



## General Certificate of Secondary Education

# Science: Double Award (Modular) 3468/1H *Specification A*

## Mark Scheme

### *2006 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.



**3468/1H Q2**

question	Answers	extra information	mark
(a)	any <b>two</b> from: <ul style="list-style-type: none"> <li>• uses no/less water <b>or</b> no plucking needed</li> <li>• no/less need for air conditioning</li> <li>• no/less food goes to producing feathers</li> </ul>		2
(b)	any <b>two</b> from: <ul style="list-style-type: none"> <li>• unable to mate</li> <li>• susceptible to temperature variations</li> <li>• susceptible to sunburn</li> </ul>		2
total			4

**3468/1H Q3**

question	answers	extra information	mark
(a)	• LHS sodium chloride + water	do <b>not</b> accept sodium chlorine accept hydrogen oxide/hydroxide	1
	• RHS sodium hydroxide + hydrogen + chlorine	do <b>not</b> accept chloride  ignore state symbols and numbers	1
(b)	2(NaCl) 2 (H <sub>2</sub> O) 2 (NaOH)	all correct allow multiples if whole equation correctly balanced	1
(c)	aqueous	allow dissolved in water solution is neutral mention of liquid negates answer	1
total			4

**3468/1H Q4**

question	answers	extra information	mark
(a)	gas <b>or</b> gaseous	vapour neutral	1
(b)	-150 to -155	<b>must</b> have minus sign for mark	1
(c)	any <b>two</b> from: <ul style="list-style-type: none"> <li>• as atomic number/mass number/atomic mass/proton number increases, boiling point increases</li> <li>• boiling point increases from helium to radon/boiling point increases down the group</li> <li>• not directly related/proportional/rises quickly at first then more slowly</li> </ul>		2
(d)	<ul style="list-style-type: none"> <li>• 2 electrons on inner ring</li> <li>• 8 electrons on outer ring</li> </ul>	do <b>not</b> award if extra rings drawn	1 1
total			6

**3468/1H Q5**

question	answers	extra information	mark
(a)	<ul style="list-style-type: none"> <li>• 0.59 <b>or</b> 0.588 <b>or</b> 59% <b>or</b> 58.8% <b>or</b> 200 / 340 <b>or</b> 10 / 17</li> </ul> gains 2 marks	evidence of: 200 / 30 + 28 + 10 + 28 + 44 + 200 gains 1 mark  do <b>not</b> allow '60' without correct working shown  allow error carried forward in denominator	2
(b)	<ul style="list-style-type: none"> <li>• alpha <b>and</b> beta <b>and</b> gamma</li> </ul>	all three in any order accept correct greek symbols references to rays/particles are neutral	1
(c)	<ul style="list-style-type: none"> <li>• gamma/beta</li> <li>• can penetrate (cells or skin)</li> </ul>	marking points are independent	1 1
total			5

**3468/1H Q6**

question	answers	extra information	mark
(a)	mainly empty space	do <b>not</b> accept space between atoms	1
(b)	(repelled/reflected) by positive charge	allow repelled/reflected by nucleus/proton allow gold atoms/particles have positive charge reject gold/leaf positively charged	1
(c)	any <b>three</b> from: <ul style="list-style-type: none"> <li>• a nucleus</li> <li>• nucleus containing protons</li> <li>• nucleus containing neutrons</li> <li>• electrons outside the nucleus</li> </ul>	allow marks on labelled diagram  reference to charges neutral  allow electrons in orbits/shells  if no marks gained allow one mark for proton, neutron and electron	3
total			5

**3468/1H Q7**

question	answers	extra information	mark
(a)	8 gains 2 marks	else evidence of $20 \times 40 / 100$ gains 1 mark	2
(b)	(C) <ul style="list-style-type: none"> <li>• (B) 82</li> <li>• (C) 84</li> </ul>	ignore letter but give one mark for each correct calculation	1 1
(c)	<ul style="list-style-type: none"> <li>• digested</li> <li>• absorbed/diffuse/taken into/passes into</li> <li>• into blood</li> </ul>	allow broken down/decomposed dissolved is neutral reject disintegrated  allow correct digestive enzyme + substrate for 1 mark each to max 2  i.e. protease + protein carbohydrase/amylase + carbohydrate/starch lipase + fat/lipid  incorrect references to enzymes are neutral	1  1  1
total			7

**3468/1H Q8**

question	answers	extra information	mark
(a)	<ul style="list-style-type: none"> <li>• increase in temperature increases number of bubbles</li> <li>• increase greater at lower temperatures</li> </ul>	explanations neutral since asked for a description  accept increases up to $20^{\circ}\text{C}$ <b>or</b> stays constant after $20^{\circ}\text{C}$	1 1
(b)	<ul style="list-style-type: none"> <li>• temperature not limiting/some other factor limiting</li> <li>• light/carbon dioxide</li> </ul>		1 1
total			4

## 3468/1H Q9

question	answers	extra information	mark
	<ul style="list-style-type: none"> <li>mutation/variation (1 mark)</li> </ul>		2
	<ul style="list-style-type: none"> <li><b>but</b> mutation/variation produces large(r) guppies in upper pool (2 marks)</li> </ul>		1
	<ul style="list-style-type: none"> <li>large(r) guppies not eaten (by predators)</li> </ul>		1
	<ul style="list-style-type: none"> <li>genes passed on/these guppies reproduce</li> </ul>		
total			4

