



ASSESSMENT and
QUALIFICATIONS
ALLIANCE

Mark scheme

June 2003

GCSE

Human Biology

3415

Foundation

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**GCSE BIOLOGY (HUMAN)
FOUNDATION TIER 3415/F**

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

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 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.

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 $\text{speed} = \text{time}/\text{distance}$ **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 $\text{speed} = \text{distance}/\text{time}$ 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 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 (Human)
Foundation Tier 3415/F**

3415/F Q1

question	answers	extra information	mark
	red (blood cell)		1
	platelet		1
	white (blood cell)		1
	plasma		1
total			4

3415/F Q2

question	answers	extra information	mark
(a)	correctly labelled on diagram		
	(i) 'X' on an alveolus	centre of X on the alveolus wall or inside the alveolus	1
		not if the centre is outside	
	(ii) arrow pointing downwards	accept anywhere but must point down	1
(b)	in sequence		1
	1 trachea		
	2 bronchi		
	3 bronchioles		
	4 alveoli		
(c)	diffusion	accept positive indicator	1
total			4

3415/F Q3

question	answers	extra information	mark
	in the correct order		
	DNA		1
	23		1
	XX		1
	XY		1
	recessive		1
	dominant		1
total			6

3415/F Q4

question	answers	extra information	mark
(a)	in sequence starch sugar protein <u>amino acids</u>		1 1 1 1
(b)	(too) large or insoluble cannot be absorbed or cannot enter blood or cannot pass through wall / lining of intestine / gut or villi	do not accept “breaking up” do not accept complex accept ‘need to make molecules smaller / soluble’ – reverse argument “body” not enough not large intestine	1 1
(c)	mouth	accept positive indication	1
(d)	enzymes	allow catalysts do not accept <u>catalase</u>	1
total			8

3415/F Q5

question	answers	extra information	mark
(a)	points plotted accurately	$\pm \frac{1}{2}$ square deduct 1 mark per error ignore the line	2
(b)	30 or correct from candidate's graph	accept 30 000 lynx do not accept 30 000	1
(c)(i)	fall	mark (i) and (ii) separately	1
(ii)	fewer hares or lack of food	do not accept <u>no</u> hares or food	1
(d)	kills / preys / preys on / hunts / catches and eats / for food (other) animals	must have the eat and kill for the point	1
total			6

3415/F Q6

question	answers	extra information	mark
(a)	drawing shows		
	stem longer	stem longer but pointing down gets 1 mark	1
	stem bending upwards		1
(b)	drawing shows		
	two bends in stem, bends to the <u>left</u> then towards vertical		1
	stem tip vertical	ignore the leaves	1
(c)	so light has <u>no effect</u> or so only effect of gravity	do not accept so it grows longer	1
total			5

3415/F Q7

question	answers	extra information	mark
(a)	94.8		1
(b)(i)	to cool (the body) / maintain (body) temperature	do not accept let out heat	1
(ii)	water and ions		1
(iii)	water	ignore CO ₂ and vapour	1
(c)	any two from: used in respiration provides energy (energy) needed for movement / running / muscle action		2
total			6

3415/F Q8

question	answers	extra information	mark
(a)(i)	62		1
(ii)	60	accept 31 times	1
(b)	() cancer / heart disease / atherosclerosis	accept circulatory disease do not accept passive smoking effects eg asthma, heart problems, clots, strokes, blood pressure lung disease too vague	1
(c)(i)	reduces it / less	do not accept stops	1
(ii)	reduced	the answer must refer to mass of babies accept 'it is smaller' accept ' <u>it</u> is lighter' do not accept smaller (size of) / lighter baby must use it / mass	1
total			5

3415/F Q9

question	answers	extra information	mark
	<p>Quality of written communication <i>The answer to this question requires 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.</i></p> <p>Polar bear has</p> <p>white fur - camouflage or not seen by prey</p> <p>thick(er) fur - insulation or keeps heat in</p> <p>thick(er) fat - insulation or keeps heat in</p> <p>- energy reserve or can release heat</p> <p>lower SA - slower / less heat loss (re body size)</p>	<p>maximum of 4 marks if ideas not well expressed</p> <p>accept converse points re sun bear</p> <p><u>number must be comparative</u> numbers given must be explained do not accept keeps warm / keeps out the cold</p>	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>
total			5

