

GCSE 2004  
*June Series*



## Mark Scheme

### **SCIENCE: SINGLE AWARD (Modular) 3469H**

---

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.

Further copies of this Mark Scheme are available from:

Publications Department, Aldon House, 39, Heald Grove, Rusholme, Manchester, M14 4NA  
Tel: 0161 953 1170

or

download from the AQA website: [www.aqa.org.uk](http://www.aqa.org.uk)

Copyright © 2004 AQA and its licensors

#### COPYRIGHT

AQA retains the copyright on all its publications. However, registered centres for AQA are permitted to copy material from this booklet for their own internal use, with the following important exception: AQA cannot give permission to centres to photocopy any material that is acknowledged to a third party even for internal use within the centre.

Set and published by the Assessment and Qualifications Alliance.

The Assessment and Qualifications Alliance (AQA) is a company limited by guarantee registered in England and Wales 3644723 and a registered charity number 1073334. Registered address AQA, Devas Street, Manchester, M15 6EX.

*Dr. Michael Cresswell Director General*

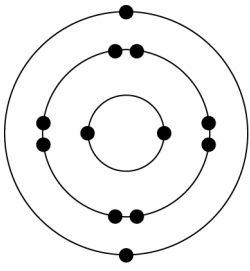
**Science: Single Award (Modular)****June 2004****3469H****3469H Q1**

question	answers	extra information	mark
(a)	ovaries	accept ovary	1
	womb	accept uterus	1
	fertility	accept FSH do <b>not</b> accept fertilisation	1
	contraceptive(s)	allow birth control accept oestrogen <b>or</b> progesterone do <b>not</b> accept pill alone	1
(b)	man XY	allow (chromosomes) different	1
	woman XX	allow (chromosomes) same genes and alleles are neutral allow 1 mark for one is XX and one is XY	1
total			6

## 3469H Q2

question	answers	extra information	mark
(a)	any <b>two</b> from <ul style="list-style-type: none"> <li>• space</li> <li>• light</li> <li>• water</li> <li>• mineral ions / ions / salts</li> </ul>	<p><b>not Sun</b></p> <p>accept nutrients food is neutral</p>	2
(b)	Quality of written communication: correct sequence : dissolves → acid → damage		1
	any <b>two</b> from <ul style="list-style-type: none"> <li>• dissolves in rain</li> <li>• forms acid</li> <li>• (which) damages trees</li> <li>• makes rivers / lakes acid</li> <li>• kills or harms aquatic animals / plants</li> <li>• corrosion / weathering / erosion</li> </ul>	maximum 1 mark if reference made to greenhouse effect or to ozone layer	2
total			5

## 3469H Q3

question	answers	extra information	mark
(a)	9 protons /Proton Number 9	mass / atomic number is neutral	1
	10 neutrons		1
	electron arrangement 2,7 / 9 electrons	incorrect configurations neutral	1
		if no points scored, allow 1 mark for nucleus surrounded by electrons <b>or</b> nucleus contains neutrons and protons	
(b)		Mark is for 2,8,2 arrangements. accept electrons anywhere in correct orbit	1
total			4

## 3469H Q4

question	answers	extra information	mark
(a)(i)	catalyst / enzyme		1
(ii)	any <b>two</b> from <ul style="list-style-type: none"> <li>• heat</li> <li>• stir / shake</li> <li>• increase concentration of peroxide / catalyst</li> <li>• increasing surface area of catalyst</li> </ul>	do not accept increase volume of peroxide	2
(b)	Gas or oxygen lost	do not allow incorrect gas	1
total			4

**3469H Q5**

question	answers	extra information	mark
(a)	1:2	accept 0.5:1 reject 2 to 1	1
(b)	gases combine in simple / whole-number ratios / proportions		1
(c)	(Gay-Lussac) twice as much hydrogen as oxygen (formed when water electrolyses)	Answer must refer to volumes not just atoms	1
(d)	reference to (shared) electrons / (covalent) bonding	reject <u>ionic</u> bonding accept electric forces	1
total			4

**3469H Q6**

question	answers	extra information	mark
(a)	(orbit) low		1
	polar		1
	(reasons) can scan whole of Earth / a country each day / since Earth rotates	allow a geostationary satellite would only scan part of the country	1
	from close range or since Earth rotates beneath it		1
(b)	gravity		1
	correct / high speed		1
total			6

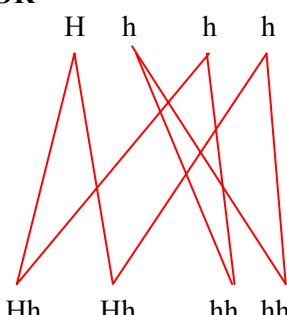
**3469H Q7**

question	answers	extra information	mark
(a)(i)	cannot penetrate aluminium	allow can only pass through air / paper too weak is neutral	1
(ii)	gamma rays not affected (by aluminium)	allow <u>all</u> / <u>most</u> (gamma rays) to pass through  too strong is neutral danger is neutral	1
(b)(i)	(nuclei) unstable		1
(ii)	causes harm / damage to body / cells  detail e.g., causes mutations / causes cancer / damages DNA / damages chromosomes	allow radiation sickness  allow two effects for 2 marks	1  1
total			5

