things to do after exercise, such as cool down, wrap up or rest, and made no reference to sodium ions. Hardly any students linked sodium ions to salty food. Answers such as 'eat more sodium' were common.
- (b) (iii) Just over a quarter of students gained full marks and the majority of students scored at least one mark. The most common responses referred to the body becoming dehydrated so water should be drunk, or heart rate increased so they should rest. Many students gained one mark for giving general suggestions of what to do after a race, but they had not clearly stated how an internal condition, other than concentration of sodium ions, might change.

Question 5 (Low Demand)

- (a) (i) The majority of students gave the correct response selecting 'unreactive'. A few students selected 'coloured'.
- (a) (ii) More than a third of students thought that gold is an element because all of its molecules are the same. Few selected that gold is an element because its symbols are the same.
- (b) Many responses gave the numbers for protons and neutrons the wrong way round or the number of neutrons being the same as the mass number.

-
- (c) (i) The most common response was a mixture of two metals. Some students went on to say that an alloy was stronger than a pure metal. Marks were lost when students said the metals formed a compound. Some responses simply gave examples of alloys, for example, steel or bronze, which was not enough for the mark.
- (c) (ii) Only a fifth of students answered this question correctly. Many students said bronze was cheaper than copper, even though the question stated that they cost the same. Other incorrect responses stated that bronze was less reactive, lighter, or easier to get than copper. Many thought that copper rusts.

Question 6 (Low Demand)

- (a) (i) Many students said the quarry would provide more jobs or increase trade. Uses of limestone were often mentioned but ignored, as were references to the quarry being a tourist attraction.
- (a) (ii) Most correct responses mentioned noise or dust pollution. Many students just said the quarry would cause pollution, which was too vague. A specific example had to be given.
- (b) (i) The majority of students selected the correct formula for limestone.
- (b) (ii) Approximately, equal numbers of students selected either carbon dioxide or carbon monoxide as one of the products formed when limestone is heated. Few gave oxygen as the answer.
- (b) (iii) A fifth of students thought heating limestone is an oxidation reaction. The remaining students were roughly split between selecting combustion or decomposition.

Question 7 (Low Demand)

- (a) The majority of students knew that biofuels are renewable resources, but a significant number thought they are made from crude oil. Many students did not follow the instructions and ticked either only one statement or more than two statements.
- (b) A third of students scored full marks for this question. Many students said there were no oxygen atoms and five hydrogen atoms in ethanol.
- (c) (i) Almost all students answered this question correctly. It was good to see so many correct bars drawn using a ruler.
- (c) (ii) Many responses just repeated information given in the question, such as 'rapeseed is widely grown'. This was not enough for the first mark as there is no value added. Some students gained this mark for saying that it would not have to be imported. Many students said that rapeseed releases the least energy of the three oils as a disadvantage, whilst others thought that having yellow flowers was a disadvantage.
- (d) Comparative statements were needed. Many students just quoted figures for one of the fuels, so did not gain marks. Some students did not understand the figures given for the sulfur content and thought biodiesel contained the most sulfur. Others talked about the amount of sulfur emitted, which was incorrect. Very few mentioned sulfur dioxide emissions.

Question 8 (Low Demand)

- (a) Almost two-thirds of students gained three marks. Of the incorrect responses, many students named electrical energy in the batteries, rather than chemical, and chemical energy in the wires instead of electrical.
- (b) (i) Many students carried out a calculation to work out the efficiency of the fan, even though this was not necessary given the figures on the diagram. Quite a few added all three numbers up to give an answer of 200, or described the efficiency as being 'good' rather than giving a figure. Some quoted that 30 % of the energy was wasted, which did not answer the question.
- (b) (ii) By far the most common answer was that the energy transferred from the fan decreases the temperature of the surroundings. Less than a third of students selected 'increase'.

Question 9 (Low Demand)

- (a) Over half of students gained two marks. A common error was to give water instead of liquid, and air instead of gas.
- (b) This question on convection currents was very well answered with the vast majority of students completing all of the boxes correctly.

Question 10 (Low Demand)

Question 10, as a whole, demonstrated a lack of understanding of factors that affect the rate of cooling of an object.

- (a) Shape A was most often matched correctly to the middle line on the graph. The other shapes were sometimes given in the wrong order, labelling B, which had the largest surface area, as cooling the slowest.
- (b) (i) The correct answer of '0–2 minutes' was given by just under half of the students. Almost as many students opted for '4–6 minutes', suggesting that cooling curves are not well understood.
- (b) (ii) Around half the students selected the correct answer, but almost as many opted for 'a small temperature difference between the three shapes' as the reason for the shapes cooling the fastest.
- (c) Less than a fifth of students gained at least one mark. The majority of responses referred to changing the size, shape or surface area of the clay, all of which were ignored. Some students said 'make its temperature different' which was not enough for the mark; they needed to say increase its temperature. Some students did not understand what a rate is and suggested increasing the time allowed for the shape to cool. Almost a fifth of students did not attempt this question.

Question 11 (Low and Standard Demand)

- (a) (i) Usually students are asked to give a control variable. This question asked students to give a variable the engineer controlled. The different way of asking the same question confused many students. The most common response was to give the independent variable - the angle of the panel. When a correct answer was given it was usually the size of the panel.
- (a) (ii) Many students used poor language so did not gain the mark. Most said that black attracts heat, when the word absorb was needed. Others said black absorbs light or Sun, rather than heat.
- (b) (i) Most students gained the first marking point for describing the pattern, but few gained the second marking point. Generally a more detailed description is needed for two marks. Some students tried to explain the change, but this was not creditworthy. When a description of a graph is asked for it is best to use the labels given on the axes to describe the changes, rather than alternative language which may not be scientifically correct.
- (b) (ii) Students who gave a value between 0 and 20° gained two marks. Many just said a small angle or pointing directly towards the Sun which gained one mark.

