GCSE 2004
June Series

ASSESSMENT and QUALIFICATIONS ALLIANCE

Mark Scheme

Biology Specification B
3411/H

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

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GCSE BIOLOGY

INFORMATION FOR EXAMINERS

1. General

The mark scheme for each question shows:

- the marks available for each part of the question;
- the total marks available for the question;
- the typical answer or answers which are expected;
- extra information to help the Examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

The extra information is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme.

At the beginning of a part of a question a reminder may be given, for example:
where consequential marking needs to be considered in a calculation;
or the answer may be on the diagram or at a different place on the script.

In general the right hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening

2.1 In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following lines is a potential mark.

2.2 A bold **and** is used to indicate that both parts of the answer are required to award the mark.

2.3 Alternative answers acceptable for a mark are indicated by the use of **or**. (Different terms in the mark scheme are shown by a / ; e.g. allow smooth / free movement.)

3. Marking points

3.1 Marking of Quality of Written Communication

Where *Quality of written communication* appears in the mark scheme, one mark is to be awarded for either of the following points:

- Using correct scientific terms
- Correct sequencing or linking of ideas or points

The mark scheme will specify which of the points is to be awarded in a particular question. A QoWC mark can be awarded for a scientific answer, even if it is not accurate. It cannot be awarded for a nonsensical or non-scientific answer.
On the script, the QoWC tick should be identified by a 'q' written next to it.

3.2 Marking of lists

This applies to questions requiring a set number of responses, but for which candidates have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error/contradiction negates each correct response. So, if the number of error/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

Example 1: What is the pH of an acidic solution? (1 mark)

Candidate	Response	Marks awarded
1	4,8	0
2	green, 5	0
3	red*, 5	1
4	red*, 8	0

Example 2: Name two planets in the solar system. (2 marks)

Candidate	Response	Marks awarded
1	Pluto, Mars, Moon	1
2	Pluto, Sun, Mars, Moon	0

3.3 Use of chemical symbols/formulae

If a candidate writes a chemical symbol/formula instead of a required chemical name, full credit can be given if the symbol/formula is correct and if, in the context of the question, such action is appropriate.

3.4 The marking of quantitative relationships

Full credit can be given for a correct quantitative relationship expressed in:

- named units;
- physical quantities;
- standard symbols;
- a combination of physical quantities and units.

No credit can be given for any quantitative relationship expressed in terms of:

- a combination of physical quantities, units and symbols;
- a diagram, e.g. the ohm's law triangle, unless the rest of the answer shows clearly that the candidate understands the relationships involved.

3.5 Marking procedure for calculations

3.5.1 Full marks can be given for a correct numerical answer, as shown in the column 'answers', without any working shown.
However:

- if the answer is incorrect, mark(s) can be gained by correct substitution/working and this is shown in the 'extra information' column;
- if the answer is correct, but an incorrect relationship is written in the working, then no marks can be awarded (see 3.5.2).

3.5.2 Where calculations are based on incorrectly recalled relationships, neither the incorrectly recalled relationship, nor the resulting calculation based on the incorrect relationship, will be credited.

3.6 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.7 Errors carried forward

There should be no error carried forward from a previous answer which has been based on wrong science. Any error in the answers to a structured question should be penalised once only.

Examples

(a) A candidate who calculates average speed using speed = time/distance **and** then proceeds to use this incorrect answer to calculate an acceleration based on the correct quantitative relationship should be given credit for the use of the correct acceleration relationship but none for either numerical answer.

(b) A candidate who incorrectly calculates average speed using speed = distance/time and then proceeds to use this incorrect value to calculate an acceleration based on the correct quantitative relationship, should be given credit for the use of both correct quantitative relationships **and** for the correct substitution and use of the incorrect value in the calculation of the rate of acceleration.

Papers should be constructed in such a way that the number of times errors can be carried forward are kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation e.c.f. in the marking scheme.

3.8 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

3.9 Brackets

(…..) is used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

3.10 Interpretation of marginal points

There will be times when the answer is almost, but not quite, correct. Some examiners would award a mark while others would not. In any one script, an attempt should be made to balance these nearly correct answers by giving the mark on some occasions but not on others. If this is not done, the marking would end up being too lenient or too harsh.

3.11 Unexpected Correct Answers not in the Mark Scheme

The Examiner should use professional judgement to award credit where a candidate has given an unexpected correct answer which is not covered by the mark scheme. The Examiner should consult with the Team Leader to confirm the judgement. The Team Leader should pass this answer on to the Principal Examiner with a view to informing all examiners.

