



General Certificate of Secondary Education

Science: Single Award 3463/3H *Specification B (Co-ordinated)*

Mark Scheme

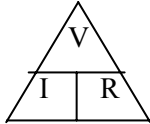

2005 examination - June series

Mark schemes are prepared by the Principal Examiner and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation meeting attended by all examiners and is the scheme which was used by them in this examination. The standardisation meeting ensures that the mark scheme covers the candidates' responses to questions and that every examiner understands and applies it in the same correct way. As preparation for the standardisation meeting each examiner analyses a number of candidates' scripts: alternative answers not already covered by the mark scheme are discussed at the meeting and legislated for. If, after this meeting, examiners encounter unusual answers which have not been discussed at the meeting they are required to refer these to the Principal Examiner.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of candidates' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

**Single Award
Higher Tier 3463/3H**

3463/3H Q1

question	answers	extra information	mark
(a)(i)	$A_1 = 0.5$	ignore any units	1
	$A_4 = 0.5$	allow 1 mark for $A_1 = A_4 \neq 0.5$	1
(ii)	the resistance of P is more than 20Ω		1
	a smaller current goes through P / A_2 (than 20Ω)	dependent on getting 1 st mark correct accept converse	1
(b)(i)	potential difference = current \times resistance	accept pd / voltage for potential difference accept $V = I \times R$, correct symbols and correct case only accept volts = amps \times ohms accept  provided subsequent method is correct allow combination of physical quantities and named units allow voltage = $I \times R$	1
(ii)	6	allow 1 mark for correct substitution	2
(iii)	6	accept their (b)(ii)	1
(c)	<u>thermistor</u> or 	accept correct circuit symbol allow phonetic spelling	1
	<u>resistance</u> goes down (as temperature of thermistor goes up)	do not accept changes for goes down do not accept an answer in terms of current only answers in terms of other components are incorrect	1
total			10

3463/3H Q2

question	answers	extra information	mark
(a)(i)	larger the distance, greater the time	accept 'they are proportional' accept converse	1
(ii)	any value between 6 and 9 years inclusive		1
(b)(i)	carbon dioxide		1
(ii)	(Venus) has <u>higher</u> temperature (than Mercury)	accept has the <u>highest</u> temperature accept Venus is <u>hotter</u> / <u>hottest</u> do not accept has a high / very high temperature	1
	(Venus) further from the Sun than Mercury	accept 'Venus is not the closest planet to the Sun' answer in terms of greenhouse effect only, scores 0 marks	1
total			5

3463/3H Q3

question	answers	extra information	mark
(a)(i)	20		1
(ii)	convection		1
(iii)	fit draughtproof strips	accept lay carpet accept fit curtains accept close doors / windows / curtains accept any reasonable suggestion for reducing a draught 'double glazing' alone is insufficient	1
(b)	air is (a good) insulator or air is a poor conductor	accept air cavity / 'it' for air	1
	reducing heat transfer by <u>conduction</u>	accept stops for reduces ignore convection do not accept radiation do not accept answers in terms of heat being trapped	1
(c)(i)	most cost effective	accept it is cheaper or <u>lowest</u> cost accept shortest payback time accept in terms of reducing heat loss by the largest amount do not accept it is easier ignore most heat is lost through the roof	1
(ii)	4		1
total			7

3463/3H Q4

question	answers	extra information	mark
(a)	converted into helium	accept helium created accept converted into heavier elements accept used up in nuclear fusion / to produce energy do not accept any reference to burning	1
(b)	Quality of written communication	correct points must be in sequence	1
	turns / expands into a <u>red giant</u>	contradictions negate mark	1
	contracts and explodes or becomes a supernova		1
	may form a (dense) <u>neutron star</u> or (if enough mass shrinks to) form a <u>black hole</u>	accept forms a neutron star and (then) a black hole	1
(c)(i)	supernova or remains of an earlier star	ignore super nebula	1
(ii)	younger or not formed at the time of the Big Bang		1
total			7

3463/3H Q5

question	answers	extra information	mark
(a)(i)	infra red or ir		1
(ii)	a series of <u>on and off</u> pulses or a signal having only two values	accept a diagram accept starts and stops like 1 0	1
(b)	signals pick up <u>noise</u> / <u>interference</u> which is also <u>amplified</u> different frequencies weaken different amounts more amplification increases the difference in amplitude between different frequencies	must be clear noise or interference amplified accept distorts signal accept answers in terms of the more amplifications, the less like the original signal	1 1 1
(c)	<u>absorbed</u> by water / fat / oil molecules (in cells) cells damaged by the <u>heat</u> released	accept causes <u>increase</u> in vibrations of oil / fat / water molecules / particles accept cell killed by the heat released or (enzymes denatured by heat released) accept for 1 mark 'heats up water (in cells)' ignore reference to cancer	1 1
total			7

3463/3H Q6

question	answers	extra information	mark
(a)(i)	both lose <u>2</u> protons and (<u>2</u>) neutrons	accept changes by 2 protons and 2 neutrons	1
(ii)	different number of protons (in the nucleus)	accept different atomic number do not accept different number of protons and neutrons or different mass number ignore electrons	1
(iii)	gamma involves no change in the number of protons (in the nucleus) or gamma is a wave (not a particle)	do not accept number of neutrons and / or protons ignore electrons	1
(b)(i)	water because for all energy values the thickness of water needed to absorb (90% of) the radiation is more than the other materials	both material and reason required accept thickness of water required is always more than the other materials	1
(ii)	6	allow 1 mark for obtaining both correct values 72 and 12 from graph allow 1 mark for incorrect values 71 and / or 11 from graph evaluated correctly	2

cont...

3463/3H Q6 cont...

<p>(c)</p>	<p>any three from:</p> <ul style="list-style-type: none"> • <u>most</u> (alpha) particles passed <u>undeflected / straight through</u> the gold • suggesting most of the atom is empty (space) • a <u>few</u> (alpha) particles <u>scattered / deflected</u> through (very) <u>large</u> angles • suggesting a concentrated / small nucleus • nucleus is positive because it <u>repels</u> the positive (alpha) particles <p style="text-align: right;">no reference to experiment, maximum 1 mark</p>	<p>may be scored on annotated diagram provided not negated elsewhere</p> <p>accept repelled do not accept reflected / rebound / bounce back</p> <p>3</p>
<p>total</p>		<p>9</p>