



**General Certificate of Education (A-level) Applied
June 2012**

Applied Science

SC08

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

Unit 8: Medical Physics

Report on the Examination

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General Comments

Most candidates were well prepared for this exam and showed a sound understanding of the physics principles involved. Graphical work was generally better than in previous examinations but many candidates still had great difficulty in manipulating equations. As in previous years, there was a small minority of candidates who seemed to have very little knowledge and understanding of this unit. There was also a substantial minority who appeared to have had no experience of practical work using radioactive sources and were not even able to state **realistic** precautions that need to be taken when working with such materials.

There were also a substantial minority of candidates who required additional answer sheets to answer the QWC questions. This should **not** be necessary as there is sufficient space available on the paper for a complete answer to be given, provided the candidate has actually thought about what they are going to write before starting to answer the question.

Question 1

- (a) This was generally answered correctly.
- (b) This was generally answered correctly though some candidates discussed reflections and acoustic impedance, indicating a complete lack of understanding of how EEGs work.
- (c) Many candidates had difficulties with this question, which tested synoptic knowledge from SC02. Most candidates gained at least one mark, however.
- (d) Most candidates answered all three sections correctly.

Question 2

- (a)(i) Most candidates answered this correctly. Those who talked about a single atom decaying did not gain credit.
- (a)(ii) Most candidates answered this correctly though there were some wild guesses.
- (b)(i) Most candidates gained three marks, though a small minority of candidates seemed to think that a line of best fit had to be a straight line rather than a line that fits the points best.
- (b)(ii) Most candidates who had drawn an appropriate line gained this mark.
- (c) About half of candidates gained the full three marks. Most of those who did not managed to score one mark for stating the correct equation and some gained a second mark for correct substitution. Inability to manipulate equations and/or to add or subtract fractions were the main reasons for not gaining full marks.
- (d) Most candidates gained two marks though there were some who thought that implants should have a short half-life so that they would work faster!

Question 3

- (a)(i) Most candidates gained at least one mark. It was disappointing to see how many candidates believed that being digital made the thermometer automatically more accurate.
- (a)(ii) Most candidates gained at least one mark.
- (a)(iii) About half of candidates gained this mark. Candidates need to learn the values given in the specification. In this case there was some leniency where candidates believed death occurred at 25°C.
- (a)(iv) Many candidates had no idea of how a thermistor thermometer worked. There were also candidates who were able to provide full and detailed explanations and therefore gained full marks.
- (a) Many candidates seemed to have no idea that perspiration was involved in cooling the body.
- (b) Most answers to this question were vague and few candidates gained more than one mark. Many candidates also provided responses that did not answer the question, the most common of these being to state what should have been done to treat the person with hypothermia.

Question 4

- (a) Most candidates gained both marks.
- (b)(i) Most candidates gained at least one mark. Responses related to how long the isotope 'stays in the body' were often seen and were too vague to gain credit.
- (b)(ii) Most candidates gained at least one mark with many gaining both.
- (b)(iii) Most candidates gained one mark for recognising that 4 half-lives were involved and many gained both marks.
- (c)(i) Most candidates gained at least one mark.
- (c)(ii) Most candidates gained at least one mark.
- (c)(iii) Few candidates seemed to understand what the terms 'toxicity' and 'daughter product' meant and therefore only a minority gained both marks.
- (d)(i) Most candidates gained this mark.
- (d)(ii) Most candidates gained this mark.
- (e) About 2/3 of candidates got this completely correct whilst most gained at least one mark.

Question 5

- (a) This question was answered well by candidates who were familiar with radioactivity practical work but answered very poorly by those who were not. The main issues that prevented candidates from gaining marks were:
- failure to read the question properly and writing about using paper, aluminium and lead shields to test which type of radiation was emitted
 - lack of knowledge of basic equipment, such as Geiger–Muller tubes, and basic procedures
 - poor level of communication skills – failure to write answers in a logical manner as well as basic errors in spelling, punctuation and grammar. Having said this, the quality of written communication was generally better than in previous exams.
- (b)(i) Most candidates answered this correctly. The most frequent wrong answers related to fair testing.
- (b)(ii) Most candidates gained this mark.
- (c) This question was answered well by candidates who were familiar with radioactivity practical work but answered very poorly by those who were not. The main issues that prevented candidates from gaining marks were:
- stating unrealistic precautions such as wearing lead lined clothing or film badges
 - stating ineffective precautions such as wearing goggles or gloves.

Question 6

- (a)(i) Most candidates gained both marks.
- (a)(ii) Most candidates gained at least one mark but several failed to score the second mark as they could not work out the correct power of 10.
- (b) About half of candidates gained full marks. As previously, most gained one mark for stating the correct equation; many gained 2 marks for correctly substituting into that equation but failed to score the third mark as they could not do the maths.
- (c)(i) Most candidates gained at least one mark but many mentioned electrical conductivity showing that they had little understanding of the context.
- (c)(ii) About half of candidates got this right, indicating a lack of understanding of what the gel actually does.

Question 7

- (a) This was generally answered well, with most candidates gaining at least 3 marks. Those who failed to do so generally either:
- did not read the question thoroughly and therefore did not use key information provided, or
 - did not plan their answers and therefore produced responses that were not logically organised, and/or were too long requiring candidates to use additional answer sheets which is not advantageous.

- (b)(i) Most candidates answered this correctly, though some did not appear to understand the meaning of the term 'property'.
- (b)(ii) Most candidates realised that the density of the stomach tissue was too low to absorb X-rays but very few realised that contrast depends on density *difference*.
- (c) Most candidates gained at least one mark.

Mark Ranges and Award of Grades

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