GCSE Biology
Higher Tier 3411/H

3411H Q1

question	answers	extra information	mark
(a)(i)	protease	accept peptidase **or** named protease e.g. pepsin / trypsin allow 'proteinase'	1
(ii)	amino acids	accept peptides / polypeptides / peptones	1
(b)	points plotted accurately	± ½ square deduct **1** mark per error	2
	best fit curve **or** ruled point-to-point	if double line within ½ square allow sharp apex do **not** allow single straight line if no points line defines points if (5,0) not plotted only penalise **1** mark bar graph wide bars – **no** marks bar graph ± ½ square max **2** for points	1
(c)(i)	2 **or** correct from candidate's graph	± ½ square	1
(ii)	stomach		1
(d)	proteins are large / product is small		1
	proteins (may be) insoluble / product is soluble		1
	cannot be absorbed / cannot enter blood **or** cannot pass through gut lining	accept reverse referring to product	1
total			10

3411H Q2

question	answers	extra information	mark
(a)(i)	any **one** from: • chemical messenger • chemical / substance released in one part to have effect elsewhere in body • chemical / substance which affects another / target organ / tissues / cells	allow chemical from endocrine gland	1
(ii)	in blood / circulatory system / any named part including plasma	extra wrong answer would cancel example **not** red blood cells	1
(b)	**Quality of written communication**: correct use of at least two relevant scientific term**s** spelt phonetically	e.g. pregnancy, ovulation, FSH, oestrogen, progesterone, ovary, follicle, circulation, thrombosis, feminisation, sperm count, STD Q ✓ or Q X	1
	any **three** from: Oral contraceptives: (benefit) • prevent (unwanted) pregnancy **or** prevent egg release • regulate menstrual cycle / periods (problems) • prolonged use may prevent later ovulation / cause infertility • named side-effect on female body e.g. circulatory problems / weight gain / nausea / headache / breast cancer / mood swings • increased promiscuity / increase in STD's / STI's • named side-effect on environment e.g. feminisation of fish **or** lowered sperm count in human males Fertility drugs: (benefit) • can enable woman to have children **or** to become pregnant **or** stimulates egg release (problem) • multiple births	for full marks must score at least **one** re contraceptives **and** at least **one** re fertility drugs if unclear which type of hormone maximum **2** marks from 3	3
total			6

3411H Q3

question	answers	extra information	mark
(a)	burning fossil fuels / named example	accept <u>driving</u> cars / lorries etc burning fuels in power stations ignore combustion unqualified do **not** accept catalytic converter on its own **or** emissions from power stations	1
(b)(i)	pollutants / smoke <u>breathed in</u>		1
(ii)	SO_2 and deaths rise (and fall) at same times **or** SO_2 and deaths parallel each other / show same pattern		1
(iii)	no – could be due to some other factor / pollutant / to smoke **or** correlation not precise / described	explanations must come to a conclusion named examples must be plausible allow 'coincidence'	1
total			4

3411H Q4

question	answers	extra information	mark
(a)	**A** = protein (coat)	accept capsid / capsomere	1
	B = DNA / gene(s) / genetic material / nucleic acid	allow RNA do **not** allow chromosome	1
(b)(i)	any **two** from: • skin • scabs / clot • mucus • stomach acid / gut protease	allow tears	2
(ii)	diagram shows extensions of intact cell membrane around viruses		1
(iii)	antibodies	allow enzymes re (ii) allow interferon ignore antitoxins / proteins	1
(c)	<u>virus</u> is transferred		1
	(virus in) blood / body fluids – transfer (via needles)		1
total			8

3411H Q5

question	answers	extra information	mark
(a)(i)	lower – **B** loses less (water / mass) than **C** **or** described in terms of petroleum jelly	accept converse re Leaf **C**	1
(ii)	yes - **B** and **C** lose less than **D** **or** **B** and **C** lose more than **A** **or** **D** loses the <u>most</u> **or** **A** loses the <u>least</u>	do **not** accept just 'all leaves lose some weight'	1
(b)(i)	**X** = stoma **Y** = guard cell	accept stomata / stomatal pore do **not** accept air space	1 1
(ii)	petroleum jelly blocks stomata / pores **or** petroleum jelly prevents water loss **or** petroleum jelly waterproofs water (mainly) lost via stomata / pores / **X** **or** stomata on lower surface only	allow pores are blocked in **B**	1 1
total			6

