



General Certificate of Secondary Education

Science A 4406

SCA2FP Unit 6

Report on the Examination

2012 Examination – January series

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Science A
Foundation Tier SCA2FP**General**

There were 14 questions on the Foundation Tier paper. Questions 1–11 targeted grades E–G. Questions 12–14 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.

The Quality of Written Communication (QWC) question (question 13(b)) was generally well attempted, but significant numbers of students lost marks by 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.

In the opinion of the examiner, the majority of students had sat this examination too early in their course as exemplified by the large number of part-questions that were not attempted and the general lack of understanding of many topics.

Question 1 (Low Demand)

- (a) This question was very well answered, but several students lost marks because they drew more than one line from a plant. The most common error was to link large colourful flowers and a strong scent, for the Azalea, to absorbing lots of light.
- (b) It was reassuring to see almost half the students gaining full marks for this open question about factors that plants compete for. The majority of students correctly gave space, light and water. Some just wrote ‘Sun’ which was not enough to gain the mark and many wrote food, soil or a named gas. A few students thought plants competed for mates.

Question 2 (Low Demand)

- (a) Most students selected the correct answer, but a few thought that simple life forms first developed on Earth more than 3 million years ago, rather than 3 billion years ago.
- (b) Some students did not use the words from the box and many confused the terms mutation and evolution. Almost two-thirds of students were credited at least two marks for this question.
- (c) (i) Some students gave more than one answer so could not be given the mark, even if crocodile was one of them. Some said reptiles, but if crocodile was not mentioned they could not gain credit as the question asked for an animal. It is important to use the words given in the question. Some gave the name of a bird as the answer, when the question asked for the animal most closely related to birds.

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- (c) (ii) Most students answered this question correctly. An answer of 120 million years ago was often given as students had read the scale on the diagram the wrong way up. Answers of 80 years ago did not gain credit.

Question 3 (Low Demand)

- (a) This question was well answered with nucleus being the most common correct label. The most common error was to mix up chromosome and gene. 'Gamete' was sometimes incorrectly used to label the gene, but 'characteristic' was rarely used for any label.
- (b) Once again, with linking boxes the most common error was to have extra lines drawn. Students should be encouraged to do these in pencil first so they can be erased. Quite a lot of responses had a characteristic linked to 'affected by neither genes nor the environment', suggesting a lack of understanding. However, most students gained at least one mark for this question.

Question 4 (Low Demand)

The carbon cycle is a new topic for this specification, which was reflected in few students gaining top marks. Many responses used words from Question 2(b) about variation and evolution. Pollution or decay was seen frequently for D, combustion. The most common correct responses were either photosynthesis or respiration. As a process was asked for, an answer such as 'food' was not enough for the feeding mark.

Question 5 (Low Demand)

- (a) Over a third of students achieved full marks. 'Core' was the structure that was most often labelled correctly, followed by 'mantle'. 'Atmosphere' was the least well known, often being referred to as the outer crust or ozone layer. Responses were often doubled up, with one part being referred to as the inner core, crust or mantle and another part as the outer.
- (b) Most students were able to interpret the bar chart and realised that carbon dioxide was the main gas on Mars. 'Noble gases' was the most common distracter for the other two answers, with gravity being the most frequent response that was not a gas. Almost all students did gain at least one mark.

Question 6 (Low Demand)

- (a) (i) Most students answer this question correctly. The most common incorrect responses were 1 g and 5 g.
- (a) (ii) This question was mostly answered correctly, however, of the incorrect responses several students did not realise that they had to do a subtraction, or they subtracted the wrong numbers, eg 46–45. Many students had number lines written in their responses, suggesting that they did not have a calculator with them.
- (a) (iii) Many students do not understand what a conclusion is and simply described or copied data from the table.

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- (b) (i) A large proportion of students were not able to interpret the data given in the table and some may not have realised that room temperature is normally taken to be 20 °C. Several students named more than one oil.
- (b) (ii) Many students realised that palm oil was the least healthy to eat, but did not gain the second mark as they failed to make a comparison with the others. They just said 'it had a high percentage of saturated fat' or 'had 52 % saturated fat'. Olive oil was often given, with the reason that it contained the most unsaturated fat.
- (c) Few students appreciated that oil's higher boiling point meant that the food could cook at a higher temperature. There were many incorrect references to boiling and melting points. Others thought that the oil heated up quicker.

Question 7 (Low Demand)

- (a) Most students were able to identify fuels for use in cars. There were many unusual answers for the name of saturated hydrocarbons, and the terms monomer and polymer were often confused. Almost all students gained at least one mark for this question.
- (b) The use of broken pottery as a catalyst in the cracking of decane was not well known. Many thought it was a barrier, insulator or conductor. Incorrect responses for the two hydrocarbons included decane or octene for octane, and polyethene, ethane or ethanol for ethene.

Question 8 (Low Demand)

- (a) Most students scored a mark for this question. For incorrect answers, longitudinal and transverse were often given the wrong way round.
- (b) Most students achieved full marks however, once again, several students drew more than one line from each box. The most common error was linking refraction to the diffraction diagram.
- (c) (i)+(ii) These questions were well answered with a few students putting answers B and D the wrong way round.

