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# GCSE Physics

## SAMPLE MARK SCHEME

## First Examination Summer 2008

## USING THE MARK SCHEME

1. This mark scheme gives you;
   * an idea of the type of response expected
   * how individual marks are to be awarded
   * the total mark for each question
   * examples of responses that should not receive credit.
2. ; separates points for the award of each mark.
3. / means that the responses are **alternatives** and either answer should receive full credit.
4. ( ) means that a phrase/word is not essential for the award of the mark but helps the examiner to get the sense of the expected answer.
5. Phrases/words in **bold** indicate that the meaning of the phrase/word is **essential** to the answer.
6. OWTTE (or words to that effect) and eq (equivalent) indicate that valid alternative answers (which have not been specified) are acceptable.
7. 'Ignore' means that this answer is not worth a mark but does not negate an additional correct response.
8. 'Reject' means that the answer is wrong and negates any additional correct response for that specific mark.
9. ORA (or reverse argument) indicates that the complete reverse is also valid for the award of marks.
10. ecf (error carried forward) means that a wrong answer given in an earlier part of a question is used correctly in answer to a later part of the same question.

## MARKING

1. You must give a tick (in red) for every mark awarded. The tick must be placed on the script close to the answer. The mark awarded for part of a question should be written in the margin close to the sub-total.
2. The sub-total marks for a question should be added together and the total written and ringed at the end of the question then transferred to the front of the script.
3. Suggestion/explanation questions should be marked correct even when the suggestion is contained within the explanation.
4. **Do not** award marks for repetition of the stem of the question.
5. Make sure that the answer makes sense. Do not give credit for correct words/phrases which are put together in a meaningless manner. Answers must be in the correct scientific context.

## AMPLIFICATION

1. In calculations, full credit must be given for a bald, correct answer. If a numerical answer is incorrect, look at the working and award marks according to the mark scheme.
2. Consequential marking should be used in calculations. This is where a candidate's working is correct but is based upon a previous error. When consequential marks have been awarded write "ecf" next to the ticks.
3. If candidates use the mole in calculations they must be awarded full marks for a correct answer even though the term may not be on the syllabus at their level.
4. If candidates use chemical formulae instead of chemical names, credit can only be given if the formulae are correct.

1

| | mass in a.m.u. | charge | fundamental particle? |
|---|---|---|---|
| electron | | | YES |
| positron | $\frac{1}{2000}$ | +1 | |
| alpha | | +2 | |

**Total 4 marks**

2 (a) inserted down throat into/for internal examination of stomach; 1
(b) total internal reflection; 1
(c) angle $75 < x < 80$; 1
(d) flexible/can bend easier etc. 1

**Total 4 marks**

3 (a) (i) breathing, respiration, kidney action; 1
(ii) $200 \times 2$;
400 J; 2
(iii) energy transferred is equal to work done;
$400 \times 10/4200 = 1$; 2
(iv) Any 2 of:
1. to reduce the effect of interference due to movement
2. to reduce the effect of electrical noise
3. back-up strategy
4. to help eliminate the reading due to non-pulsatile (veinous or capillary) blood; 2

(b) (i) dangerous to the volunteer/ unethical/OWTTE; 1
(ii) unreliable;
has been extrapolated/is a guess; 2

**Total 10 marks**

4 (a) (i) proton number greater than 82; 1
(ii) above the curve; 1
(b) (i) up and down; 1

(ii)

| particle | total number of quarks | number of u quarks | number of d quarks |
|---|---|---|---|
| **neutron** | 3 | 1 | XXX |
| **proton** | XXX | 2 | 1 |

4

(iii) opposite;
twice charge on d; 2

(iv) proton; 1

(v) a d becomes a u; 1

**Total 11 marks**

5 (a) (i) it will penetrate through to the tumour/
dangerous to operate on the brain; 1

(ii) statement of fact;
logical argument/reason;

**example**

gamma produces little ionisation;
therefore would need high dose if only one beam used;

**or**

ionising radiation is dangerous/harms normal brain cells;
therefore 3 beams to harm the tumour and not other brain cells; 2

(iii) destroyed/cell division stopped; 1

(b) (i) a (moderately) slow neutron; [Accept low energy] 1

(ii) correct equation 11 and 5 in correct places 2

(c) (i) lithium(nucleus); 1

(ii) it has greatest mass; [Accept its heaviest /ORA] 1

(d) (i) Any two of:

1. boron atoms capture a neutron and becomes unstable;
2. alpha is ionising;
3. alpha (and lithium) kills the cells with boron in them;
4. alpha has short range /does not kill other cells;
5. gamma may have some effect too; 2

(ii) Any two of:

1. less damage to other tissues;
2. alpha/ lithium has small range;
3. radiation source at the tumour centre;
4. only one treatment needed;
5. less side effects eg hair loss, nausea; 2

**Total 13 marks**

6 (a) Any sensible suggestion;
eg to produce an average reading/
to reduce effect of anomalous results
[Do not credit vague answers eg its better] 1

(b) suitable scales;
points;
curve/line of best fit; 4

(c) pressure caused by particles hitting walls/number of particles constant;
more hits per unit time; 2

(d) Pressure increased (no mark)
particles would have moved faster;
(particles) would hit walls harder; 2

**Total 9 marks**

7 (a) (i) thermionic emission; 1

(ii) substitution; $6.7 \times 10^{-17} = 1.6 \times 10^{-19} \times V$
rearrangement; $V = 6.7 \times 10^{-17} / 1.6 \times 10^{-19}$
answer with unit = 419 V; 3

(b) between 1.3 and 1.5 Hz;
evidence that students have used two or three periods; 2

(c) (i) depolarisation and contraction;
of the ventricles; 2

(ii) size of QR from graph 1.1 – 1.2 mV; 1

**Total 9 marks**

**TOTAL MARKS 60**