



**General Certificate of Education (A-level) Applied
January 2011**

Applied Science

SC05

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

Unit 5: Choosing and Using Materials

Report on the Examination

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General Comments

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

As in the past, the standard of mathematical calculations was disappointing. It was also very disappointing to find, yet again, that those questions involving straightforward recall of standard definitions were poorly answered by many candidates.

Again many candidates were careless in their wording and lost marks as a result. For example, describing a composite material as a mixture of **one** or more materials.

Question 1

This question was answered very well, with the vast majority of candidates scoring 4 or 6 marks.

Question 2

A well-answered question. 70% of candidates obtained full marks.

Question 3

- (a) (i) This question was answered correctly by less than half of all candidates.
- (a) (ii) The majority of candidates could identify a desirable and an undesirable property for the skis to have but many could not give reasons. Some of the reasons given referred to the skier's clothes instead of the skis.
- (b) (i) The vast majority of candidates could give the definition of a composite material. Although fewer than in the past, some candidates gave the answer 'a mixture of **one** or more materials'.
- (b) (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.
- (b) (iii) Less than half of all candidates obtained full marks for this question. A significant number of candidates thought that a vaulting pole should be stiff.
- (b) (iv) Approximately half of all candidates could give the meaning of the term 'brittle'.
- (c) Both parts of this question were answered badly. Candidates' knowledge of the different types of composite materials was very weak.

Question 4

- (a)
- (b) Both parts of each of these questions were answered very well.
- (c) The majority of candidates obtained the correct answers for both parts of this question either by calculation (using the numbers in the table) or by correctly reading answers from their graph. Disappointingly, a significant number of candidates, having drawn the graph correctly, could not interpret the scales on the axes correctly and hence lost marks.
- (d) (i) Nearly all candidates knew that the law being referred to was Hooke's law but a large number could not spell Hooke.
- (d) (ii) Most candidates named Hooke's law again instead of stating it.
- (e) (i)
- (ii) The density calculation was done very well but correct units were few and far between.
- (f) A few answers were very good, earning 5 or 6 marks out of 6. About 25% of answers, however, were a jumbled mess earning zero marks. Some candidates managed to pick up 1 mark for stating that density = mass \div volume even though the rest of their answer was not creditworthy.

Question 5

This question was answered reasonably well by the majority of candidates with the exception of parts (c) and (d).

Question 6

- (a) (i) Surprisingly, only about 25% of all candidates could mark the position of the elastic limit on the graph.
- (a) (ii) Many candidates did not answer the question. They correctly talked about plastic deformation but did not say what would happen to the extension of the wire.
- (b) (i)
- (ii)
- (iii) The calculations of strain, stress and Young modulus still present a problem to many candidates despite them being well established questions. Candidates had great difficulty in handling indices. As a result there were few correct answers for parts (i) and (ii), although some candidates gained marks in part (iii) due to errors carried forward. A lot of candidates picked up 1 mark for each part of this question by knowing the correct formulae for strain, stress and Young modulus.

- (c) A surprisingly large number of candidates thought that diameter is a factor that does not affect the stress in a wire.
- (d) The majority of candidates gave the correct answer to this question. A significant number of candidates stated that strain has no units 'because it is a ratio' rather than 'a ratio of two lengths'.
- (e) (i) This question was very poorly answered. Only a few candidates referred to plastic deformation as an indicator of ductility.
- (e) (ii) This question was very well answered.
- (f) The majority of candidates obtained 1 mark for referring to 'free electrons / delocalised electrons' but very few scored the second mark for saying that these electrons can move in an organised way.

Question 7

- (a) This question was well answered.
- (b) Only a very small number of candidates obtained the correct answer to this calculation. A few candidates correctly calculated the temperature **rise** but did not add this to the original temperature in order to obtain the **final** temperature.
- (c) Both parts of this question were poorly answered.
- (d) (i) Most candidates knew the meaning of the word 'amorphous'.
- (d) (ii) A lot of candidates gave clay as an example of a ceramic material. This did not score, but baked or fired clay would have been credited.
- (e) (i) Only a handful of candidates could give the definition of thermal conductivity.
- (e) (ii) Nearly all candidates scored on this question, some very well. A few candidates ignored the pins held in place by candle wax and gave an answer involving expansion.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the [Results statistics](#) page of the AQA Website.