Question 9 (Low Demand)

- (a) A very well answered question. The most common incorrect response was 3 cm.
- (b) Less than half of students answered this question correctly. The most common incorrect response was 20 with others giving an incorrect answer of 0.2.
- (c) Most students gained full credit for this question. A number of students were able to substitute correctly into the formula but were then unable to calculate 20×0.5 . Some students selected the wrong equation.
- (d) Generally, graph skills were poor.
- (d) (i) Most students correctly circled the anomaly.

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- (d) (ii) The drawing of a line of best fit was done very badly with only a tenth of students gaining one mark. Many students did not appreciate that a line of best fit can be a curve or they did not include the (0, 0) point. Sometimes a ruler was used to join the points with straight lines, or a curve that had little relationship to the points was drawn.
- (d) (iii) Some students did not use the line they had drawn to take the graph reading. Others had a guess without drawing any line at all. Just over a third of students gained credit for this question.

Question 10 (Low Demand)

- (a) A range of errors was made in this question. Some students gave the names of rays already given in the spectrum, the names of appliances or words such as transverse, sound, solar, electric, gametes, satellite and indicator. Some wrote visible but with no mention of light and a few wrote invisible. The position of gamma in the electromagnetic spectrum was better known than that of light.
- (b) Once again extra lines were drawn. The methods of transmission for satellite and terrestrial TV were not well known, with most thinking that satellite TV was transmitted by radio waves and terrestrial TV by microwaves or UV rays. Almost a fifth of students achieved full marks.

Question 11 (Low Demand)

- (a) Many students were able to give an acceptable conclusion, but others simply described parts of the data. To gain credit, statements had to be comparative eg 'mobile phone use has a greater risk (than using corded phones)'. Many answers simply said 'using mobile phones affects the number of sperm'.
- (b) Over half of students scored at least one mark for this question. A larger sample or the inclusion of men not at the fertility clinic were the most common correct responses. There were many unqualified answers relating to the hours of mobile phone use or the use of different phones. Some students said women and children should be included.

Question 12 (Standard Demand)

- (a) This type of question had not been set before but almost a quarter of the students gained full marks. The range of acceptable answers for two marks was 32 %–42 %. Students were awarded one mark if they gave an acceptable number of squares covered by the plant (acceptable range 8–10.5), but failed to calculate the percentage correctly.
- (b) (i) This question required a description of the distribution of the two species and quite a lot of students gained both the available marks. Students awarded one mark generally described the distribution of only one of the species, or said 'where the number of one plant is high the number of the other plant is low'.
- (b) (ii) This question asked students to suggest reasons for the distributions they had described in part (b)(i). Consequently, the majority of students failed to make suggestions and merely again described the differences in the distribution. The most common adaptation given was that Ribwort plantain is taller, but these students had difficulty in articulating why this was an advantage. Less than a tenth of students gained both marks.

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- (c) Almost half of the students gained a mark for stating that there would be more plantains in the football field because of lower human influence, however there were few two mark answers seen.

Question 13 (Standard Demand)

- (a) (i) Although the specification clearly states that students 'should know that scientists once thought that the features of the Earth's surface were the result of the shrinking of the crust as the Earth cooled down following its formation', a tiny proportion of students could quote this statement. The vast majority ignored the diagrams and gave descriptions in terms of tectonic plates. Some students mentioned Lamarck, the Big Bang and weathering and erosion.
- (a) (ii) Only a third of the students were able to give suggestions in terms of evidence. Most gave very confused answers about the wrong theory.
- (b) In this question students were assessed on their ability to both describe how the positions of the continents had changed and to explain the processes that had brought about change. They were also assessed on QWC - their ability to use good English, organise information and use appropriate specialist terms. Significant numbers of students lost at least one mark by not observing the QWC criteria. The majority of Foundation Tier students gained one or two marks, but some did give Level 2 and Level 3 answers and the question was generally well attempted. Students were usually able to describe the movement of continents, but were not able to explain why this occurred. Tectonic plates were generally well known, but the processes that caused movement of the plates were often poorly explained.

Question 14 (Standard Demand)

- (a) It was surprising how few students could name a nuclear fuel. Fossil fuels were named by many students.
- (b) Many students could name the generator, but fewer could name the turbine. Correct labelling of the boiler / heat exchanger was rarely seen. Several thought that step-up or step-down transformers were part of the power station.
- (c) (i) Around a third of the students gave step-up transformer, others generally gave step-down or just named parts from the diagram, eg pylon.
- (c) (ii) Only about a third of students realised that the voltage was increased, but relatively few went on to explain that this increase would result in decreased energy loss from the cables. Many students answered unacceptably in terms of power or voltage loss, or electricity moving through the cables faster.
- (d) About half of the students were able to give one acceptable factor, usually cost or the disposal of waste. There were many vague answers in terms of pollution, non-renewable fuels and 'danger'. Many students gave pre-prepared answers in terms of advantages and disadvantages of nuclear fuels which did not really address the question set.

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