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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Education

Applied Science 8771/8773/8776/8779

SC08 Medical Physics

Report on the Examination

2007 examination - June series

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General Comments

Some candidates were clearly well prepared for this examination and achieved high marks. Others appeared to have little knowledge or understanding of the unit specification and therefore gained very few marks indeed.

It was good to see that the majority of candidates were able to recall appropriate equations, though many still had problems in manipulating these in order to gain the required answers.
Most candidates dealt with question 1 very well whereas the questions on MRI and experimental design caused the most problems. Very few candidates were able to describe an experiment to measure the critical angle of glass.

Question 1

Almost all candidates gained full marks.

Question 2

(a) Only about half of candidates seemed to be aware that magnetic field were involved in MRI scanning.

(b) Similarly, only about half of candidates seemed to be aware that CAT scans used X-rays.

Question 3

(a) Most candidates who answered the question gained at least two of the three available marks however; many described how a liquid in glass thermometer was used which did not gain credit.

(b) Most candidates were able to provide a suitable advantage though some did not compare the liquid-in-glass thermometer with the thermistor thermometer used on the forehead as the question required and therefore produced inappropriate answers (e.g. non-invasive). Fewer candidates were able to give acceptable disadvantages.

(c) Almost all candidates answered this part of the question correctly.

Question 4

(a)(i) Most candidates were aware that ultrasound was a sound wave but fewer were sufficiently specific about the frequency to gain the second mark.

(ii) Most candidates were aware that X-rays were high frequency waves and many were aware that they were part of the electromagnetic spectrum though some described them as ‘light’ or ‘electrical’ – neither of which was given credit.

(b) Most candidates gained at least two of the four available marks.

(c) Almost all candidates answered this part of the question correctly though some suggested monitoring the foetus which was not acceptable as the question was related to treatment.

(d)(i) Most candidates gained credit for citing the correct equation but few manipulated it or substituted correctly; even fewer were able to give the correct unit for the answer.

(ii) This was a difficult part of the question and few candidates answered it correctly. Most thought that the speed would also increase.

(e)(i) Most candidates did well on this part of the question though there was some confusion between electrons and X-rays.

(ii) Most candidates gained at least one mark. The major misconception was that the rotating anode produced a cooling effect in the way that a fan does, which is, of course, incorrect as the anode is housed in a vacuum.

(f) Most candidates were aware that ultrasound images are produced through reflection of the incident waves. Fewer were able to explain that X-ray images are produced by means of differential absorption/attenuation. Some candidates described X-rays as being reflected at boundaries with dense tissue.

Question 5

(a) Answered correctly by most candidates.

(b) Fewer than half the candidates made a link between refractive index and critical angle and many of these described an incorrect relationship.

(c) Many candidates were able to state the correct equation but few could manipulate it correctly or substitute correctly. The use of sines proved a real challenge for most candidates.

(d) Generally very poor performance on this part of the question. Many candidates seemed to have no idea of what they were trying to measure and many also did not know that angles are measured to the normal. Most candidates gained only one or two marks here, some scoring no marks at all.

Question 6

(a)(i) Most candidates appeared to have some idea of what a tracer is but they were not always able to express this clearly enough to gain the mark.

(ii) Almost all candidates gained this mark.

(b)(i) Almost all candidates gained two or three of the three available marks.

(ii) Most candidates gained two or three of the three available marks.

(iii) Most candidates gained two marks. Candidates failed to gain marks through lack of proper explanation.

Question 7

(a)(i) Most candidates gained two marks.

(ii) Most candidates gained the first mark but fewer were able to explain the reasons behind implants needing to have long half-lives.

(b) Most candidates gained at least one mark.

Question 8

(a)(i) Most candidates were able to find the half-life of the isotope. Generally, only the higher attaining candidates gained the second mark.

(ii) Most candidates gained one mark, generally for commenting on the advisability of having more readings, but generally, only the higher attaining candidates gained the second or third marks.

(b)(i) Only about half of the candidates recalled this equation correctly and even fewer were able to manipulate it or substitute correctly.

(ii) Almost all candidates gained at least one mark.

Mark Ranges and Award of Grades

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