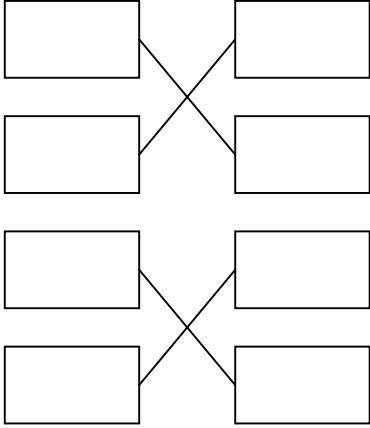
3415/F Q10

question	answers	extra information	mark
(a)	an atrium		1
	an artery		1
	a semi-lunar valve		1
(b)(i)	1 4 2		1
(ii)	any one from: deposit is fat or comes from fat it reduces amount of fat entering blood fatty foods contain cholesterol it reduces amount of cholesterol in blood	accept these foods provide fats accept cause cholesterol to build up accept reverse statements	1
total			5

3415/F Q11

question	answers	extra information	mark
(a)	cervical		1
(b)	C		1
	A		1
	B		1
(c)	more / most calcium and protein	both are needed for mark	1
	calcium for mineral content or hard matter of bone	accept makes bone hard / strong / rigid	1
	protein to make bone (cells) grow	accept helps repair of bone or growth of ligament or cartilage accept protein for flexibility of bone or less brittle	1
total			7

3415/F Q12

question	answers	extra information	mark
(a)	lines connecting: testes contained in scrotum outside body cavity with lower temperature helps sperm development prostate gland with produces an alkaline fluid for sperm to swim spongy tissue in penis with fills with blood during intercourse smooth muscle in lining of sperm duct with forces sperm along by peristalsis	maximum 3  two lines from 1 box in List A disqualifies that box	3
(b)	3		1
(c)	<p>Quality of written communication <i>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</i></p> <p>any three from:</p> <p>placenta stops secreting <u>progesterone</u></p> <p>muscles of uterus contract</p> <p>cervix relaxes / dilates / widens / opens</p> <p>placenta breaks free or released</p>	<p><i>maximum of 2 marks if ideas not well expressed</i></p> <p>accept uterus contracts ignore description of uterus getting thicker</p> <p>ignore expands or gets bigger</p> <p>accept placenta born</p>	3
total			7

3415/F Q13

question	answers	extra information	mark
(a)(i)	soft parts decay / rot	accept teeth / bones are only parts hard enough to survive	1
(ii)	any one from: humans attacked by predators or carnivores parts of body scattered by scavengers	accept humans eaten accept name of any suitable scavenger such as hyena or vulture accept suitable description of action of scavenger accept earth movements or earth transport accept wind or water movement	1
(b)	some teeth missing or part missing or front part missing	accept not complete or some parts missing or teeth rotting or juvenile teeth	1
(c)	better crops / surplus meant did not have to search for food	accept good examples	1
	had to stay in one place to care for / protect / harvest crops	accept good examples	1
total			5

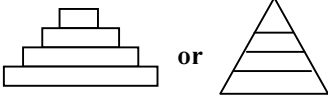
3415/F Q14

question	answers	extra information	mark
(a)(i)	L.H.S. – water / H ₂ O	accept H ² O	1
	R.H.S. – oxygen / O ₂	accept O ² / O	1
(ii)	chlorophyll	must make it clear that it is the chlorophyll do not credit chloroplast on its own do not accept chloroplast / chlorophyll without indication that it is chlorophyll	1
(b)(i)	light intensity / temperature is high enough for higher rate or light / temperature is not limiting		1
	low CO ₂ available or not enough CO ₂ available or rate would be higher with more CO ₂		1
(ii)	temperature	allow water / rain allow (too) cold / hot as a minimum allow wave length / frequency / colour ignore ions ignore heat	1
total			6