## 3468/1H Q10

question	answers	extra information	mark
(a)(i)	<ul style="list-style-type: none"> <li>Z</li> </ul>	all three for 2 marks; two or one for 1 mark	2
(ii)	<ul style="list-style-type: none"> <li>X</li> </ul>		
(iii)	<ul style="list-style-type: none"> <li>Y</li> </ul>		
(b)	<ul style="list-style-type: none"> <li>FSH/hormone Z given</li> <li>causes eggs to mature/develop</li> </ul>	allow causes eggs to be released egg production/more eggs neutral	1 1
(c)(i)	<ul style="list-style-type: none"> <li>pill stops egg maturing/release</li> <li>by inhibiting FSH/hormone Z production</li> </ul>		1 1
(ii)	any <b>two</b> from: <ul style="list-style-type: none"> <li>fertilised egg</li> <li>embryo rights/right to life</li> <li>encourages promiscuity/irresponsibility</li> </ul>	accept reference to embryo/fetus allow like abortion/like murder  morally wrong (unqualified) neutral religious belief (unqualified) neutral	2
total			8

**3468/1H Q11**

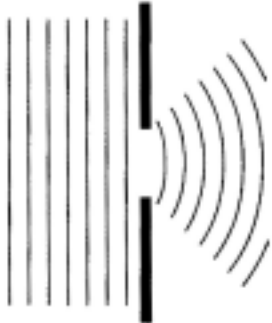
question	answers	extra information	mark
(a)(i)	2.8.7	accept correct diagram	1
(ii)	2.8.8	accept correct diagram	1
(iii)	<ul style="list-style-type: none"> <li>outer electron(s)/shell nearer to nucleus/less shielding/stronger attraction/fewer shells</li> <li>electron(s) gained more easily</li> </ul>	fluorine further up group neutral	1 1
(b)(i)	<ul style="list-style-type: none"> <li>helium (outer) electron shell full</li> <li>no tendency to gain/lose/share electrons</li> </ul>		1 1
(ii)	(yes) <ul style="list-style-type: none"> <li>radon has more electron shells than xenon/outer electrons are further away/more shielding/less attraction</li> <li>so more likely to lose/gain/share electron</li> </ul>	<b>more</b> reactive neutral further down group neutral	1 1
total			8

**3468/1H Q12**

question	answers	extra information	mark
(a)	<ul style="list-style-type: none"> <li>because there are free/delocalised electrons</li> <li>since (most carbon) atoms (only) form three (covalent) bonds</li> </ul>	reject ionic bonds	1 1
(b)	any <b>two</b> from: <ul style="list-style-type: none"> <li>carbon/atoms form layers</li> <li>weak forces/bonds between layers</li> <li>layers can slide over each other</li> <li>some carbon/atoms/graphite/ layers left on paper</li> </ul>		2
total			4



## 3468/1H Q13

question	answers	extra information	mark
(a)	<p><i>Quality of written communication</i>  <i>One mark for correct use of <b>three</b> of the following scientific terms</i>  <i>ray, normal, reflection, critical angle, angle of incidence</i></p> <p>any <b>three</b> from:</p> <ul style="list-style-type: none"> <li>• angle between ray and normal</li> <li>• greater than critical angle</li> <li>• ray reflected</li> </ul> <p><b>but</b> total internal reflection gains 2 marks</p>	<p>allow angle of incidence  allow 'greater than 42°'  allow on diagram</p> <p>refraction (neutral)</p>	<p>1</p> <p>3</p>
(b)(i)		<p>minimum 2 waves curved <b>and</b> spreading out</p> <p>ignore changes in wavelengths/distances between lines</p>	1
(ii)	diffraction		1
(c)	3 gains 2 marks	<p>wave speed = frequency <math>\times</math> wavelength  or substitution gains 1 mark</p>	2
total			8

**3468/1H Q14**

question	answers	extra information	mark
(a)(i)	360		1
(ii)	(X) speed greater	allow arrives first	1
(b)(i)	speed changes	allow refraction/change in density allow refraction once in (i) or (ii) references to outer core neutral	1
(ii)	moves from liquid to solid <b>or</b> <u>sudden</u> change in medium/density/speed		1
total			4

**3468/1H Q15**

question	answers	extra information	mark
(a)(i)	<ul style="list-style-type: none"> <li>• filtered</li> <li>• <b>all</b> reabsorbed</li> </ul>	allow idea of leaving blood/plasma	1
			1
(ii)	<ul style="list-style-type: none"> <li>• filtered</li> <li>• <b>some</b> reabsorbed</li> </ul>	allow idea of leaving blood/plasma	1
			1
(iii)	not filtered	allow stays in blood/plasma	1
(b)	(urea) not reabsorbed  <b>or</b>  reabsorption of water (leads to more concentrated solution)		1
(c)	any <b>two</b> from <ul style="list-style-type: none"> <li>• more water reabsorbed</li> <li>• less urine produced</li> <li>• urine more concentrated</li> </ul>		2
total			8

**3468/1H Q16**

question	answers	extra information	mark
(a)(i)	the higher the atomic number, the greater the reactivity	reference to position in group neutral	1
(ii)	the higher the atomic number, the lower the reactivity	reference to position in group neutral	1
(b)	any <b>two</b> from: <ul style="list-style-type: none"> <li>• reactivity <u>low</u>/no reaction with water/oxygen</li> <li>• less likely to tarnish/corrode</li> <li>• attractive/shiny</li> <li>• malleable/ductile</li> </ul>	do <b>not</b> accept unreactive/does not react reject doesn't rust  melting point neutral strong/hard/soft neutral	2
total			4