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General Certificate of Secondary Education

Science A 4406

SCA1FP Unit 5

Report on the Examination

2012 Examination – January series

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Science A
Foundation Tier SCA1FP

General

There were 15 questions on the Foundation Tier paper. Questions 1–10 targeted grades E–G; Questions 11–15 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 must be used, for example least, longest etc.

The Quality of Written Communication (QWC) question (question 12), 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.

Question 1 (*Low Demand*)

(a) (i) This question addressed a topic new to the specification leading to considerable variation in responses. The most common correct response was 'nucleus'. Many students gave 'synapse' for one of the labels.

(a) (ii) A surprising number of students did not know that light receptors are found in the eyes.

(b) Many responses did not give the names of sense organs despite the question and table heading asking for these. The specification gives the names of sense organs and type of receptors found in them.

Question 2 (*Low Demand*)

(a) Students scored well but sometimes mixed up ovary and uterus. A few thought that embryos were inserted into the pituitary gland.

(b) (i) Many students were confused by other data in the table, referring to the number of treatments or to the percentage of successful pregnancies rather than number of embryos transferred. A significant number of students attempted to explain the effect of age on fertility. As the question asked how one factor affected another, a relationship was needed. Writing 'it increases' would not score without reference to the changing age of women. About half of students were able to obtain this mark.

(b) (ii) Many unacceptable responses referred to vague ideas of ethical issues, such as 'some people don't like it' and the common 'it's against their religion'. Some students incorrectly referred to selecting characteristics during IVF and others thought it would not be their baby. Some students believe 'older women can't care for children'. Generally, there is a good understanding of the high cost of IVF treatment, but few who discussed this elaborated in enough detail to link this with the chances of successful treatment. Some students described data not directly linked with the question, for example 'more embryos transferred in older women' without going on to explain why this is an ethical issue.

Question 3 (*Low Demand*)

(a) Most students were able to gain at least two marks for this question. A common incorrect response was ‘stop pathogens entering the body’. Some students confused antibodies and antibiotics.

(b) Many students answered in terms of bacteria fighting the antibiotic or being stronger than the antibiotic. Others thought the body was resistant or rejected the antibiotic.

(c) (i) About half of all students gained a mark for this question. Some students shaded the box as indicated by the key, rather than giving the letter. These answers gained credit.

(c) (ii) A lot of responses gave values greater than 100 %. A common mistake was to use figures from the wrong years or to misread the scale. Some students thought they had to calculate a percentage rather than just do a simple subtraction. They appeared not to understand the term ‘difference’ or had not read the label on the y-axis. Some wrote down 54–46 but did not get the correct answer. Students who have poor maths skills should be encouraged to check all their answers using a calculator.

(c) (iii) A wide range of incorrect responses was given and less than a fifth of students were able to score at least one mark. Many thought the bacteria got used to the antibiotic, could fight it or got stronger. Others said the wrong antibiotic or dose had been given or that a new antibiotic was used instead. Once again, many students thought the body became immune to the drug. Some thought it was related to more or less people catching pneumonia. Antibiotic resistance and immunity are misunderstood and often confused.

Question 4 (*Low Demand*)

Most students were able to score one mark with almost a third of students gaining full marks. Many students gave the correct responses for copper and gold. Aluminium was the most common incorrect response.

Question 5 (*Low Demand*)

(a) Almost all students scored at least one mark. Most students said that carbon dioxide is produced when petrol burns but hydrocarbons were often given as the incorrect second product.

(b) Few students knew that solid particles cause global dimming, but thought they caused global warming. Many thought that carbon dioxide was produced when sulfur is burned; although they did go on to gain the mark for acid rain.

Question 6 (*Low Demand*)

(a) Surprisingly, few students could give the test for carbon dioxide. Many answers referred to the 'squeaky pop test' or stated 'it will put out a lit splint'. A lot of students wrote about burning fuels to produce carbon dioxide or using limestone water to test the gas. Less than a fifth of students gained any credit for this question.

(b) Very few students knew that clay is heated with limestone to form cement.

(c) (i) Students did not understand the word 'property'. A common error was to say the amount of fibre, confusing property with variable. A third of students scored this mark.

