



General Certificate of Secondary Education

Biology (Human) 3415/F

Mark Scheme

2006 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
	<u>In correct sequence:</u> heart ovary eye stomach pancreas		1 1 1 1 1
total			5

3415/F Q2

question	answers	extra information	mark
(a)(i)	A		1
(ii)	C		1
(iii)	D		1
(b)	(muscle) contracts / shortens	do not accept tightens / smaller / thicker allow tenses	1
(c)	any two from: <ul style="list-style-type: none"> • automatic / non-conscious • reaction / response (to a stimulus) • rapid 	accept 'no thinking' or not involving brain / involves non-thinking part of brain do not accept instinctively / subconsciously do not accept just 'action'	2
total			6

3415/F Q3

question	answers	extra information	mark
	<u>In correct sequence:</u> asexual identical clones gametes sexual different		1 1 1 1 1 1
total			6

3415/F Q4

question	answers	extra information	mark
(a)(i)	to cool down / to lose heat / to maintain (body) temperature		1
(ii)	more / a lot of <u>water</u> is lost in <u>sweat</u>	do not accept 'most water'	1
(b)	volume of <u>water</u> is lower / less <u>water</u> / not enough <u>water</u> (in urine)		1
(c)	breathing / defecation / faeces	do not accept respiration / tears / colloquial names for faeces	1
total			4

3415/F Q5

question	answers	extra information	mark
(a)(i)	gene / DNA / genetic material <u>for coat protein</u>		1
(ii)	coat protein / protein coat		1
(b)(i)	white blood cells		1
(ii)	antibodies		1
(iii)	more rapidly		1
total			5

3415/F Q6

question	answers	extra information	mark
(a)	warm / 20°C / room temperature	do not accept temperature / heat / suitable temperature / hot	1
	moist / water / damp / wet	ignore 'when made up' ignore 'when left open in kitchen' ignore oxygen	1
(b)(i)	oxygen		1
(ii)	respiration		1
(iii)	more slowly		1
total			5

3415/F Q7

question	answers	extra information	mark
	<u>In correct sequence:</u> diffusion high low membrane osmosis wilts		1 1 1 1 1 1
total			6

3415/F Q8

question	answers	extra information	mark
(a)(i)	10		1
(ii)	31 to 32		1
(b)(i)	extra chromosome / 3 copies of (chromosome) 21	do not accept extra chromosomes do not accept more chromosomes do not accept gene	1 1
(ii)	male – XY / has X and Y	accept male and Y present accept reverse argument – male, because female would be XX	1
(c)	DNA		1
total			5

3415/F Q9

question	answers	extra information	mark
(a)	pollen falls / lands (on mud / water / lake)	or pollen falls (implied mud)	1
	becomes buried in more <u>mud</u> (with time)		1
(b)(i)	birch		1
(ii)	8 200		1
(c)(i)	dry / drier	accept less / little rain ignore less water ignore references to Sun and temperature ignore rain unqualified	1
(ii)	wet / damp / moist / humid / more rain / raining / rainy	ignore more water ignore references to Sun and temperature ignore rain unqualified	1
total			6

3415/F Q10

question	answers	extra information	mark
(a)(i)	2	ignore working or lack of working $\frac{200}{100}$ for 1 mark	2
(ii)	athlete runs faster in 100 metres	do not accept speed unqualified do not accept different speeds do not accept distance	1
(b)(i)	oxygen debt		1
(ii)	lactic acid		1
total			5

3415/F Q11

question	answers	extra information	mark
	cartilage		1
	ligament		1
	synovial fluid		1
total			3

3415/F Q12

question	answers	extra information	mark
(a)	coronary (artery)		1
(b)(i)	extra layer (on wall)	do not accept just a deposit accept fats or fatty substances present ignore clogs as it is clogged	1
(ii)	fat or fatty food or has saturated fat or oily food	accept high fat food or cholesterol or named food such as butter or milk or cheese or eggs do not accept crisps or chocolate or named commercial food	1
total			3

