



## **General Certificate of Education**

# **Applied Science**

## **8771/8773/8776/8779**

**SC08      Medical Physics**

# **Report on the Examination**

*2007 examination - January series*

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## General comments

Candidates were generally well prepared for this paper. Most had recalled the appropriate equations to use though many had difficulty using sines. Thermography appeared to be the area of diagnosis that was least well known.

### Question 1

- (a) Generally correct.
- (b) Generally correct.
- (c)(i) About half of the candidates answered this correctly. Frequent wrong answers given included *gamma* and *theta* (which appears to be a cross between delta and theta and did not gain credit).
- (ii)(iii) Both were answered correctly by about one third of candidates. Some got these the wrong way round and others gave answers that would relate to monitoring the heart e.g. tachycardia and fibrillation.

### Question 2

- (a) Both parts were generally correct.
- (b)(i)
- (ii)(iii) Generally correct though some candidates stated precautions that the radiographer would take to protect themselves. This would still allow them to gain credit in (ii).
- (iv) Very few candidates knew what these terms meant.
- (c)(i) Generally correct though some candidates wrote generally about what *contrast* meant rather than *high contrast* and therefore did not gain the mark.
- (ii) Very few candidates gained both marks here. The question was specifically about how high contrast was achieved and not just about how X-rays produced an image. This question also produced a large number of responses that suggested that X-ray images are produced by reflection of the X-rays rather than by differential absorption/attenuation.
- (d) Most candidates gained both marks.

### Question 3

- (a)(i) Generally correct though not always expressed well.
- (ii) Generally correct.
- (iii) Almost all candidates gained one mark here though very few gained both.

- (b)(i) Graphs were generally plotted correctly though a substantial minority of candidates were not able to draw an appropriate line. Many of these drew a straight line, which is totally inappropriate. Some even drew a straight line starting at the origin, with a positive gradient. Some candidates gained only one mark because they chose a scale that was too small.
- (ii) Most candidates who had drawn an appropriate best fit line gained one mark here. Some failed to do so because they misread the scale on the x axis. Few candidates gained the second mark.
- (c)(i) Though the isotope in question had a longer half-life than most tracers, candidates were generally able to justify its suitability for use as a tracer and almost all gained at least one of the two available marks.
- (ii) Most candidates were able to outline a suitable experiment and were able to explain how they could tell whether alpha, beta or gamma radiation was present. Some lost sight of the question however, and did not say clearly how they could tell that the radioisotope emitted ONLY gamma radiation. About half the candidates were able to suggest an acceptable possible source of error. Some candidates, however, produced completely unsuitable experiments. Some of these included measuring half life and suggesting that gamma radiation had a longer half life than alpha or beta. Some even suggested that a person or animal should swallow the isotope and the experimenter should track the emissions.
- (d) Most candidates were able to gain two marks here. Few gained more than this. There was often the suggestion that alpha and beta radiation were stored in the body which is not the same thing as acting at site. Some then indicated that because it wasn't stored, gamma wasn't dangerous at all – which again, is not the case.
- (e) Generally answered quite well with most candidates gaining two or three of the four available marks.
- (f) Few candidates answered this correctly though most who attempted it gained one mark for stating the equation correctly. Manipulating the equation proved to be too difficult for many candidates.

#### **Question 4**

- (a) Very few candidates were able to gain full marks here though the many were able to state the equation correctly and hence gain the first mark.
- (b) About half of candidates gained all four marks. Most gained at least two.
- (c) Most candidates gained one or two of the four available marks.
- (d)(i) Generally correct.
- (ii) Very few candidates gained this mark.
- (e) Generally correct.
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### Question 5

- (a) Most candidates gained one mark for knowing that ultrasound was a sound wave. Fewer referred correctly to the frequency. Some candidates thought ultrasound was a form of electromagnetic radiation.
- (b)(i) Most candidates gained at least one mark.
- (ii) Most candidates gained two or three marks here but some failed to gain credit because they failed to use appropriate terminology, e.g. they referred to waves being 'bounced back' rather than reflected – this is not acceptable at A2 level.
- (c)(i) A substantial number of candidates did not seem to know what thermography was. Most of those who did gained both marks.
- (ii) Quite a small number of candidates gained this mark. Many did not comment on the fact that thermography is completely non-invasive.

### Question 6

- (a)(i)
- (ii) Both generally correct.
- (b) Most candidates gained at least one of the two marks here. Many made the error of assuming that invasive methods are the only ones that can be either electronic or can produce continuous readings. This is clearly not the case.
- (c) Most candidates gained at least one mark here.

## **Mark Ranges and Award of Grades**

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