(c) (ii) This question was well answered with common correct responses being 'thickness of the slab' or 'the ball'. Incorrect responses were 'the slab' or 'height of ball'.

(c) (iii) About half of the students gave the correct response. Misreading the scale tended to be the most common error.

(c) (iv) Many students do not understand what a conclusion is and either described what the student did or what the they was trying to find out. A common error was to mix up cause and effect, with many students saying that the higher the ball the more fibre was in the slab. Many responses did not relate to the investigation but stated that the higher the ball the easier it was to crack the slab. Students had to mention the independent variable. Those students who gained this mark generally phrased their answers well, giving a relationship between the variables.

(d) (i) Students did not know the stages in the production of calcium hydroxide, demonstrated by less than a tenth of students gaining full marks. Some students wrote the names of processes where a chemical should have been written, or used incorrectly written formulae. Credit is not given for lower case letters or numbers that are not subscripts within a formula. It is safest to write the words.

(d) (ii) Many students wrote that the acid was killed. Very common errors related to the alkali being a fertiliser, pesticide or weed killer. Some said it helped the plants to grow but did not explain how. It was rare to see reference to neutralising the acid, but a few students did say it removed the acid.

Question 7 *(Low Demand)*

A very well answered question with most students gaining three marks. The most common error was to mix up kinetic and electrical.

Question 8 *(Low Demand)*

(a) A very well answered question with most students gaining at least one mark. Almost all students labelled the gas correctly.

(b) A well answered question with almost two-thirds of students obtaining full marks. The most common error was to mix up solid and gas, but these students still gained one mark for liquid.

Question 9 *(Low Demand)*

(a) Most students correctly selected water as storing the most energy.

(b) (i) Whilst most students correctly chose the water-filled heater, many students failed to identify the highest power output as the reason, despite the stem of the question stating that the power output was shown. Many students answered in terms of it having the most energy. Some students just gave the heater as being a radiator, rather than naming it, which could not be credited. Students should be encouraged to use the language given in the question.

(b) (ii) Many students selected the wrong equation so could go no further. Others correctly wrote down 1.5×5 but came up with the wrong answer, presumably because they did not have a calculator. Some students changed the units from those given in the question so could not gain full marks. Almost a half of students picked up at least one mark for this question.

(c) Almost a third of students gained full marks for this question. Students who presumably did not have a calculator often gave an incorrect number of zeros, but had attempted to use the correct equation.

Question 10 *(Low Demand)*

(a) Many students thought the lid prevented energy loss by conduction rather than convection.

b) This question was not answered well with a very small proportion of students able to gain both marks. Schools are reminded to use the correct version of the glossary. Many students said the data logger was more precise, which related to the glossary used with the previous specification and was therefore ignored. The required answer was greater resolution, although a description of this would gain the mark. Many responses were simply copies of information given in the stem of the question or that it was faster.

(c) (i) An explanation for the difference in temperature was required, but one mark was allowed for a description of the temperature difference as long as the answer was comparative and not just a statement about one can. Many students thought that the cans were warming up or explained the greater temperature drop in the black can as being because black surfaces absorb more energy. In relation to radiation, students should understand the difference between absorption and emission.

(c) (ii) This question was well answered with over three-quarters of students gaining full credit.

Question 11 *(Standard Demand)*

This question addressed a topic new to the specification leading to considerable variation in responses.

(a) Students were asked to describe differences in the growth of the two sides of the stem. However, many students answered the question in terms of ‘plants’, ‘seedlings’ or ‘seeds’. Many students described the shapes of the two lines on the graph then went on to state that the stems grew diagonally.

(b) Many students ignored the command word 'Explain' and went on to give virtually the same answer as in part (a). Only a fifth of students were able to obtain at least one mark. A common misunderstanding was to infer that auxins were alive and were killed by light or that they could grow. Many students stated that auxins inhibited the growth of the shaded part of the stem, contradicting their descriptions in part (a). Others stated that auxins inhibited the growth on the illuminated part of the stem. Very few students referred to the effect of hormones on cell elongation. Some students thought that auxins were given to the plants.

Question 12 *(Standard Demand)*

In this question students were assessed on their ability to evaluate an investigation. 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.

