



## General Certificate of Secondary Education

# Science: Double Award 3462/1H *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.

## Double Award Higher Tier 3462/1H

### 3462/1H Q1

question	answers	extra information	mark
(a)(i)	liver		1
(ii)	<u>on diagram:</u> ‘X’ on liver	must be unambiguous (eg not overlapping gall bladder) intersection of X in liver	1
(b)	stomach  <u>small</u> intestine	accept duodenum or ileum extra wrong answers cancel the mark, eg small intestine (colon) = no marks	1  1
(c)	amylase not produced by stomach  acid / low / wrong pH in stomach <b>or</b> enzyme would be denatured in stomach <b>or</b> amylase only works in neutral / alkaline conditions	accept no starch digesting enzymes in the stomach accept correct enzyme not in stomach accept <u>only</u> proteases in stomach do <b>not</b> accept protease does not digest starch  incorrect extra information cancels mark do <b>not</b> accept amylase does not work in the stomach	1  1
(d)	any <b>three</b> from:  • non-digestible / insoluble matter in faeces or fibre / roughage in faeces  • <u>water</u> absorption / <u>water</u> removed (into blood)  • by <u>large</u> intestine / colon / rectum  • by osmosis / diffusion	ignore ‘solid’ accept cannot be broken down  cancel mark if list of materials	3
total			9

## 3462/1H Q2

question	answers	extra information	mark	
(a)	A = nucleus	accept phonetic spelling only	1	
	B = (cell) membrane	accept plasma membrane	1	
(b)	any <b>one</b> from:  photosynthesis  <u>makes</u> sugar / starch / carbohydrate / organic material  traps or absorbs light	accept ' <u>makes</u> food' do <b>not</b> accept makes chlorophyll ignore stores starch / food / light / chlorophyll	1	
(c)	any <b>two</b> from:  <b>Plant cell</b>  • (has) vacuole <b>or</b> has cell sap  • (has) wall/ cellulose  • (stores) starch <b>or</b> doesn't store glycogen	<b>Animal cell</b>  • no vacuole <b>or</b> small / temporary vacuole <b>or</b> no cell sap  • no wall / cellulose <b>or</b> <u>only</u> membrane  • doesn't store / have starch <b>or</b> stores glycogen	ignore reference to shape  must be clear indication in all four boxes  ignore reference to chlorophyll	2
total			5	

3462/1H Q3

question	answers	extra information	mark
(a)	burning fossil fuels / coal / gas / oil	accept driving <u>vehicles</u> / eg cars accept coal-fired power station accept car emissions  ignore combustion unqualified do <b>not</b> accept power station unqualified do <b>not</b> accept <u>using</u> fossil fuels	1
(b)(i)	(SO <sub>2</sub> ) makes it acidic / makes acid rain / lowers pH		1
(ii)	any <b>one</b> from:  (SO <sub>2</sub> ) kills leaves reduces number of leaves reduces leaf area <b>or</b> smaller leaves causes fewer leaves to grow	ignore correct extras, eg withered, yellow etc	1
(c)	any <b>two</b> from:  (fewer leaves / less leaf S.A) so less photosynthesis  less food / less sugar / less starch supplied (to roots / to stems)  (SO <sub>2</sub> ) lowers pH of soil / makes soil acidic  ions (/minerals / salts / nutrients) less available (to plants)	accept don't get enough nutrients	2
total			5

