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General Certificate of Education

Applied Science 8771/8773/8776/8779

SC08 Medical Physics

Report on the Examination

2008 examination - June series

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General Comments

Overall this paper was addressed well by candidates though there was some evidence of a significant number of candidates being very poorly prepared for the examination, having little basic knowledge and displaying very little understanding of how this knowledge could be applied. There were problems with answers to some questions not relating to the questions set. It was pleasing to see good quality graph work and much improved mathematical skills from candidates.

Question 1

(a) Generally answered quite well.

(b) Answers were variable with a significant number of candidates not knowing the temperature at which hypothermia starts and a worrying number of candidates having no idea of what 'normal' body temperature is.

(c) Most answers stated that digital thermometer should be used because it is more accurate. This is not the case and candidates need to understand that ease of reading is not the same thing as accuracy. Most candidates gained at least one mark as they understood that a device that could monitor continuously would be more effective.

Question 2

(a)(i) Generally correct.

(ii) Generally correct but sometimes too vague to be given credit. Candidates often, however, focussed on the laser and ignored the endoscope and hence gave inappropriate answers that did not gain credit.

(b) Generally correct but safety goggles and protective clothing, though often stated, were too vague to be given credit.

Question 3

(a) Generally correct though a number of candidates did not recognise that the vacuum was the important part of C.

(b) Generally correct.

(c) In some centres all candidates answered this correctly, for other centres none did.

(d)(i) Answers were very variable. Many candidates gained at least three of the four available marks. A significant number, however, talked about the X-rays being reflected rather than absorbed and hence were able to gain very little or no credit. Others also talked about X-rays emitting gamma rays indicating a lack of understanding of the difference between X-rays and radioactivity.

(ii) Few candidates answered the question asked. Some wrote about using filters or lower energy X-rays to achieve greater contrast and others wrote about dyes and how they were administered.

(e) Most candidates gained at least one mark.

Question 4

(a) Generally correct.

(b) Generally correct but a significant minority wrote about reducing reflection or mentioned acoustic impedance – indicating confusion with ultrasound scanning.

(c) Most candidates gained one or two marks. Some named gamma rays indicating confusion between EEG traces and radioactivity.

Question 5

(a)(i) Generally correct though sometimes poorly explained.

(ii) Generally correct.

(iii) About half of the candidates answered this correctly.

(b)(i) Almost all candidates gained both marks for drawing the graph. Those who failed to gain marks did so for:

- choosing scales that were too small
- uneven scales
- drawing a straight best fit line rather than a curve.

(ii) Most candidates gained at least one mark and a significant number gained both marks.

(c) Most candidates selected the correct isotope however, very few then addressed the question when writing the explanation for their choice, writing instead about how it would be good for a tracer as it would not remain radioactive for too long. Hence, most candidates gained only one of the three marks available. Those candidates who addressed the question of why the isotope was made when required rather than bought in and stored generally gained all three marks.

(d) Generally correct with most candidates gaining at least two marks.

(e)(i) Most candidates gained three or four marks. Candidates failed to gain marks because they did not address how you could tell that only beta radiation was emitted. Some candidates also failed to include a detector in the equipment they would use in the experiment.

(ii) Most candidates gained at least one mark.

(f) Generally answered quite well.

(g)(i) Most candidates gained two of the three marks – one for recalling the equation and one for correct substitution. Failing to invert the ‘answer’ achieved for adding 1/4 and 1/12 was what led to the final mark not being gained.

(ii) About half of candidates gained this mark.

Question 6

(a)(i) Only about half of the candidates answered this correctly.

(ii) Most candidates gained at least two marks. Failure to provide a correct unit meant that candidates did not gain the third mark.

(b)(i) In some centres all candidates answered this correctly. In other centres none did. Overall about a quarter of candidates answered this correctly.

(ii) Generally well attempted with most candidates gaining at least two marks. Failure to 'square' at various points was the most common cause of losing marks.

(c)(i) Failure to provide a comparison between X-rays and ultrasound in this situation was the main cause of candidates failing to gain marks. Few candidates gained both marks here.

(ii) Most candidates gained one or two of the four marks available. Poor explanations and lack of appropriate technical language contributed to many candidates not gaining full marks – they had a general idea but could not express it sufficiently well. Candidates also failed to gain marks because some seemed to have forgotten that the question was about comparison of the two methods described and gave answers that related to 'surgery' and 'incisions' which were not relevant.

(d) Generally not well answered. Again, candidates did not always consider the comparison that the question was about. Some also seemed to think that ultrasound was a form of ionising radiation. Some candidates, however, produced excellent answers and gained both marks.

Mark Ranges and Award of Grades

Grade boundaries and cumulative percentage grades are available on the **Results statistics** page of the AQA Website.