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ASSESSMENT and QUALIFICATIONS ALLIANCE

General Certificate of Secondary Education

Biology 3411/H
Specification B

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 (Specification B)
Higher Tier 3411/H

3411/H Q1

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

3411/H Q2

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

3411/H Q3

question	answers	extra information	mark
(a)	burning fossil fuels / coal / gas / oil	accept driving vehicles / eg cars accept coal-fired power station accept car emissions ignore combustion unqualified do **not** accept power station unqualified do **not** accept using 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

3411/H Q4

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 stimulates (/ causes) growth / elongation	allow grew because of 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: rooting 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

3411/H Q5

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)	• fossils show changes	do **not** accept just 'evolved'	1
	• over time	**not** just a past event	1
(b)	**Quality of written communication**	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	1
	any **two** from:		2
	mutation occurs in bacteria or change in DNA / gene occurs	cancel if mutation 'caused by' antibiotic	
	(when antibiotic used) only resistant bacteria survive **or** non-resistant bacteria are killed **or** reference to 'natural selection'		
	resistant bacteria pass on the gene / allele	allow pass on the mutation do **not** accept just 'pass on resistance'	
total			6

3411/H Q6

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: <u>more</u> sweating (at 37.6°C) <u>more</u> 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

3411/H Q7

question	answers	extra information	mark
(a)(i)	bacteria respire / reproduce / grow (more) quickly	accept bacteria more active accept bacteria not killed accept enzymes not denatured **or** enzymes work best ignore bacteria work best accept otherwise bacteria will be killed	1
(ii)	25 ºC		1
(b)(i)	respiration is anaerobic **or** fermentation occurs	accept so that lactic acid is made accept respiration not aerobic	1
(ii)	any **two** from: use lactose / (milk) sugar produce lactic acid / lactate denatures / coagulates / damages / alters protein	 do **not** accept use glucose **or** other named sugars ignore clots	2
(c)(i)	curds solid **and** whey liquid / runny	require both or a comparative statement ie curds more solid, whey more liquid / runny accept curds are white **and** whey is more yellow do **not** accept whey thinner	1
(ii)	by filtering	accept decant(ing) / siev(ing) / drain(ing) / centrifug(ing)	1
(iii)	addition of bacteria / mould (slow) ripening / maturing	eg penicillium ignore addition of salt, wrapping in cloth	1 1
total			9

3411/H Q8

question	answers	extra information	mark
(a)	measles mumps rubella / German measles	any order	1
(b)	**Quality of written communication**:	for giving at least **two** statements linked to vaccination	1
	any **four** from:	N.B. max **3** marks for only one side of argument do **not** accept economic argument	4
	a valid reference to pain	eg pain of vaccination / disease	
	should		
	protect against diseases		
	measles / mumps / rubella are dangerous diseases / can cause lasting harm / death		
	cannot be treated by antibiotics		
	problem of epidemics		
	should not		
	may suffer autism / damage to mental / social development		
	may suffer large intestine disorders		
	separate vaccines available that cause no / less problems		
total			6

3411/H Q9

question	answers	extra information	mark
(a)	accurate plots smooth curve or ruled dot-to-dot	accept max $\frac{1}{2}$ square error	1 1
(b)	used by <u>mould</u> **or** taken in by the <u>mould</u>	do **not** accept 'made into amoxycillin'	1
(c)	as nutrient decreases amoxycillin increases any **one** from: • nutrient falls faster than amoxycillin rises at start • nutrient falls slower than amoxycillin rises in middle • nutrient falls faster than amoxycillin rises at end	allow converse	1 1
(d)	kill bacteria	do **not** accept viruses **or** vague references to other pathogens do **not** accept 'fight bacteria'	1
total			6

3411/H Q10

question	answers	extra information	mark
(a)(i)	haemoglobin / oxyhaemoglobin	must be phonetic	1
(ii)	carries oxygen **or** forms oxyhaemoglobin from lungs to tissues	ignore references to CO_2 / iron cancel if extras like food / glucose	1 1
(b)	no nucleus **or** biconcave disc (described)	ignore references to size ignore vague references to being 'round' / 'donut' shaped etc.	1
(c)	any **three** from: • combines with haemoglobin / with red pigment • irreversibly • less oxygen transport **or** less oxygen (to fetus) • less energy release **or** less respiration (in fetus) • less growth of fetus **or** lower birth mass	 do **not** accept any wording suggesting zero oxygen do **not** accept 'does not grow properly'	3
total			7