**3462/1H Q4**

question	answers	extra information	mark
(a)	shoot <b>A</b> grew <b>or</b> got longer / taller / larger	accept <b>B</b> didn't grow	1
	(in <b>A</b> ) auxin moves / spreads down / through the stem <b>or</b> moves away from tip		1
	auxin <u>stimulates (/ causes)</u> growth / elongation	allow grew <u>because of</u> hormone	1
	in <b>B</b> no auxin / little auxin / <b>or</b> auxin supply removed		1
(b)(i)	towards shade / away from light	ignore 'to the left' accept 'towards R'	1
(ii)	<b>R</b>		1
(c)	any <b>two</b> from:		2
	<u>rooting</u> of cuttings <b>or</b> as a <u>rooting</u> powder		
	(control of) fruit / seed ripening	accept either delays or promotes	
	weedkiller	ignore wrong qualification	
	accept:		
seedless fruit formation			
inhibition of (lateral) bud growth	accept 'to save having to trim hedges'		
for tissue culture			
total			8

3462/1H Q5

question	answers	extra information	mark
(a)(i)	remains of an organism in rock / amber / coal / ice / tar <b>or</b> remains of an organism which lived long ago	accept bones, shells or impression for ‘remains’	1
(ii)	<ul style="list-style-type: none"> <li>• fossils show changes</li> <li>• <u>over</u> time</li> </ul>	<p>do <b>not</b> accept just ‘evolved’</p> <p><b>not</b> just a past event</p>	<p>1</p> <p>1</p>
(b)	<p><b>Quality of written communication</b></p> <p>any <b>two</b> from:</p> <p>mutation occurs in bacteria or change in DNA / gene occurs</p> <p>(when antibiotic used) only resistant bacteria survive <b>or</b> non-resistant bacteria are killed <b>or</b> reference to ‘natural selection’</p> <p>resistant bacteria pass on the gene / allele</p>	<p>for correct use of at least <b>two</b> scientific terms eg mutation, resistant (<b>not</b> just ‘antibiotic- resistant’, <b>not</b> ‘immune’) / selection / natural selection / survival / reproduction / gene / allele / DNA</p> <p>cancel if mutation ‘caused by’ antibiotic</p> <p>allow pass on the mutation do <b>not</b> accept just ‘pass on resistance’</p>	<p>1</p> <p>2</p>
total			6

**3462/1H Q6**

question	answers	extra information	mark
(a)	345 to 350	ignore working or lack of working  use of 355 to 360 <b>and</b> 10 for <b>1</b> mark	2
(b)	any <b>two</b> from:  <u>more</u> sweating (at 37.6°C)  <u>more</u> water loss <b>or</b> dehydration <u>occurs</u>  blood becomes (more) concentrated / (more) salty <b>or</b> need to replace water  stimulation of the hypothalamus	'more' at least once in the first 2 points  do <b>not</b> accept prevents dehydration only	2
(c)	any <b>three</b> from:  evaporation  of <u>water</u>  cools skin <b>or</b> uses heat from skin  cools blood / heat from blood (passing through skin)	do <b>not</b> accept just water loss unqualified    related to sweating cooling the blood ignore vasodilation	3
total			7

3462/1H Q7

question	answers	extra information	mark
(a)(i)	haemoglobin / oxyhaemoglobin	must be phonetic	1
(ii)	carries oxygen <b>or</b> forms oxyhaemoglobin	ignore references to CO <sub>2</sub> / iron cancel if extras like food / glucose	1
	from lungs to tissues		1
(b)	no nucleus <b>or</b> biconcave disc (described)	ignore references to size ignore vague references to being 'round' / 'donut' shaped etc.	1
(c)	any <b>three</b> from: <ul style="list-style-type: none"> <li>• combines with haemoglobin / with red pigment</li> <li>• irreversibly</li> <li>• <u>less</u> oxygen transport <b>or</b> <u>less</u> oxygen (to fetus)</li> <li>• <u>less</u> energy release <b>or</b> <u>less</u> respiration (in fetus)</li> <li>• <u>less</u> growth of fetus <b>or</b> <u>lower</u> birth mass</li> </ul>	do <b>not</b> accept any wording suggesting zero oxygen     do <b>not</b> accept 'does not grow properly'	3
total			7



