ASSESSMENT and QUALIFICATIONS ALLIANCE

Mark scheme June 2003

GCSE

Human Physiology and Health

3417

Higher

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Information to 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 typical expected **answer** is given in the left hand side of the appropriate section of the mark scheme. The **extra information** is given in the right hand side of the same section and should only be applied to that item in the mark scheme.

e.g. **Question:** Where, in a human, would the cell body of a motor neurone be found?

(1 mark)

	answers	**extra information**
Mark Scheme	brain **or** spinal cord **or** CNS	'grey matter' must be qualified re. one of these
Candidates' Answers	*1. in the brain*	scores 1 mark
	2. in the grey matter	scores 0 marks
	3. in the grey matter of the spinal cord	scores 1 mark

At the beginning of the mark scheme to 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 located in an unusual situation, such as on the diagram or a graph.

In general, the extra information on the right hand side of the mark scheme is there to amplify the mark scheme, showing possible acceptable alternatives which may be given by candidates, providing limits of accuracy (e.g. in reading data from a graph), as well as any common errors which might result in cancellation of the mark. The purpose is to improve the consistency of marking.

All marks are awarded independently unless linking is specified.

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 points following 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

Examiners are reminded of the need to assess QoWC by the following statement appearing in the appropriate parts of the mark scheme:

The answer to this question requires ideas in good English in a sensible order with correct use of scientific terms. Quality of written communication should be considered in crediting points in the mark scheme.

The maximum marks available to a candidate whose answer is not well expressed will be (the number of marks available) – 1.

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 errors/contradictions equals or exceeds the number of marks available for that part of the question, no marks can be awarded

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

e.g. **Question:** Give **three** functions of the placenta. *(3 marks)*

Mark Scheme	**answers**	**extra information**
	any **three** from:	
	supply oxygen to fetus	
	supply food to fetus	**allow** correct named food
	supply antibodies to fetus	do **not** accept 'protein' unqualified
	remove CO_2 from fetus	**allow** 'remove waste' only if no named examples
	remove urea from fetus	
		do **not** accept 'supply blood to fetus'

Candidates' Answers:

✓ ✓ 1. *To supply oxygen and food to the baby*	scores 2 marks
✓ ✓ × 2. *To supply oxygen, food and blood to the fetus*	scores 1 mark
✓ ✓ × ✓ 3. *To supply oxygen, food and blood to the fetus and remove CO_2*	scores 2 marks
✓ * ✓ 4. *To supply oxygen (and goodness) to the baby and remove waste*	scores 2 marks

3.3 Use of chemical symbols/formulae

If a candidate writes a chemical symbol/formula instead of the 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 Marking procedure for calculations

3.4.1 Full marks can be given for a correct numerical answer, as shown in the column 'answers', without any working being shown. However, if the answer is incorrect, mark(s) can still be gained by correct substitution/working. This is shown in the 'extra information' column.

3.4.2 In a calculation based on figures obtained by the candidate from information supplied elsewhere in the question (e.g. from a table or a graph), credit will still be given for workings based upon the candidate's incorrect figures and the answer resulting therefrom.

3.4.3 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.

3.5 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.

3.6 Errors carried forward

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

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.

3.7 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term. Particular terms to watch out for are:

urea	urine		
ureter	'ureta'	'urether'	urethra
mitosis	'meitosis'	'miosis'	meiosis

3.8 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.

3.9 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 50% of the time and withholding it the other 50%. If this is not done, the marking would end up being too lenient or too harsh.

3.10 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.

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Higher Tier Question 1

question	answers	extra information	mark
(a)	bacteria	accept correctly named alternatives	1
(b)(i)	chicken		1
(ii)	8	allow **1** mark for $\frac{16}{100} \times 50$	2
(c)(i)	(raw) milk is heated (rapidly) to 72 °C kept (at 72 °C) for 15 seconds cooled (rapidly)	do **not** accept boiled	4
(ii)	any **one** from: sterilisation **or** UHT dehydration	 accept freezing do **not** accept refrigeration	1
total			9