**3469H Q8**

question	answers	extra information	mark
(a)	a qualitative answer i.e fell for 1 mark a quantitative answer for 2 marks i.e to less than half / by 37 (per 100 000) from 54 to 17 (per 100 000)		2
(b)	fewer women than men died  women deaths rose (then fell)		1  1
(c)	275	allow 273 – 277	1
(d)	as number of men / women smoking falls so do deaths from lung cancer  as numbers of women who smoke increases, so do deaths from lung cancer		1  1
total			7

## 3469H Q9

question	answers	extra information	mark									
(a)	<p>gametes H and h, h and h</p> <p>F<sub>1</sub> genotypes correctly derived</p> <p>Phenotypes identified</p> <p><b>OR</b></p>  <p><b>OR</b></p> <table border="1" data-bbox="351 963 670 1086"> <tbody> <tr> <td></td> <td>H</td> <td>h</td> </tr> <tr> <td>h</td> <td>Hh</td> <td>hh</td> </tr> <tr> <td>h</td> <td>Hh</td> <td>hh</td> </tr> </tbody> </table>		H	h	h	Hh	hh	h	Hh	hh	<p>gametes – 1</p> <p>F1 genotypes corresponding to ‘lines’ – 1 lines must be correct</p> <p>Huntington’s identified (Hh) – 1</p> <p>gametes – 1 boxes all correct – 1 Huntington’s identified (Hh) – 1</p>	3
	H	h										
h	Hh	hh										
h	Hh	hh										
(b)	<p>both parents unaffected / don’t have the disease but both parents hh / <b>or</b> homozygous recessive <b>or</b> neither parent has H / dominant (allele)</p>	<p>qualitative answer gains 1 mark</p> <p>gains 2 marks</p>	2									
total			5									



**3469H Q10**

question	answers	extra information	mark
(a)	any <b>two</b> from <ul style="list-style-type: none"> <li>copies of <u>chromosomes</u> made</li> <li><u>cell</u> divides twice 4 cells formed</li> <li>each gamete / cell now has single set of chromosomes</li> </ul>	allow chromosome number halved / cells haploid / cells n	2
(b)	any <b>two</b> from <ul style="list-style-type: none"> <li>sex cells / gametes fuse / fertilisation</li> <li>offspring receive genes or chromosomes or alleles from both parents</li> <li>alleles in a pair may vary</li> </ul>		2
(c)(i)	new form of gene	allow change in genetic material / DNA / chromosomes / gene	1
(ii)	(no) any <b>two</b> from <ul style="list-style-type: none"> <li>some neutral</li> <li>exemplified</li> <li>some increase chances of survival /</li> <li>reference to natural selection or evolution</li> <li>exemplified</li> </ul>	e.g extra digit     e.g example of disease resistance	2
total			7

**3469H Q11**

question	answers	extra information	mark
(a)	Mendeleev arranged known elements in order of mass or properties	reject explanation in terms of electrons and / or atomic number	1
	gaps in Periodic Table / group 1		1
(b)	does not last long enough to experiment / very little of it	allow it has a short half-life	1
(c)(i)	(much) more violent	accept more reactive	1
(ii)	since outer electron / or shell further from nucleus	do not credit lower down group larger / more shells neutral	1
	therefore more easily lost	accept screening by inner electrons	1
total			6

**3469H Q12**

question	answers	extra information	mark
(a)(i)	2.25	correct answer gains three marks  if incorrect allow 1 mark for 2 correct readings (130 and 175) and further mark for $45 \div 20$ allow e.c.f.	3
(ii)	concentration of reactant(s) lower		1
	fewer collisions per second / time unit		1
(b)	labour costs lower / enzymes costs lower	<b>not</b> stop and start	1
total			6

**3469H Q13**

question	answers	extra information	mark
(a)	(ultrasound) waves reflected	accept 'bounce off'	1
	at boundary / from muscle		1
(b)(i)	time		1
(ii)	speed of (ultrasound) waves		1
total			4

**3469H Q14**

question	answers	extra information	mark
(a)(i)	two protons	if neither point gained allow 1 mark for helium nucleus	1
	2 neutrons		1
(ii)	electron		1
(b)	neutron splits (to form proton and electron)		1
total			4

**3469H Q15**

question	answers	extra information	mark
(a)	any <b>two</b> from <ul style="list-style-type: none"> <li>• Universe started in one place</li> <li>• (huge) explosion</li> <li>• Universe is expanding</li> </ul>	do not accept big bang	2
(b)	Quality of written communication: Links needed between : galaxies, red shift, and distance /expansion  any <b>two</b> from <ul style="list-style-type: none"> <li>• light from (galaxies) shifted towards red end of spectrum</li> <li>• the further away the galaxy, the greater the red shift</li> <li>• this shows that galaxies are moving away from us</li> <li>• this suggests that Universe is expanding</li> </ul>	do not accept light from planets	1  2
total			5

**3469H Q16**

question	answers	extra information	mark
(a)	180 / 179.9		1
(b)	99.4		1
(c)(i)	reduction		1
(ii)	more concentrated		1
total			4

**3469H Q17**

question	answers	extra information	mark
(a)	Two from  decommissioning cost high  since nuclear fuel waste radioactive / dangerous waste difficult to dispose of		2
(b)(i)	building / barrage needs to be very large (since energy dilute) or need many of them	accept building in water more expensive	1
(ii)	e.g. lack of suitable estuaries / environmental impact		1
(c)(i)	<b>X</b> and <b>Y</b>	both needed	1
(ii)	<b>Z</b>		1
(iii)	<b>X</b>		1
(d)	unsaturated / alkenes / those with double (C = C) bonds		1
total			8