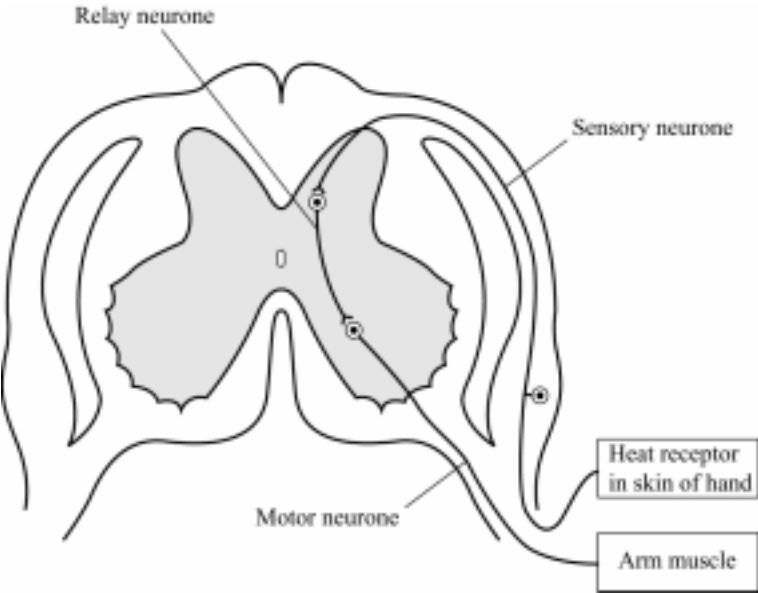
**3462/1H Q8**

question	answers	extra information	mark
(a)	1.67 / $1\frac{2}{3}$	accept 1.6 to 1.7 ignore working or lack of working  $\frac{400 \times 100}{24000}$ for <b>1</b> mark	2
(b)	any <b>three</b> from:  lost as heat <b>or</b> keeping body warm  lost in respiration  movement  not eaten parts or individuals / non-edible parts / dead leaves / wood / bones / faeces / urine	deduct only 1 mark for any mention of in carnivore  lost in metabolic functions is not enough  do <b>not</b> accept ' <u>used for</u> respiration'  ignore 'waste'  ignore references to growth / reproduction	3
total			5

**3462/1H Q9**

question	answers	extra information	mark
	any <b>three</b> from adaptation <b>and</b> effect: few leaves / no leaves / little growth above ground / low surface area above ground so less water loss  <u>deep</u> roots so can reach water <b>or</b> because surface soil is likely to dry out  roots near surface so can obtain water when it does rain  widespread roots or many roots so can obtain water from a large area  swollen stem so can store water	ignore references to ions throughout ignore animals eating plant  do <b>not</b> accept zero water loss  accept 'moisture' for water	3
total		3	

**3462/1H Q10**

question	answers	extra information	mark
(a)	 <p>sensory neurone correctly drawn <b>and</b> labelled</p> <p>motor neurone correctly drawn <b>and</b> labelled</p>	<p>from receptor + via dorsal root + cell body in ganglion + synapse to relay neurone</p> <p>to muscle + via ventral root + same shape as relay neurone + synapse with relay neurone</p> <p><b>OR</b> correct <u>pathways</u> for both neurones given (ie without synapse or cell bodies) <b>and</b> labelled, <b>or</b> correctly <u>drawn</u> but unlabelled = 1 mark for this part)</p>	<p>1</p> <p>1</p>
(b)	<p>any <b>two</b> from:</p> <p>reference to synapses / gaps between neurones</p> <p>extra time for release / movement of chemical</p> <p>extra time for development of muscle 'tone' / tension</p>		2
total			4

**3462/1H Q11**

question	answers	extra information	mark
	any <b>three</b> from:  FSH stimulates growth / maturing of follicle(s) / eggs  FSH stimulates oestrogen release  oestrogen stimulates development of uterus lining  oestrogen stimulates LH <u>release</u> / <u>production</u>  LH stimulates ovulation / egg release		3
total			3

