



General Certificate of Secondary Education

Biology (Human) 3415/F

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.

Biology (Human) Foundation Tier 3415/F

3415/F Q1

question	answers	extra information	mark	
(a)	<p>Stimulus</p> <p>Touch</p> <p>Light</p> <p>Chemicals</p> <p>Sound</p>	<p>Part of the body</p> <p>Skin</p> <p>Tongue</p> <p>Eye</p> <p>Ear</p>	<p>1 mark for each correct line</p> <p>if 2 lines to one box, CANCEL mark</p>	max 3
(b)	<p><u>in correct sequence:</u></p> <p>sensory</p> <p>brain</p>		<p>1</p> <p>1</p>	
total			5	

3415/F Q2

question	answers	extra information	mark
	<p><u>in correct sequence:</u></p> <p>breathing</p> <p>diffusion</p> <p>respiration</p>		<p>1</p> <p>1</p> <p>1</p>
total			3

3415/F Q3

question	answers	extra information	mark
(a)(i)	carbon dioxide	accept other positive indications	1
(ii)	methane	accept other positive indications	1
(b)	increase	accept other positive indications	1
(c)	any three from: building farming / removing hedgerows / fire quarrying / mining industry drainage of marshland dam construction / flooding land dumping waste	accept houses / airports / roads / factories do not accept pesticides, fertilisers etc accept release of toxic chemicals / named eg accept acid rain / global warming only if linked to production by human activity do not accept just ‘pollution’ do not accept fly tipping, litter	3
total			6

3415/F Q4

question	answers	extra information	mark
(a)(i)	clones	accept other positive indications	1
(ii)	same genes / alleles / DNA grown in same (environmental) conditions or correct eg – same amount of water / same temperature / same amount of light	accept same genetics / genetic information do not accept same chromosomes	1 1
(b)	any two from: <u>water</u> uptake ion / salts / minerals / nutrient uptake stability / support / anchorage	do not accept 'food' / vitamins	2
total			5

3415/F Q5

question	answers	extra information	mark
(a)(i)	(predator) lion		1
	(prey) antelope		1
(ii)	light	accept other positive indications	1
(iii)	<u>in sequence (top to bottom):</u> lion antelope grass		1
(b)(i)	bacteria / fungi / saprotrophs	accept moulds / decomposers / microorganisms / microbes / saprophytes / saprobionts	1
(ii)	aerobic	accept other positive indications	1
	moist		1
	warm		1
(iii)	carbon dioxide		1
	mineral salts		1
total			10

3415/F Q6

question	answers	extra information	mark
(a)	one from each parent / one from egg and one from sperm	do not accept egg and sperm join / fertilisation unqualified	1
(b)(i)	nn	accept a ring around printed nn	1
(ii)	Nn Nn		1
total			3

3415/F Q7

question	answers	extra information	mark
(a)	decrease in number of deaths (after vaccination started)		1
(b)	<u>in correct sequence:</u> bacteria white blood cells antibodies		1 1 1
total			4

3415/F Q8

question	answers	extra information	mark
(a)(i)	8		1
(ii)	125	accept 124 accept correct answer from candidate's (a)(i) unless zero	1
(b)	any three from: 'over the limit' slows reactions / takes longer to stop car / increased reaction time mars judgement / cannot estimate distances / slower thinking over-confident / do not notice other road users / less aware of surroundings problems with vision / blurred vision / dizzy lack concentration / sleepiness / drowsy upsets balance	ignore: affects nervous system unqualified	3
(c)	<u>in correct sequence:</u> (blood) plasma diffusion lungs		1 1 1
(d)	damage to brain / kills brain cells / damage to liver / cirrhosis / addiction / 'become an alcoholic' / obesity / overweight / 'beer belly' / stomach ulcers	accept liver cancer / liver failure ignore kidney damage do not accept transient effects, eg drunkenness do not accept lung damage / heart disease	1
total			9