Question 12 (Standard Demand)

This question was common with the Higher Tier paper. Some students knew some of the words used to describe the structures involved in a reflex action, although they were often given in the wrong order. The receptor was often incorrect, with sensory neurone frequently being given as an incorrect response here. Sensory and motor neurones were sometimes named correctly. A range of responses were given for CNS. Spinal cord was allowed, but incorrect answers included relay, which was already given in the sentence, synapse and brain, demonstrating some knowledge but not sufficient to gain a mark. Spine and spinal column were not allowed as these are made of bone. For effector, several students gave reactor, contractor or gland. Unfortunately a lot of students did not know any of the words and wrote nerve in several of the spaces. Only half the students gained at least one mark for this question.

Question 13 (Standard Demand)

Some responses demonstrated a good understanding of the precautions required when preparing agar plates. However, in many cases students had not read the question properly and described how to reduce risk to the experimenter rather than only growing bacteria from the milk. They talked about incubation temperatures and how to prevent bacteria escaping from the Petri dish, rather than preventing microbes from the air entering the dish. Many students mentioned sterilising the equipment, or gave a description of this which was allowed, but did not go on to say that this killed bacteria. A few mentioned wearing gloves, but did not say that they had to be sterile. A large number of students said the dish had to be sealed and some thought it had to be airtight, which was ignored.

Question 14 (Standard Demand)

- (a) This common question was poorly attempted, but it was good to see that when it was answered most students wrote the formula using capital letters and subscripts. There were only a few who wrote lower case letters or numbers that were as large as the symbol letters or superscripts. Writing an incorrect formula, such as C_3H_6 or C_3H_{6+2} were the most common errors.

- (b) A well answered question with over half of students answering correctly. However, a fifth of students did not attempt it. Errors made included a double bond in the structure or no bonds being drawn between the carbon atoms. Many students just added one hydrogen atom to show methane.
- (c) A poorly answered question with only three-quarters of students making an attempt. Very few students knew the products of complete combustion of a hydrocarbon. A surprising number of students included various oxides and hydroxides of butane as one of the products. Other incorrect inclusions were hydrogen, carbon, butane, butene, hydrocarbon and propane. Often when formulae were given they were written incorrectly with superscripts so could not be credited. It is advisable that students write the names of chemicals if a word equation is asked for.
- (d) Another poorly answered question, with no students gaining full marks with a fifth of students not making an attempt. Few students knew that smoke contains carbon, with many thinking that smoke is carbon dioxide. Many responses just included information given in the question. A few said that smoke is produced due to incomplete combustion and mentioned the production of carbon monoxide but not carbon.

Taking questions (c) and (d) together, students do not know the products of complete and incomplete combustion of hydrocarbons.

Question 15 (*Standard Demand*)

- (a) Many students drew the correct electronic structure of 2,8,7. Some errors were made with counting, especially when the electrons were positioned separately. Fewer errors were made when students drew the electrons in pairs.
- (b) Just over a tenth of students were able to score at least one mark for this question. Just over a fifth of students did not make an attempt. Some students seemed to be describing the reaction of lithium with water, mentioning a coloured flame, fizzing or an explosion. Many responses gave vague statements about lithium joining or bonding with chlorine without explaining what happened to the lithium atom, which was what the question asked. There was much confusion with covalent bonding and sharing electrons, which limited the answer to a maximum of two marks. The transfer of atoms, rather than electrons, was often mentioned. A lot of students picked up one mark for mentioning that a full outer shell was achieved.

Question 16 (*Standard Demand*)

- (a) Many students were confused by having two independent variables and answered in terms of the effect of temperature on humidity, rather than the effect of each of these on the drying time. A lot of students gave two correct converse statements about one of the independent variables to gain one mark, but others gave contradictory statements so negating the mark. There were a lot of vague responses stating that temperature affects the drying time, but did not explain how it affects it. There were many responses that quoted data from the table. Describing data is **not** a conclusion. Just under a fifth of students were credited with two marks.
- (b) Many students had not read the question properly and restated temperature or humidity as a factor. A third of students did answer correctly with the most common correct answer given being the amount of paint applied.

Question 17 (Standard Demand)

In this question students were assessed on both their scientific knowledge and ‘QWC’ - their ability to use good English, organise information and use appropriate specialist terms. In most cases the level of QWC matched their level of scientific knowledge.

Students were asked for three pieces of information about energy transfer from both the roof **and** windows of a house: to name the processes of energy transfer, to suggest methods to reduce the rate of energy transfer and to explain how the methods reduced the rate of energy transfer. Most students made reference to both roof and windows, usually giving two correct methods to reduce energy transfer to gain two marks at Level 1. To progress to Level 2, students had to also mention at least one process and attempt to explain at least one of the methods. The processes were often omitted or incorrect, limiting the marks to two. For Level 3, a detailed description for both the roof and windows was required, to include a process of energy transfer, a method to reduce it and an explanation of the method for each area of the house. Students should be guided to read questions carefully and follow the instructions given. Where processes were given they often demonstrated a poor understanding of conduction, convection and radiation. Heat was often said to rise, rather than hot air. Air being a poor conductor, or air being trapped in insulation were rarely mentioned. Few responses said that energy is transferred through glass by conduction.

Grade boundary ranges aqa.org.uk/gradeboundaries

UMS conversion calculator www.aqa.org.uk/umsconversion