



**General Certificate of Secondary Education**

**Additional Applied Science 4863**

**AASC/2H Science at Work**

**Report on the Examination**

*2008 examination – June series*

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## General comments

The candidates had enough time to complete the paper. It was pleasing to note that there were very few unattempted questions. Some parts of questions proved more challenging for the majority of candidates. These questions were 5(b)(i), 6(b)(ii) and, in particular, 6(b)(iii), the forensic test for alcohol. This indicates that the paper tested to the highest level, without lacking in opportunity across the whole mark range.

### Question 1

The rise in percentage (numbers) of overweight children was well identified in 1(a), but a few failed to gain the mark when they attributed the graph to children becoming heavier. References to a positive correlation were not accepted.

In 1(b) quick and easy were the most popular correct answers, with some candidates identifying advertising or a rise in the number of takeaways. The rarest answers were about the role of parents. Answers referring to cost, taste or laziness were not awarded marks.

The first part of 1(c) was well done, with many candidates identifying that almost all the daily energy was being delivered in one meal. The second point, that this caused over eating, was often missed. In 1(c)(ii) many candidates correctly identified that eating lots of takeaway food could be a reason for them putting on weight, because of the high fat content, but few related this to the fat being stored. A few candidates were able to gain marks for answering NO by reasoning that it could be due to a lack of exercise and the fat not being burnt off. In 1(c)(iii) and (d) there were some good answers. It was good to see some candidates using more specific examples, such as tartrazine.

### Question 2

The scene of crime question (2(a)) was generally well done, with cotton wool bud/swab, plastic container/bag and sealed being the three most common successful answers. A number of candidates failed to read the question correctly and gave answers about taping off a crime scene, wearing gloves etc. A few did not gain the first mark, if they used a pipette or the second mark for suggesting a paper bag as a container.

The proportion of fully correct responses for 2(b)(i) was disappointing, considering it was simply the identification of three blood cells or cell particles. Red (blood) cell was the most common correct answer and platelets the least. In 2(b)(ii) ambiguous versions of nucleus, such as nuclear, nucules, were not accepted and a number chose other blood parts such as haemoglobin or plasma. Quite a surprising number of candidates (over 30%) gained only one of the two possible marks in 2(b)(ii), generally for A and B (often in lower casement). AB and O were less often correct, being replaced by surprising combinations of letters.

### Question 3

Body Mass Index was well answered in 3(a)(i), and in 3(a)(ii) the majority of candidates were able to enter the correct figures into the equation and achieve the correct calculation. There were occasional inaccuracies in the final calculation, which lost the second mark.

In 3(b)(i) most candidates identified Athlete 2 as overweight, and recommended a reduction in fats/ carbohydrates. Exercise was often cited, but did not gain the mark unless more exercise was stated. Candidates are still losing marks with vague answers such as 'eat healthily'. Many candidates were able to identify muscle mass as a possible reason for variations in BMI in 3(b)(ii), but 'heavy bones' or 'height' (already in the BMI calculation) were not awarded marks.

In 3(c) a table or diary of what was eaten was the first mark gained by most candidates. Reference to a time line (daily, for a week etc, but not 'time of day') was the next most successful mark. Identifying the quantities of the food eaten was the least successful, with a number of candidates losing the mark by referring to the quantities of the nutrients. Too many candidates were also recording how much exercise was carried out.

## Question 4

In 4(a)(i) the most common correct answer was Salmonella, but often E coli and occasionally Campylobacter were also given, with most candidates being successful. Candidates who noted that question 4(a)(ii) was about personal hygiene, normally gained the mark for 'wash hands', but a number of candidates gave answers about general restaurant cleanliness and lost the mark. Of the alternatives, 'tie hair back' was the most common, but these candidates often failed to gain the second mark because they said merely 'to stop hair falling into the food' without making the connection to bacterial transfer.

In most cases for 4(b), candidates were familiar with the concept of reducing numbers to countable levels, but many confused serial dilution with the process of counting colonies on agar plates. This led to a number of candidates gaining only the first 'sampling' mark, with 'shake the tube' being the rarest answer. Full marks for this question were rare.

In 4(c)(i), (ii) and (iii) the multiplication from 30 to 30,000 was clearly intended in most cases, but carelessness with the exact number of noughts lost marks for some in (c)(ii), but the third  $\times 10$  multiplication was generally correct, so most candidates gained at least two of the three marks.

## Question 5

The greatest number of candidates chose polypropylene for 5(a) and the most common reasons were 'lightweight' and 'does not get heavy when wet', with 'colours do not fade' also well answered. Unfortunately, a substantial number of candidates, although correctly interpreting the information for relative density as lightweight, went on to quote directly from the table for other points without any interpretation e.g. 'durable' did not get the mark unless it was explained as being 'hard wearing'. Some explained 'stain resistant' as being 'does not stain', when the answer 'easier to (keep) clean' was needed. Candidates who chose polyester could not gain the absorbency or the stain resistance mark, but could still gain four marks, wool had only two possible marks and cotton one.

Question 5(b)(i) was less well answered than might have been expected. Composite was the only acceptable answer, although its correct definition would have been accepted. 5(b)(ii) was a comparison between two materials question and this needed to be reflected in the answer, so 'durable' did not gain a mark, it had to be 'more durable', likewise 'stronger' and 'lighter' etc.

Question 5(c) was not a comparison, but the answers needed to be about the suitability of a metal for the job, not just general metallic properties, such as 'easily moulded into shape' which did not get a mark. The most successful answers were strong, light and durable. Candidates should be advised NOT to compare costs in these sorts of questions about properties. They also need to beware of repeating the same marking point, for example 'strong' and 'hard to break' are the same.

## Question 6

Most candidates attempted 6(a)(i), but gained only one mark as their line (which had to be drawn with a ruler) either stopped inside the glass or did not bend away from the normal on exit. In 6(a)(ii) the mark was awarded only for a pair of angles correctly labelled on either side of the same interface. For 6(a)(iii) many candidates gained an immediate two marks by quoting the correct formula:

$$\text{refractive index}(n) = \frac{\sin i}{\sin r}$$

although many candidates failed to gain the first mark for measuring the angles. The hot oil method was less common, but also attempted reasonably well, with many candidates gaining two marks for placing the glass in the oil and heating the oil until glass disappeared. The mark for reading the temperature was rarely awarded and knowing that the refractive index was read from a table was rarer still.

Ethanol and covalent were the only acceptable answers for 6(b)(i) and (b)(ii) respectively and were very rarely seen. 6(b)(iii) was the only question not attempted in any significant numbers. Many candidates guessed a test such as the flame test or a test for glucose or hydrogen. The most common, but still rare answer, was the colour change orange to green.

## Mark Ranges and Award of Grades

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