To attain level 3 (5-6 marks), students needed to include evidence supporting the newspaper's claim, evidence that did not support the claim and to give a reasoned conclusion. They were also required to make an appropriate reference to the presence or absence of polyphenols in the chocolate. A few Foundation Tier students did give Level 3 responses.

Most Foundation Tier students gave Level 1 or 2 responses. Many responses included at least one piece of evidence supporting the claim and one piece of evidence not supporting the claim, with many also attempting to give a conclusion. However, many students only argued their case from one side so were limited to Level 1.

Generally the question was well attempted, but simply copying the text did not gain credit.

Question 13 *(Standard Demand)*

(a) Just over half of students answered this question correctly however, it was surprising to see how many could not use the data in the table to find the correct answer.

(b) Whilst many students were able to interpret the data given in the table and draw correct conclusions regarding the patterns of the properties, some students referred to boiling point rather than melting point or to the unit rather than the name of the property. Some students only gave one or two properties and should be encouraged to look at the number of marks the question is worth to judge how many points need to be made.

(c) Students usually answered in terms of strength, though most did not gain credit as they failed to give a comparison eg 'strength' rather than 'stronger'. Other incomplete responses referred to the melting point but without appreciating that it gave a lower working temperature or that the lead pipes would not melt. Only a quarter of students answered this question correctly.

Question 14 *(Standard Demand)*

(a) Few students demonstrated understanding of the role of the stirrer in this investigation. Many thought that the magnetic hotplate magnetised the ball affecting the rate at which it dropped and others thought the stirrer heated the water. The most commonly obtained mark was for the distribution of energy throughout the water, usually expressed in terms of all the water being at the same temperature. Hardly any students realised how the stirrer would assist in a uniform temperature distribution throughout the hydrocarbon or that the hydrocarbon would have the same temperature as the thermometer.

(b) (i) The most commonly obtained marking point was for stating that as the temperature increased the ball fell faster. Many students simply described the graph without drawing any conclusions from the data. Others made reference to the hydrocarbon rather than to the ball falling. A common mistake amongst those who tried to interpret the graph was that the viscosity of A was greater than that of B. Very few students obtained full marks for this question.

(b) (ii) Hardly any students gave a correct response. Common mistakes included simply repeating the question, answering in terms of thickness or density, or simply quoting figures from the graph. Others answered in terms of the different water temperatures.

Question 15 *(Standard Demand)*

(a) There was widespread confusion about what efficiency is, exemplified by statements such as 'appliance that's the least useful'. The lowest level of acceptable response 'the bulb with lots of energy wasted' gained one mark. To gain two marks, students should have made it clear that efficiency is about proportion or percentage, rather than simple comparative statements about the amount of energy lost. Many students stated that it was 'the bulb that loses the most energy', which is incorrect because out of the three bulbs, the halogen bulb wastes the most energy as it has the highest energy input. Some students said it was not good for the environment or it caused pollution.

(b) A quarter of students were able to gain at least one mark and it was clear that many students are unfamiliar with the use of Sankey diagrams to calculate efficiency and used incorrect values in their calculations. Many answers were more than 100 % because they had not used the equation from the sheet correctly. Students would benefit from being taught how to organise calculations logically.

(c) Few students read the question properly and did not answer in terms of the effect on the surroundings. Only a third of students gained credit for this question.

(d) Most incorrect answers focussed on the efficiency of the LED bulb rather than the fact that the energy input was only 2 J compared with 40 J and 50 J for the other two bulbs. As three bulbs were being compared an absolute comparator was needed – lowest energy input, rather than less or low.

(e) (i) Many students ignored the instruction, 'Use ***only*** the information in the table to answer the following questions', leading to the incorrect answer of LED, or a statement about efficiency. Only a few students followed the instruction and gained one mark for filament bulb, but the correct reason was rarely given. Once again an absolute comparator was needed to compare three bulbs.

(e) (ii) Again, many students ignored the instruction, leading to the use of the Sankey diagrams to answer the question. Many incorrectly stated that, 'the LED bulbs last a long time', which makes no comparison with the other two bulbs. The filament bulb lasting 1000 hours may also be considered a long time, but an absolute comparator was needed for the mark to be awarded.

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