**3462/1H Q12**

question	answers	extra information	mark
(a)(i)	<b>Aa</b> or <b>aA</b>		1
(ii)	allele / gene for vestigial wings / <b>a</b> is recessive <b>or</b> vestigial is recessive <b>or</b> <b>A</b> is dominant <b>or</b> <b>A</b> would override the effect of <b>a</b> <b>or</b> <b>A</b> present gives long wings		1
(b)	parental genotypes correct – both <b>Aa</b>	NB can pick up chain of logic at any point correctly derived from candidate's previous point	1
	gametes correctly derived from <b>P</b> genotypes		1
	offspring genotypes correctly derived from gametes		1
	<b>3:1</b> ratio recognised	wrong cross and not 3:1 ratio = max 2	1
total			6

3462/1H Q13

question	answers	extra information	mark
(a)(i)	any <b>two</b> from:  sprayed / sprinkled through the <u>air</u> <b>or</b> droplets through the <u>air</u>  (large) air spaces (between stones)  thin film of sewage on stones  large surface area of stones  slow flow rate / trickles over stones		2
(ii)	L.H.S. – oxygen  R.H.S – carbon dioxide + water	accept words or correct symbols O <sub>2</sub> , CO <sub>2</sub> , H <sub>2</sub> O	1  1
(b)	any <b>two</b> from:  at depth - no light  - no photosynthesis  - no chlorophyll (produced in dark)	accept converse for surface	2

cont...

**3462/1H Q13 cont...**

(c)	<p><b>Quality of written communication</b></p> <p>for <b>2</b> points relating cause and effect</p> <p>any <b>three</b> from:</p> <p>dead plants / sewage used by bacteria / food for bacteria / broken down by bacteria</p> <p>number of bacteria increases / large number of bacteria present</p> <p>oxygen from water used (by bacteria) / less oxygen for other organisms</p> <p>particles (of sewage / bacteria) block light <b>or</b> growth of surface plants blocks the light</p> <p>less light (for plants) for photosynthesis</p> <p>plants produce less oxygen</p> <p>other organisms cannot respire / get energy</p> <p>organisms killed</p> <p>accept microorganisms / microbes do <b>not</b> accept 'germs'</p> <p>ignore suffocate / cannot breathe do <b>not</b> accept wrong context – eg 'algae use up oxygen'</p> <p>ignore references to disease / toxins ignore 'eutrophication'</p>	<p>1</p> <p>3</p>
total		10

3462/1H Q14

question	answers	extra information	mark
(a)	(before exercise) – 9 to 11 <b>and</b> (after exercise) – 12 <b>or</b> 13	<b>both</b> correct	1
(b)	0.75 to 0.90	ignore working or lack of working  eg. 2.35 – 1.55 <b>or</b> $\frac{(2.35 - 1.0) \times 60}{100}$  <b>or</b> other suitable figures for <b>1</b> mark	2
(c)	any <b>four</b> from:  still need to remove <u>extra</u> carbon dioxide  still need to remove heat / to cool  (some) anaerobic respiration (in exercise)  lactic acid made (in exercise)  oxygen needed to break down lactic acid <b>or</b> suitable reference to oxygen debt  lactic acid broken down to CO <sub>2</sub> and water <b>or</b> lactic acid changed into glucose		4
total			7



**3462/1H Q15**

question	answers	extra information	mark
(a)(i)	<b>A</b> = xylem	accept phonetic only	1
(ii)	<b>B</b> = phloem	accept phonetic only	1
(b)	(radioactive CO <sub>2</sub> used in) <u>photosynthesis only in the light</u>	accept converse	1
	glucose / sucrose / sugar / organic molecules are made	do <b>not</b> accept 'starch'	1
	(organic molecules) transported (out of leaf) <u>via phloem</u> / <u>via tissue B</u> / via candidate's name in (a)(ii)		1
total			5