3411H Q6

question	answers	extra information	mark
(a)	antibiotics diffuse / pass (into agar)	do **not** allow into dish	1
	kill / prevent growth of bacteria or destroy cell wall / bacteria	accept bacteria are dead	1
(b)	it / higher concentration kills more bacteria or causes less growth	do **not** accept anything referring to size of circle	1
	levels off (at 6 units)	accept above 4 units	1
(c)	**Quality of written communication**: for correct sequencing or linking of ideas or points	this mark can only be awarded for a plausible attempt (not necessarily biologically correct) to link a precaution to a purpose Q ✓ or Q ✗	1
	<u>Loop flamed</u> to sterilise it / kill unwanted microorganisms	accept so no bacteria present do **not** accept to clean it	1
	<u>Lid taped</u> prevent bacteria getting in / out **or** prevent someone touching bacteria	accept microorganisms/fungi for bacteria do **not** accept viruses or germs	1
	<u>25°C</u> prevents / reduces <u>growth</u> of / reproduction		1
	harmful bacteria / microorganisms or pathogens		1
(d)	any **two** from: • to avoid over-use of antibiotics **or** use no / less / low concentration antibiotics • select antibiotic that is most effective • finish the course • don't give or use for animals • develop new antibiotics **or** alternatives		2
total			11

3411H Q7

question	answers	extra information	mark
(a)	warmer when leaving		1
	(heat produced) by (metabolic) reactions / respiration / fermentation		1
(b)	provide oxygen		1
	for respiration (of microorganisms)	aerobic respiration = 2 marks	1
(c)	any **two** from:		2
	• pH	do **not** accept conditions before fermenter	
	• temperature		
	• nutrients or named ones		
	• oxygen		
	• protein concentration / amount		
	• speed of paddles or stirring		
(d)	curve / line from bottom left to top right	going upwards must extend to at least 4.5 days	1
	shape a mirror image of graph (sigmoid curve)	ignore time lag reasonable attempt	1
(e)	no air / oxygen		1
total			9

3411H Q8

question	answers	extra information	mark
(a)	**Quality of written communication**: ideas given in a sensible order	broken down giving products (could be CO_2, minerals or gas) (used by trees) Q ✓ or Q X	1
	any **three** from:		3
	• microorganisms / bacteria / fungi / saprotrophs	accept saprophytes / saprobionts / detritivores (named)	
	• digest / break down organic matter / leaves / decompose / reference decomposers / decay / rot		
	• use of enzymes / correct named example		
	• absorption by diffusion / active transport	must be of breakdown products	
	• respiration / combustion		
	• release of carbon dioxide		
	• CO_2 can be used (by trees) in photosynthesis	do **not** accept CO_2 taken in by roots	
(b)	any **two** from:		2
	• warmth / suitable temperature	do **not** accept heat / hot weather	
	• damp / water / rain / humid / moisture		
	• oxygen		
	• suitable pH		
total			6

3411H Q9

question	answers	extra information	mark
(a)(i)	respiration		1
(ii)	9600	if correct answer, ignore working / lack of working $\frac{80 \times 12000}{100}$ for **1** mark	2
(b)	any **three** from: • dilates / widens **or** muscle in wall relaxes **or** sphincter opens • more blood flows near skin surface **or** more blood through capillaries • heat lost by radiation / convection / conduction • heat loss from blood / cools blood	 do **not** accept expands or just gets bigger ignore evaporation	3
(c)	hypothalamus / brain		1
total			7

3411H Q10

question	answers	extra information	mark
(a)	chromosome	accept chromosomes	1
(b)	drawing shows: just 2 chromosomes one long + one short		 1 1
total			3

3411H Q11

question	answers	extra information	mark
(a)(i)	sensory / afferent		1
(ii)	<u>on diagram</u>: arrow (next to neurone **A**) pointing towards spinal cord **and** arrow (next to neurone **B**) pointing towards muscle		1
(b)	chemical (released) **or** neurotransmitter **or** by diffusion	accept correct named example of a neurotransmitter	1
(c)	<u>on diagram</u>: **X** labelling muscle **or** motor end plate	do **not** accept on stretch receptor	1
total			4

3411H Q12

question	answers	extra information	mark
	any **five** from: • genetic variation exists in a population **or** variation caused by mutation / change in gene / in DNA • larger voles have smaller $\frac{\text{S.A.}}{\text{Vol.}}$ **or** have more fat • larger voles lose less heat / are better insulated **or** more energy stored • larger voles survive • larger voles breed • larger voles pass on (beneficial) gene / allele / mutation / DNA	'they' accept as larger voles ignore characteristic	5
total			5

3411H Q13

question	answers	extra information	mark
(a)(i)	one of two (/ of several) forms of a gene **or** (a variant) form of a gene		1
(ii)	expressed even if only one copy inherited **or** expressed / seen in heterozygote		1
(b)(i)	nervous	ignore brain	1
(ii)	Man / affected = **Hh and** Wife / unaffected = **hh**	N.B. can pick up chain of logic at any point correctly derived from candidate's previous line	1
	correct gametes from Parental genotypes	need full diagram	1
	F_1 genotypes correctly derived from P gametes		1
	identification of **Hh** in F_1 as having Huntington's		1
	correct probability from F_1 genotypes e.g. $\frac{1}{2}$ / 0.5 / 50% / 1 in 2 / 1:1 / 50:50	**not** 1:2 **or** 50/50	1
total			8