3415/F Q15

question	answers	extra information	mark
(a)	A = cornea B = suspensory ligament		1 1
(b)	H	extra letters cancel ignore any names	1
(c)	carries impulses / electrical signal / electrical messages / electrical pulses (to the brain)	do not accept “messages” or “the image” or “signal” or pulses unqualified not electronic	1
total			4

3415/F Q16

question	answers	extra information	mark
(a)	0.1	ignore working or lack of working $\frac{88 \times 100}{88\,000}$ for 1 mark	2
(b)	<u>shape</u> : pyramid with 4 tiers <u>labels</u> : Plants + Herbivores + Carnivores + Top carnivores (in sequence – largest to smallest)	 or allow suitable named examples inverted pyramid correctly labelled = 1 mark	1 1
(c)	more energy / biomass / materials / matter available or less energy lost or energy used up (by herbivores)	not just plants	1
total			5

3415/F Q17

question	answers	extra information	mark
(a)	any two from: no nucleus or DNA / chromosome / genetic material free in cytoplasm (only) has one chromosome circular DNA / chromosome no mitochondria has cell wall	accept converse as long as specified not a chromosome ignore shape	2
(b)	any two from: skin – barrier (to entry) (blood) <u>clotting</u> – barrier to (entry) tears – kill bacteria (antiseptic / lysozyme) <u>mucus</u> – traps bacteria <u>cilia</u> – <u>remove</u> bacteria <u>stomach acid</u> – <u>kills</u> bacteria / <u>denatures</u> protein / <u>denatures</u> enzyme w.b.c.s. / phagocytes – (involved in) phagocytosis w.b.c.s. / lymphocytes / T or B cells – antibody / antitoxin production	must be feature and what it does allow alternatives to bacteria, germs etc accept scab ignore hairs accept ‘engulfs’ bacteria ignore ‘eats’ / ‘destroys’ bacteria	2
(c)(i)	kills / destroys <u>bacteria</u> or prevents growth of <u>bacteria</u>	do not allow germs do not allow fights or gets rid of	1
(ii)	any two from: bacteria may be resistant / immune (treatment futile) or bacteria would not be killed may select for resistant type may cause increased incidence of resistance or Penicillin less effective in future sore throat might be due to a virus – Penicillin would not work	accept descriptions from table accept ‘fights’ here do not accept people resistant	2
total			7

3415/F Q18

question	answers	extra information	mark
(a)	burning / combustion fossil fuels / burning wood deforestation	accept named fossil fuel accept driving cars / any vehicles do not accept burning / combustion unqualified do not accept factories ignore factory chimneys unqualified ignore respiration	1 1
(b)(i)	(overall) increase fluctuations	highs are higher <u>and</u> lows are not as low = 2 marks	1 1
(ii)	no – could be due to some other factor or could be coincidence or fluctuations \pm same size as the overall rise or large fluctuations or sometimes when CO ₂ rises temperature doesn't		1
(c)	any one biotic or abiotic effect eg: changes in rainfall ice-caps melting / rise in sea level changed pattern of winds changed pattern of migration changed species survival changed growth	do not credit just "climate / weather change" allow <u>extreme</u> climate / weather change accept drought, desert formation accept flooding	1
total			6

3415/F Q19

question	answers	extra information	mark
(a)(i)	(need new roots) to take in water	ignore minerals / anchorage	1
(ii)	create humid atmosphere or reduce water loss / transpiration or prevent wilting	ignore warmth	1
(b)	<p>Quality of written communication <i>The answer to this question requires 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.</i></p> <p><u>seed</u> because (no mark)</p> <p><u>sexual</u> reproduction or fusion of gametes / pollination / fertilisation</p> <p>2 sets of (different) genes / chromosomes / DNA combined</p> <p>causes variation in (appearance of) offspring / causes new variety</p>	<p><i>maximum of 2 marks if ideas not well expressed</i></p> <p>accept converse points re cuttings e.g. asexual or no fusion or only cell division / by mitosis</p> <p>do not accept breeding for sexual reproduction</p> <p>genetically identical / is a clone</p> <p>no variation / all identical (in appearance)</p>	<p>1</p> <p>1</p> <p>1</p>
total			5