Higher Tier Question 2

question	answers	extra information	mark
(i)	both use glucose both release energy	accept sugar do **not** accept produce	2
(ii)	any **one** from: aerobic uses oxygen aerobic releases more energy aerobic produces carbon dioxide aerobic produces water anaerobic produces lactic acid	accept reverse arguments	1
(b)	any **two** from: movement growth / repair maintenance of body temperature active transport	 do **not** accept reproduction qualify action of body organs accept keeping warm	2
(c)(i)	18	accept 18.5	1
(ii)	1100		1
(iii)	30 000	allow **1** mark for 24 × (1250) within small limit	2
(iv)	supplies more oxygen removes more carbon dioxide	accept for **1** mark when no gases are named gaseous exchange is faster / increases / more / better	2
total			11

Higher Tier Question 3

question	answers	extra information	mark
(a)(i)	C F A	do **not** accept names	3
(b)(i)	testes		1
(ii)	swim into oviduct / fallopian tube upper part (of oviduct) join **or** fuse / combine with egg	do not credit meet **or** fertilise / enter / penetrate egg without qualification	4
(c)	two eggs (released) each fertilised by separate **or** different sperm		2
(d)(i)	condom	accept vasectomy do **not** accept male pill	1
(ii)	ovary		1
(iii)	no egg (available) (for fertilisation) (sperm has nothing to fertilise) sperm unable to pass /(egg cannot meet sperm) (fertilised) egg unable to sink into **or** implant in uterus / no implantation	must have reason for no fertilisation accept barrier for <u>sperm</u> do **not** accept difficult to pass	1 1 1
(iv)	any **one** from: not 100% effective eggs may still be released may forget to take 'pill' regularly	accept other drugs may affect accept qualified illness may affect e.g. upset stomach / sickness	1
total			16

Higher Tier Question 4

question	answers	extra information	mark
(a)	**C**		1
	A		1
(b)	(Function)		
	to crush **or** grind food	ignore chew unless qualified – e.g. chew by grinding	1
	(Adaptation)		
	any **one** from:		1
	ridged large **or** big large surface area **or** broad / wide	accept cusps do **not** credit rough bumpy	
(c)	<u>bacteria</u> feed on **or** break down <u>sugar</u>	do **not** accept food must have both bacteria **and** sugar	3
	acid (produced) present in food / drink	accept suitable source of acid	
	(acid) erodes / dissolves / breaks down / attacks / damages enamel	do **not** accept 'eats' – must be qualified 'eats away' do **not** accept decays the tooth	
total			7

Higher Tier Question 5

question	answers	extra information	mark
(a)(i)	cowpox sufferers / dairymaids did not catch smallpox		1
(ii)	infection with cowpox gives protection **or** immunity from smallpox		2
(iii)	boy did not develop smallpox (after injection with cowpox) **or** the boy was immune to smallpox		1
(iv)	any **one** from: boy already immune / has natural resistance (smallpox) dose too small **or** weak		1
(v)	any **one** from: could not be confirmed independently too small a sample		1
(b)	any **one** from: to establish if vaccine is effective to see if vaccine harmful to see if there are side effects animals have similar immune systems not ethical to test on humans	accept correct moral argument if related to humans	1
total			7

Higher Tier Question 6

question	answers	extra information	mark
(a)	removal of waste / or named example products of metabolism **or** body processes **or** substances produced by the body	**1** mark only for removal of waste accept correct named process if linked to correct substance	1 1
(b)(i)	B		1
(ii)	carries urine to bladder		1
(c)(i)	any **one** from: removes **or** excretes urea removes **or** excretes excess salts		1
(ii)	*The answer to this question requires ideas in good English in a sensible order with correct use of scientific terms. Quality of written communication should be considered in crediting points in the mark scheme* any **five** from: meat contains protein proteins broken down to amino acids amino acids converted to urea in liver by deamination / removal of amino group more urea in A **or** B **or** more in blood	✗ Q – if English is not good and all five marks attained allow mark for liver anywhere in relation to mark points 3 or 5	5
total			10