3411H Q14

question	answers	extra information	mark
(a)	hold <u>cells</u> together **or** prevent flow of <u>cells</u> **or** trap <u>cells</u>		1
(b)	12500	if correct answer, ignore working / lack of working $\frac{100}{0.008}$ for **1** mark ignore any units	2
(c)(i)	size RBC approximately same size capillary **or** no room for more than one cell **or** <u>only</u> one can fit **or** RBC is <u>too</u> big	allow use of numbers do **not** accept capillaries are narrow	1
(ii)	more oxygen released (to tissues) **or** more oxygen taken up (from lungs) and any **two** from: • slows flow **or** more time available • shorter distance (for exchange) **or** close to cells / capillary wall • more surface area exposed		1 2
(d)	CO combines with <u>haemoglobin</u> **or** carboxyhaemoglobin formed Irreversibly / more readily reduces oxygen transport / uptake (by the cell)	accept reacts with haemoglobin	1 1 1
total			10

3411H Q15

question	answers	extra information	mark
(a)	aerobic respiration	 'anaerobic respiration' = **1** mark	1 1
(b)	any **five** from: • glucose is a small molecule • glucose passes through filter **or** glucose is filtered out of blood **or** glucose enters the capsule / kidney tubule / Q • glucose reabsorption **or** glucose taken (back) <u>into blood</u> • cells lining tubule have microvilli / shape described **or** cells lining tubule have large surface area • active transport • up concentration gradient • use of energy / ATP • long tubule for more reabsorption	 do **not** accept '<u>filtered</u>' into blood / out of tubule	5
total			7

3411H Q16

question	answers	extra information	mark
(a)	<u>Ampicillin</u> <u>Tetracycline</u> ✓ – – – ✓ ✓	accept blank **or** cross **or** – 1st: mark by rows to maximum **3** marks 2nd: if no marks by rows, mark by columns to maximum **1** mark table completely blank = **0** marks	3
(b)	1st: Yes (no mark)	if 'no' - read on for logical argument e.g. loss of plasmid **or** gene mutation	
	2nd: all formed from same original cell	must be <u>one</u> cell i.e. bacteri<u>um</u>	1
	by asexual reproduction / no fusion / not sexual	allow reference to 'mitosis'	1
	offspring cells are genetically identical **or** all have a copy of the insulin gene / of the plasmid		1
total			6

3411H Q17

question	answers	extra information	mark
(a)	any **two** from: • hard / strong / rigid • (hardness) calcium phosphate / calcium salts **not** just calcium • (strength) living cells / protein		2
(b)	ligaments have tensile strength / are strong **and** (some) elasticity tendons have tensile strength / are strong **and** little/no elasticity	minimum ligaments are strong and elastic both strong = 1 mark ligaments more elastic or comparison = 1 mark	1 1
(c)(i)	living cells / protein / organic matter / whatever stopped them being brittle destroyed (by heat)	accept proteins denatured	1
(ii)	acid dissolves / removes / (calcium) phosphate / salts / whatever makes it hard	do **not** accept inorganic matter	1
total			6

3411H Q18

question	answers	extra information	mark
(a)	any **two** from: • streamlined / aerodynamic • distance over top of wing is greater than distance under wing • lower pressure above wing • creates lift / an upward force	 or converse or converse 	2
(b)	barbs aid smooth air flow / provide strength hollow shafts provide lightness / rigidity / strength	 do **not** accept support	1 1
(c)	any **one** from: • provide large surface area to push downwards (on the air) • tilt / swivel during upstroke / downstroke		1
total			5

3411H Q19

question	answers	extra information	mark
(a)	live in / on another organism **and** feed from it		1
(b)	any **two** from: • (mosquito) feeds on / sucks blood • of someone who has the parasite • into / from salivary gland		2
(c)	any **three** from: • parasites are passed from mosquito to human • (parasite) feeds / reproduces in blood cells • blood cells rupture / burst • (severe) fever	allow a maximum **1** mark for 'malaria' if there are no other creditworthy points accept reference to damage to liver cells or disruption of liver function or toxins released	3
total			6

3411H Q20

question	answers	extra information	mark
(a)	any **two** from: • T cells **or** T lymphocytes • have receptors on surface / membrane • recognise antigen / protein (on pathogen)		2
(b)	specific / specificity memory cells or immunological memory rapid antibody production (if same antigen enters)	ignore detail about defence **not** just B lymphocytes	1 1 1
(c)	immune system no longer effective (antibiotics) kill bacteria which might cause infections / might kill the sufferer or prevent bacterial disease		1 1
(d)	× × × ✓	**all four** required	1
total			8