

Mark Scheme (Results)

June 2008

GCSE

360Science

GCSE Physics P3 (5049)

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. Suggestion/explanation questions should be marked correct even when the suggestion is contained within the explanation.
2. **Do not** award marks for repetition of the stem of the question.
3. 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 bold, 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.

Question Number	Answer	allow/comments/exemplars	ignore	reject	Mark
1(a)	minimum amount of energy to maintain life (per day)(OWTTE);	<ul style="list-style-type: none"> • is the amount of energy expended while at rest • is the number of calories you'd burn if you stayed in bed all day • number of calories needed to do nothing all day and remain alive • minimum amount of energy needed by the body to maintain life 		heart rate	(1)
1 (b)	take more exercise; increase muscle to fat ratio; eat a balanced diet; if 4 ticks, deduct 1 mark from the total if 5 ticks, then 0 marks				(3)
1 (c) (i)	heart and other organs shown correctly;				(1)
1 (c) (ii)	the heart;				(1)
2 (a) (i)	D;			anything extra loses the mark	(1)
2 (a) (ii)	B;			anything extra loses the mark	(1)
2 (b)	cathode; vacuum; light waves; increased;				(4)

3 (a)	above the 'line';	<i>if in doubt for points close to the 'line', look at the distance from the 'line' vertically</i>			(1)
3 (b)(i)	beta ⁻ particles;				(1)
3 (b) (ii)	increases;				(1)
3 (b) (iii)	stays the same;				(1)
4 (a) (i)	change of speed (of light);	change of direction /bending when qualified, e.g. bends towards/away the normal, bends when it changes medium, bends when it enters a different medium	light bends / change of direction without qualification		(1)
4 (a) (ii)	correct angle at first reflection within set tolerance; reasonable attempt to show continuous TIR along the fibre;	<ul style="list-style-type: none"> tolerance range is vertically between the first pt of impact, and the end of the leader line straight by eye 			(2)
4 (b) (i)	mechanism is (T)IR; any one from <ul style="list-style-type: none"> idea of passage of light along a fibre idea of reflection inside the body; 	tube for fibre <i>look for ans that describe mechanism not purpose or description</i>	endoscope		(2)

4 (b) (ii)	any valid suggestion;	eg more operations (possible) idea of cosmetically better (scarring, hole size) reducing pain less anaesthetic/stay awake less bleeding reduced infection risk fewer complications faster recovery time	any implication of money unqualified 'safety' unqualified 'quicker'		(1)
5 (a)	treatment for pain/symptom relief;	improve quality of life improve comfort when cancer/illness is incurable/untreatable	radiotherapy chemotherapy surgery	cure cancer/illness	(1)
5 (b) (i)	destroys/ionises/mutates cells;	DNA, nucleus/nuclei/tissues/living matter/named tissue for cells damages cells known side effect of radiation stops cell division cures/kills/causes cancer			(1)
5 (b) (ii)	allows normal cells to recover (OWTTE);	DNA, nucleus/nuclei/tissues/living matter/named tissue for cells minimising damage to healthy cells the large dose damages healthy cells more	body 'her'		(1)
5 (b) (iii)	to limit damage to other cells; Any one from • spends less time on healthy cells/ORAs • dose given from many directions • target all (parts) of the cancer • to target only the cancerous cells;	<i>Beware waffle or repeat of question look for ORAs</i>			(2)

5 (c) (i)	gamma;				(1)
5 (c) (ii)	barium-133; <u>half life</u> is • (suitably) long OR • quoted correct value from chart;	allow this mark for actinium-227 or for thorium 230		reject for both marks actinium-223 , barium 129 or thorium 233	(2)
6 (a) (i)	particle that cannot be broken down any further;	no substructure not made up of other particles			(1)
6 (a) (ii)	accept any correct particle;	Electron /beta particle/e- positron lepton neutrino	antiquark		(1)
6 (b)	proton = $(2 \times \frac{2}{3}) - \frac{1}{3} = 1$; +; neutron = $1u + 2d$;	subst must be shown in some way knowledge that p is positively charged dud allow in words			(2) (1)
6 (c) (i)	down quark changes to up quark;	now have udu/uud/duu d becomes u			(1)
6 (c) (ii)	(electron) emitted from the <u>nucleus</u> (as a beta particle);	ejected			(1)
7 (a)	neutron(s)	1_0n n^1_0 1n_0 ${}_0n^1$ n		0_1n N	(1)

7 (b) (i)	Any 2 correct statements about <ul style="list-style-type: none"> • mass • charge • antimatter • fundamental particle 	positive electron is worth 1			(2)
7 (b) (ii)	<p>advantage <i>described</i>- i.e. consequence mentioned;</p> <p>disadvantage;</p>	<p>does not stay active long-so less damage (to cells) since short half life, patient released sooner</p> <p>radioactive tracer to be produced nearby/on site time between generation and use must be small</p>			(2)
7 (c)	<p>any 2 from</p> <p>$E = mc^2$/ $E = c^2 m$</p> <p>mass of electron and positron</p> <p>KE of electron and positron</p>				(2)
8 (a) (i)	(particles) collide with tyre wall; this produces a force;		push/pushing		(2)
8 (a) (ii)	more collisions (/sec);				(1)

8 (b)	<p>correct conversion into K;</p> $\frac{1.7 \times 10^5 \times 295}{291} = P_2 ;$ $1.72 \times 10^5 = P_2;$	<p>for 2 marks accept any one of</p> <p>2.08 x10⁵</p> <p>temps swapped over (1.68 x10⁵)</p> <p>for 1 mark accept 1.39 x 10⁵</p> <p><i>units if seen must be correct</i> <i>do not accept 1.7 unless the working is shown</i></p>			(3)
9 (a) (i)	light emitting diode;				(1)
9 (a) (ii)	<p>red 660 IR 920;</p> <p>either ans with correct power of 10 and unit X 10⁻⁹ m (nm);</p>	<p>range 650-670 range 910-930</p> <p>nm <i>do not credit X 10⁻⁹ nm</i></p>			(2)
9 (a) (iii)	<p>any one from red absorbed most by deoxygenated red absorbed least by oxygenated;</p> <p>any one from IR absorbed least by deoxygenated IR absorbed most by oxygenated;</p>	<p>any one from deoxygenated blood absorbs more red deoxygenated blood absorbs least IR</p> <p>any one from oxygenated blood absorbs more IR oxygenated blood absorbs least red</p> <p>haemoglobin for blood</p> <p><i>check that it is the blood doing the absorbing</i></p>		red or IR absorbing blood/haemoglobin	(2)

9 (b) (i)	no surgery (OWTTE);	no cutting works (from) outside the body			(1)
9 (b) (ii)	a physical 'barrier'; a non-barrier idea;	skin fat muscle bone thickness of finger/nail nail varnish intensity of LED background light state of patient's health blood pressure vol of blood (in finger);;	ignore mention of haemoglobin		(2)
9 (b) (iii)	description of one of the 3 important features; and explanation;	level drops when attached -(IR & red) absorbed by haemoglobin/flesh/etc wave shape line (sinusoidal)-due to blood pulse/heartbeat average level is constant-not all radiation absorbed trough-corresponds to high blood level peak corresponds to low blood level relevant comment re regularity of pulse/heart beat	purpose of the oximeter		(2)

TOTAL MARK 60