Higher Tier Question 7

question	answers	extra information	mark
(a)(i)	(contaminated / infected) food **or** water		1
(ii)	any **one** from: (large intestine) unable to absorb water results in death due to dehydration		1
(iii)	any **one** from: antibiotics to kill bacterium administer water **or** fluid to replace fluid lost by diarrhoea		1
(b)(i)	any **one** from: surface protein on a cell **or** substance (foreign to the body) which stimulates immune response foreign protein	} both points required for mark	1
(ii)	any **three** from: white blood cells (stimulated) to <u>produce</u> antibodies (antibodies) destroy / kill bacterium future rapid response / antibodies produced quickly immunological memory / white cells remember	 ignore fights ignore antibodies remember	3
total			7

Higher Tier Question 8

question	answers	extra information	mark
(a)(i)	Australian population descended from English population	accept both from same ancestors / ethnic origin / related	1
(ii)	no 1^B / B allele in Indian population **or** no people with group B blood group (in Indian population) group AB requires the inheritance of 1^A and 1^B (alleles) **or** A and B alleles	 NOT group	2
(b)(i)	1^O1^O	accept oo / ii	1
(ii)	1^A1^A 1^A1^O	do **not** accept extra symbols e.g. A × A accept AA AO	2
(c)	AB		1
(d)(i)	allele carried only on X chromosome **or** missing from Y chromosome		1
(ii)	mother H h X X; father H X Y gametes H h H Y; X X X Y h X Y child	accept other forms of diagram e.g. Punnett square Father X^H Y; Mother X^H X^h; X^h X^hY child Parents X^H X^h Mother X^H Y Father	4
total			12

Higher Tier Question 9

question	answers	extra information	mark
(a)	during formation of gametes **or** sex cells		1
(b)	four nuclei drawn each with two chromosomes one of each type		3
(c)	order of bases (in DNA) contains code / information / plan / blueprint for order of amino acids (in protein)	do not accept message	3
total			7

Higher Tier Question 10

question	answers	extra information	mark
(a)(i)	34 (milligrams)		1
(ii)	absorption of glucose from (small intestine) **or** into blood		1
(b)	for **2** marks insulin lowers blood sugar glucagon raises blood sugar		2
	any **3** from: glucose stored as glycogen increase in respiration increase in uptake of glucose (into liver / cells / muscles) glycogen changed to glucose	these must be in correct context	3
(c)	(advantages) any **two** from: no need for (regular) injection of insulin body produces own insulin no need to control diet no further damage to (other) organs	do **not** accept less or fewer injections accept named examples	2
	(disadvantages) any **two** from: risk of surgery rejection **or** need to take anti-rejection drugs need for regular check ups	ignore waiting time ignore lack of donors ignore cost	2
total			11

Higher Tier Question 11

question	answers	extra information	mark
(a)(i)	(mean level used) because levels can vary <u>widely</u> / a lot		1
(ii)	× 20 **or** 20 times **or** 20		1
(iii)	300		1
(b)	any **four** from: source of CO (train exhaust) / train produces CO breathe in CO / fumes carbon monoxide combines with haemoglobin less oxygen is carried by the blood / haemoglobin / red blood cells little or **no** oxygen reaches vital organs / heart/ lungs / brain		4
(c)	*The answer to this question requires ideas in good English in a sensible order with correct use of scientific terms. Quality of written communication should be considered in crediting points in the mark scheme* sewage contains organic matter / causes eutrophication bacteria **or** microbes feed on organic matter **or** sewage bacteria **or** microbes multiply bacterial respiration therefore O_2 used / **or** less oxygen in water (for animals which die) (animals) deprived of oxygen		5
total			12

Higher Tier Question 12

question	answers	extra information	mark
(a)(i)	red		1
(ii)	(boiling) denatures lipase / enzyme		1
(iii)	addition of bile (salts) increases rate of reaction		1
(iv)	bile emulsifies fat in milk lipase able to work more quickly	accept description of emulsification - increases surface area for lipase	2
(v)	lipase digests fats (in milk) to fatty acids (fatty acids) lower pH **or** makes acidic		3
(vi)	increasing temperature increases rate of reaction	accept reverse answer	1
(b)	lipase (from pancreas) is unable to reach duodenum / small intestine / ileum / gut some fat is not digested (and appears in faeces)	 accept lipase cannot digest the fat	2
total			11