3415/F Q9

question	answers	extra information	mark														
	<p>Quality of written communication</p> <p>any four features + explanations from:</p> <p>cactus has:</p> <table border="0"> <thead> <tr> <th>Feature</th> <th>Explanation</th> </tr> </thead> <tbody> <tr> <td>thicker cuticle</td> <td>waterproof / keeps water in</td> </tr> <tr> <td>smaller surface area</td> <td>less water loss / less heat absorbed</td> </tr> <tr> <td>fewer stomata</td> <td>less water loss</td> </tr> <tr> <td>stomata open at night / closed in day</td> <td>(closed when warmest) – so less water loss</td> </tr> <tr> <td>more widespread roots</td> <td>quickly absorbs water (after rain) / access to bigger area for absorbing water / absorb more water</td> </tr> <tr> <td>more water <u>storage tissue</u></td> <td>little water available in environment / can survive drought / avoids dehydration</td> </tr> </tbody> </table>	Feature	Explanation	thicker cuticle	waterproof / keeps water in	smaller surface area	less water loss / less heat absorbed	fewer stomata	less water loss	stomata open at night / closed in day	(closed when warmest) – so less water loss	more widespread roots	quickly absorbs water (after rain) / access to bigger area for absorbing water / absorb more water	more water <u>storage tissue</u>	little water available in environment / can survive drought / avoids dehydration	<p>for ideas given in a sensible order; comparison made for geranium and cactus for each feature (ie not just list for geranium followed by list for cactus) + <u>linking</u> of feature & explanation</p> <p>accept converse points for geranium plant</p>	<p>1</p> <p>4</p>
Feature	Explanation																
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total		5															

3415/F Q10

question	answers	extra information	mark
	(calcium) – to keep calcium content high or to make bone strong / rigid / firm / hard or so does not bend or so does not break		1
	(vitamin D) – absorption of calcium (ions) from food or by gut or use of calcium in body	accept not enough made in skin	1
total			2

3415/F Q11

question	answers	extra information	mark
(a)	lumbar	accept lumber	1
(b)(i)	more muscles attached	accept has muscles attached accept few or no muscles in sacral region accept ligaments / tendons instead of muscles	1
(ii)	bones / vertebrae fused / vertebrae not separate / one single bone	accept joined or bones / vertebrae cannot move or have no cartilage or have openings	1
(c)	transmission of force (from legs or to spine)		1
total			4

3415/F Q12

question	answers	extra information	mark
(a)	graph shows pulse or pulse rate or pulse is same as heart rate or beats / peaks are caused by heart contracting	accept count the pulses accept each peak (of pressure) is caused by heartbeat	1
(b)	60 (beats per minute)	if answer incorrect allow 1 mark for correct working such as 10 beats in 10 seconds \times 6 or 10×6	2
total			3

3415/F Q13

question	answers	extra information	mark
(a)	5		1
	2		1
	3		1
(b)(i)	placenta		1
(ii)	any two from: allows diffusion (of oxygen) from mother's blood does not slow down molecule / oxygen or is not stopped	accept passage for diffusion accept a description of diffusion accept molecule / oxygen moves quickly / easily	2
total			6

3415/F Q14

question	answers	extra information	mark
(a)	tick for <i>Homo erectus</i>	accept other correct indication of answer	1
(b)(i)	walking upright or bipedal or similar description or bigger brains or similar description	accept upright / vertically	1
(ii)	thumb on hand	do not accept big hands	1
(iii)	any two from: <u>increasing</u> brain size <u>increase</u> in stature arms becoming <u>shorter</u> (in relation to leg length)	accept walking <u>truly</u> upright	2
(iv)	between <i>Homo habilis</i> and <i>Homo sapiens</i> because – smaller body or shorter height than <i>Homo sapiens</i> or taller than <i>Homo habilis</i> or correct position in evolution or evolved between these two or by bone dating or <i>Homo habilis</i> was first to show tool making	position and reason for it must be correct for the mark. accept after <i>Homo sapiens</i> because had a larger brain accept just before <i>Homo sapiens</i> accept on the left of <i>Homo sapiens</i>	1
total			6

3415/F Q15

question	answers	extra information	mark
(a)	(increased amount of fatty substances) increases death rate	accept (fatty substances) cause increase in death rate	1
(b)(i)	ring round arteries	accept other means of indicating right answer	1
(ii)	ring round oxygen	accept other means of indicating right answer	1
total			3

3415/F Q16

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

3415/F Q17

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 or enzyme would be denatured in stomach or 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 not accept protease does not digest starch incorrect extra information cancels mark do not accept amylase does not work in the stomach	1 1
(d)	any three 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