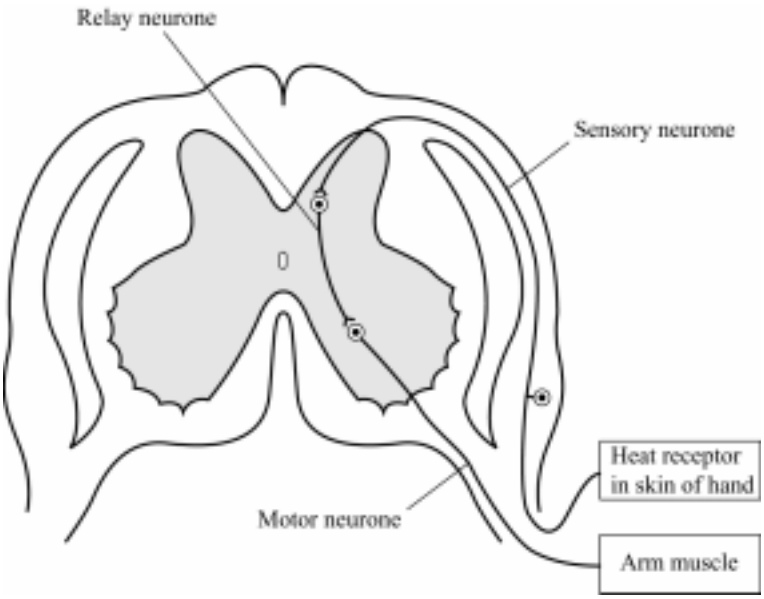
3411/H Q11

question	answers	extra information	mark
(a)	1.67 / 1 $\frac{2}{3}$	accept 1.6 to 1.7 ignore working or lack of working $\frac{400\times100}{24000}$ for **1** mark	2
(b)	any **three** from: lost as heat **or** 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 **not** accept '<u>used for</u> respiration' ignore 'waste' ignore references to growth / reproduction	3
total			5

3411/H Q12

question	answers	extra information	mark
	any **three** from adaptation **and** 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 **or** 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 **not** accept zero water loss accept 'moisture' for water	3
total			3

3411/H Q13

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

3411/H Q14

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

3411/H Q15

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

3411/H Q16

question	answers	extra information	mark
(a)(i)	any **two** from: sprayed / sprinkled through the <u>air</u> **or** 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_2 , CO_2 , H_2O	1 1
(b)	any **two** from: at depth - no light - no photosynthesis - no chlorophyll (produced in dark)	 accept converse for surface	2

cont…

3411/H Q16 cont…

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

3411/H Q17

question	answers	extra information	mark
(a)	(before exercise) – 9 to 11 **and** (after exercise) – 12 **or** 13	**both** correct	1
(b)	0.75 to 0.90	ignore working or lack of working eg. 2.35 – 1.55 **or** $\frac{(2.35-1.0)\times 60}{100}$ **or** other suitable figures for **1** mark	2
(c)	any **four** 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 **or** suitable reference to oxygen debt lactic acid broken down to CO_2 and water **or** lactic acid changed into glucose		4
total			7

3411/H Q18

question	answers	extra information	mark
(a)(i)	**A** = xylem	accept phonetic only	1
(ii)	**B** = phloem	accept phonetic only	1
(b)	(radioactive CO_2 used in) <u>photosynthesis</u> only <u>in the light</u>	accept converse	1
	glucose / sucrose / sugar / organic molecules are made	do **not** 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

3411/H Q19

question	answers	extra information	mark
(a)	any **four** from:		4
	more energy / respiration required	accept it prevents / reduces anaerobic respiration **or** less / no lactic acid reference to increase must be made, but only needed once, provided inference is clear for remainder of points	
	increase oxygen uptake into blood (in lungs)	accept 'delivered more quickly' for 'increase'	
	increase oxygen delivery to muscles		
	increase glucose delivery to muscles		
	increase removal of heat from muscles **or** increase delivery of heat to skin		
	increase removal of carbon dioxide from muscles		
	increase removal of carbon dioxide from blood (in lungs)		
(b)	strong		1
	allows (slight) compression	accept their description eg springy, elastic	1
total			6

3411/H Q20

question	answers	extra information	mark
(a)	semi / selectively / partially / differentially permeable separates blood and dialysis fluid		1 1
(b)	any **four** from: **blood cells** cannot pass through membrane **glucose** retained in blood to stop water passing into blood / osmosis no (net) diffusion **urea** removed from blood by diffusion	 accept excreted	4
(c)	problem may be temporary **or** has minor infection **or** problem could be cured by other means operation / transplants carry risk	 accept rejection	1 1
(d)(i)	no antigens on (the surface) of red blood cells		1 1
(ii)	would cause agglutination / clumping if different	ignore clotting and coagulation	1
total			11

3411/H Q21

question	answers	extra information	mark
(a)	any **two** from: single upper bone / humerus double lower (forearm) / radius **and** ulna pentadactyl limb has fewer wrist bones / digits / fingers	accept any described similarity in arrangement	2
(b)(i)	any **two** from: provide large surface area to push downwards on the air lift bird (upwards) aerofoil shape	ignore streamlining / aerodynamic	2
(ii)	any **three** from: **upstroke** feathers separate / tilt air flows between feathers reduces resistance **downstroke** feathers overlap / close together provides lift forward propulsion	 ignore aerofoil max **2** marks for either direction if direction not identified max **2** marks	3
total			7