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**General Certificate of Education (A-level) Applied
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Applied Science   **SC05**

**(Specification
8771/8773/8776/8777/8779)**

Unit 5: Choosing and Using Materials

Report on the Examination

General Comments

The paper appeared to differentiate quite well and produced a good spread of marks. The vast majority of candidates attempted every part of every question.

It was pleasing to see that the standard of mathematical calculations had improved slightly on previous series. Candidates should be encouraged to attempt all calculations; in many cases marks are awarded for selecting the correct formula to use and for providing the correct units, even if the arithmetic is faulty.

It was also pleasing to see that those questions involving straightforward recall of standard definitions were answered reasonably well by many candidates. This has been a weakness of most candidates in the past. These questions accounted for 18% of the total marks.
Again a lot of candidates were careless in their wording and lost marks as a result. For example, describing an alloy as a mixture of **one** or more metals.

Once again, the comprehension question (question 4) was poorly answered. It is recommended that centres practise the comprehension question with their candidates using past papers and mark schemes.

Question 1

(a)(i)
(b)(i)   Both were well answered but the explanations of the answers in (a)(ii) and (b)(ii) were not so well done.

(b)(iii)   Only about half of all candidates could correctly calculate the volume of the irregularly shaped object.

(b)(iv)   This question was very well answered.

(c)(i)   Most candidates knew that volume = length × breadth × height but very few talked about measuring the dimensions of the object.

(c)(ii)   About half of all candidates managed the density calculation but only half of those obtained the correct unit.

Question 2

(a)   Just over half of candidates could give the definition of tensile strength in part (i) but only a handful of those could go on in part (ii) to explain why it is measured in Nm^{-2} rather than N.

(b)   This question was extremely well answered.

(c)(i)   The meaning of the term 'composite' was one of the few definitions on the paper that was answered correctly by a very large majority of candidates.

(c)(ii)   A lot of candidates stated that the benefit of using a composite material is that 'it is stronger'. This did not score. It isn't just strength that is improved when a composite material is made. A better answer is that a composite material gains useful properties from each component.

(c)(iii)   About half of all candidates knew that plywood is a laminate composite.

(d)(e)
& (f)   These questions were well answered.

Question 3

(a)   Only 30% of candidates scored full marks on the graph question but nearly all candidates managed to score 1 mark. The most common errors were candidates not knowing the *x* axis from the *y* axis, the use of uneven scales on the axes and not drawing the line through the origin.

(b)(i)   Most candidates were able to say that as the force increases so does the extension but only a small number stated that the extension is directly proportional to the force.

(b)(ii) This question was extremely well answered.

(b)(iii) Only 25% of candidates scored on this question.

(c)   In part (i) the majority of candidates could identify the object as being a metal spring but far fewer could then go on to justify their answer in part(ii).

Question 4

(a)(b)   A large majority of candidates could select from the article suitable properties of ceramics to answer these two questions.

(c)   Only one candidate scored all 4 marks on this question. The majority of candidates did manage to score at least 1 mark. The meaning of covalent and ionic bonding was poorly understood.

The rest of this question was poorly answered and in particular part (e)(i).

Question 5

(a)(i)   Nearly all candidates scored at least 1 mark but only about one third of candidates correctly identified electrical conductivity and low density as the key properties for aluminium being used in overhead electricity cables.

(a)(ii) About half of all candidates scored on this question. A lot of candidates did not score because they said that steel is 'strong' instead of saying that steel is 'stron<u>ger than</u> aluminium'.

(a)(iii) A majority of candidates gave the correct definition of an alloy. Carelessly worded answers lost marks e.g. 'an alloy is a mixture of one or more metals'.

(b)   Just under half of all candidates scored on this question. The most common incorrect answer was to say that a polymer is a 'long chain <u>of</u> molecules' rather than a 'long chain molecule'. (A long chain of monomers was accepted).

(c)   Only one candidate scored full marks on this question and 15% of candidates scored zero. Polymer science is a weakness.

(d)   A well answered question. Nearly all candidates scored at least one mark and just over half of candidates gained full marks.

Question 6

(a)   The definitions of *stiffness* and *ductile* were reasonably well known.

(b)   The definitions of *stress* and *strain* were very well known. In part (iii) a good majority of candidates gave the correct answer to this question. However, a significant number of candidates stated that strain has no unit 'because it is a ratio' rather than 'a ratio of two lengths'.

(c)(i)
&(ii)   Although slightly more successful than in the past, the calculations of strain, stress and Young modulus still present a problem to many candidates despite them being well established questions. Candidates' handling of negative indices was particularly weak. A lot of candidates were able to pick up 1 mark in each part of this question by stating the correct formula for stress and Young modulus.

(d)   Only 40% of candidates scored on this question.

Question 7

(a)   Just over half of all candidates scored half marks or more on this question. It was obvious from the answers seen that many candidates had not seen this experiment to determine the coefficient of linear expansion of a material.

(b)(c)   These questions were poorly answered. In part (c) many candidates did not answer the question as stated. Instead of comparing the coefficients of linear expansion of steel and brass they simply stated that 'brass expands more than steel'.

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