3415/F Q20

question	answers	extra information	mark
(a)(i)	6		1
(ii)	4		1
(b)(i)	pancreas	ignore islets of langerhans	1
(ii)	'X' anywhere between >1 and ≤2 hours	anywhere in that column	1
(c)	<p>any four from:</p> <p><u>water</u> movement</p> <p><u>out</u> of cells</p> <p>dilute to concentrated solution</p> <p>reference to partially / selectively permeable membranes or described</p> <p>cells shrink / get smaller</p>	<p>do not accept solution</p> <p>accept reference to correct gradient - high Ψ to low Ψ or high to low '<u>water</u> concentration'</p> <p>must be unambiguous – i.e. not 'high to low concentration'</p> <p>accept low to high concentration</p> <p>allow crenated</p> <p>ignore plasmolysed / flaccid / floppy etc</p>	4
total			8

3415/F Q21

question	answers	extra information	mark
(a)	1 and ligament	both answers are required	1
(b)	reduce friction or lubricate or stops friction	accept smooth movement ignore name ignore shock absorber or cushion ignore stops bones rubbing together	1
(c)	cartilage worn away or cartilage not covering end of bone	accept tissues worn away or damaged	1
	uneven surface of bone or outgrowths of bone or uneven surface of cartilage or ridges on bone / cartilage	accept bones become brittle	1
	bone surface / outgrowths will rub together or not move smoothly together	accept stiffness / pain / hurts accept bones grind together accept swelling / inflammation occurs	1
total			5

3415/F Q22

question	answers	extra information	mark
(a)	arrow showing blood flow from placenta or arrow going upwards	arrow must not be ambiguous in position	1
(b)	oxygen or glucose	accept sugar or other suitable named substance or nutrients accept nicotine ignore food	1
(c)	(thin) to allow substances to pass through or useful substances from mother to embryo or waste substances from embryo to mother or allows diffusion or osmosis		1
	(not fully permeable) to prevent passage of pathogens / harmful substance / antibodies / antigens / toxins into embryo	accept prevents bloods mixing or a described effect of the bloods mixing	1
(d)	provides a larger surface or increases (surface) area	accept bacteria or germs	1
total			5

3415/F Q23

question	answers	extra information	mark
(a)(i)	count the pulse or count beats in artery in wrist / neck or feel the pulse or take the pulse or find the pulse	accept use of heart monitor or heart meter	1
(ii)	80	2 marks for correct answer if answer incorrect allow 1 mark for showing 8000 divided by 100 or indicating cardiac output divided by stroke volume	2
(iii)	increased activity stroke volume falls / gets less / should get higher / reach a peak	accept does not increase or changes from 134 cm ³ to 127 cm ³	1
(iv)	increased / more ventricle contractions	accept heart beat faster or it beats faster or more powerful contractions	1
(b)	(stronger heart muscle) increases cardiac output or increases stroke volume so more (oxygenated) blood can be sent to <u>muscles</u>	accept pumps more blood (per beat) or pumps blood faster ignore heart bigger accept more oxygen sent to muscles	1 1
total			7

3415/F Q24

question	answers	extra information	mark
(a)	forward facing eyes or large brain or social organisation	accept examples of social organisation such as living in groups	1
(b)	any one from: B has shorter tail / no tail / fewer caudal vertebrae A walking on all four legs B shows some indication of walking on hind limbs or bipedal	accept B has straighter back or more upright back accept (opposable) thumb in B	1
(c)	any two from: fore-limbs (arms) longer than hind-limbs (legs) not truly bipedal backbone arched up / is straight as in A or not showing curves of human backbone big toe further back / shorter	accept fore-limbs longer than humans accept uses fore-limbs for support / not so erect	2
total			4