3415/F Q18

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

3415/F Q19

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

3415/F Q20

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

3415/F Q21

question	answers	extra information	mark
(a)(i)	B – shows steady growth or cannot be A because curve goes above 100% or nearly to 200% then falls / shrinks	accept A grows bigger than adult size then falls / shrinks accept A goes above 100%	1
(ii)	70	accept range of 68 – 71	1
(iii)	11 – 13 because reproductive organs show sudden increase or big increase or develop	accept reproductive organs start to grow do not accept just change in reproductive organs do not accept if any figures given outside the range	1
(b)	shows one tooth growing or forming below another tooth or shows a permanent tooth or adult tooth below a milk tooth or juvenile tooth top tooth or milk tooth is ready to come out or milk tooth has not yet come out	accept shows two teeth in same socket accept other name for teeth such as top and bottom, old and new, first and second accept two teeth present accept top tooth or milk tooth has root dissolving or root breaking down	1 1
total			5

3415/F Q22

question	answers	extra information	mark
(a)(i)	blood forced out (into ventricle / C)	accept blood passes / goes as alternative to forced	1
(ii)	(when ventricle contracts) some blood passes back into atrium	accept not all blood enters arteries accept does not stop backflow ignore reference to naming incorrect artery	1
(iii)	it contracts	accept presses on blood or squeezes on blood do not accept pushes	1
(b)	adrenalin		1
	increase		1
total			5

3415/F Q23

question	answers	extra information	mark
(a)(i)	soft parts decay or all other parts decay or bones and teeth are too hard to decay or take a long time to decay	accept rot or decompose or breakdown for decay or soft parts are eaten	1
(ii)	find age of fossils	accept dating of fossils accept older fossils have less radioisotopes or radiation	1
(b)	<p>Quality of written communication for correct linking of corresponding parts or features on <i>Homo sapiens</i> and primates A and B and identifying them on each</p> <p>any two from:</p> <p>primate A eyebrows or ridges over eyes similar in size to those of <i>Homo sapiens</i> or only slightly larger or primate B has bigger eyebrows or ridges over eyes than <i>Homo sapiens</i> or primate A</p> <p>primate A lower jaw similar in size or shape to that of <i>Homo sapiens</i> or primate B has bigger lower jaw or heavier lower jaw than <i>Homo sapiens</i> or primate A</p> <p>canine teeth in <i>Homo sapiens</i> and primate A small or not pointed or in primate B long or pointed</p> <p><i>Homo sapiens</i> and A have a nose or B does not have a nose</p> <p><i>Homo sapiens</i> and A have a similar size brain or cranium or B has a differently sized brain or cranium</p>	<p>accept eyebrows or ridges over eyes similar size or shape in <i>Homo sapiens</i> and primate A or smaller than primate B</p> <p>accept lower jaw similar size in <i>Homo sapiens</i> and primate A or smaller than in primate B</p> <p>accept canine teeth similar size or shape in <i>Homo sapiens</i> and primate A or long or pointed in primate B or B has bigger teeth than <i>Homo sapiens</i> and A or <i>Homo sapiens</i> and A have similar teeth or in B the teeth are different</p>	<p>1</p> <p>2</p>
total			5

3415/F Q24

question	answers	extra information	mark
(a)(i)	contraction of muscle A will cause bending of joint or movement in one direction		1
	contraction of muscle B will cause straightening of joint or movement in other direction	accept contraction of two muscles are needed to move the bone in opposite directions for 2 marks accept when one contracts the other relaxes for 1 mark accept one muscle moves bone in one direction, other muscle in other direction for 1 mark	1
(ii)	(X – osteoarthritis) joint stiff or does not move easily or rough / uneven cartilage rubs together or bone surfaces rub together or swelling of joint or <u>joint</u> painful	accept allows friction	1
	(Y – osteoporosis) bones brittle or may break easily or weak or bones less flexible or pain	accept pain as answer once only	1
(b)	(strong) holds bones together or prevents dislocation	accept it does not break easily accept keeps joints together	1
	(elastic) allows bones to move (in joint) or allows joint to move	accept can stretch (slightly) to allow movement do not accept descriptions of contraction	1
total			6

3415/F Q25

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