3415/F Q13

question	answers	extra information	mark
(a)(i)	amniotic or amnion	spelling must be correct	1
(ii)	artery <u>and</u> vein	if named must be correct accept blood vessels or capillaries accept amnion or connective tissue	1
(iii)	(part B) <u>obtains</u> nutrients from mother's (blood) or nutrients pass into (blood of) embryo or <u>removes</u> waste (from blood) of embryo	accept correctly named nutrients or waste substances accept baby for embryo do not accept feeds baby or embryo or passes blood	1
	(umbilical cord) <u>transports</u> nutrients to embryo or waste away from embryo	accept blood vessels <u>transport</u> nutrients or waste or (embryo) blood accept carries for transport	1
(b)	C – dilates or widens	ignore any names given accept relaxes or opens or expands	1
	D – contracts	accept muscles contract ignore tightens or shortens or tenses	1
total			6

3415/F Q14

question	answers	extra information	mark
	shock		1
	thoracic		1
	cervical		1
total			3

3415/F Q15

question	answers	extra information	mark
(a)(i)	hair	accept external ears	1
(ii)	any one from: <ul style="list-style-type: none"> • mammary glands • constant temperature • internal fertilisation • heterodont dentition 	accept produces milk or feed young on milk accept warm blooded accept internal development or give birth to live young or don't lay eggs accept different types or shapes of teeth	1
(iii)	<u>gripping</u> hand or equivalent	accept have thumb	1
(b)	any three from: <ul style="list-style-type: none"> • no need to search for food • guard or protect or tend crops or regrow crops or reuse land • need to be with crops when ripe or ready or to gather food or harvest • more certain food supply or could store food or produce food excess • larger groups allowed different people to do different jobs 	accept no need to follow migrating animals accept less chance of famine or starvation accept not everybody has to produce food	3
total			6

3415/F Q16

question	answers	extra information	mark
(a)	4 (minutes)		1
(b)	86 (pulses per minute)		1
(c)	Causes a <u>spurt</u> of blood or a pressure <u>wave</u>	accept gush of blood	1
total			3

3415/F Q17

question	answers	extra information	mark
(a)	34	ignore working or lack of working $\frac{10\ 200}{300}$ for 1 mark	2
(b)(i)	mouth / <u>small</u> intestine / duodenum / ileum		1
(ii)	<u>amylase</u>	accept phonetic spelling accept carbohy <u>drase</u>	1
(iii)	sugar / maltose / glucose / disaccharide / monosaccharide / dextrin		1
(iv)	<u>small</u> intestine / duodenum / ileum		1
total			6

3415/F Q18

question	answers	extra information	mark
(a)(i)	C		1
(ii)	lack of nucleus / others have a nucleus or chromosome / DNA / genetic material free in cytoplasm	accept plurals do not accept just 'has a strand of DNA'	1
(b)(i)	breathe in <u>air</u> / droplets exhaled by other people / breathe same air or higher concentration of bacteria in the <u>air</u> or more likely to be coughed on	mark for mechanism do not penalise reference to virus / TB / germ ignore answers involving proximity unqualified	1
(ii)	(bacteria / it) enter body / lungs by breathing / via air		1
(iii)	via the blood	accept via rbc or other components of blood accept lymph	1
(c)	any two from: • skin • scabs / clot • mucus / cilia • stomach acid / gut protease	accept tears do not accept ear wax / saliva / sebum apply list principle ignore nasal hair	2
total			7

3415/F Q19

question	answers	extra information	mark
	<p>Quality of written communication:</p> <p>any four from:</p> <ul style="list-style-type: none"> • tar present • (chemicals from smoke / tar) enter the blood • mutation • (lung) cancer / reference to carcinogen • bronchitis / emphysema • less surface area / less oxygen enters blood • circulatory disease / blood clots / blocked arteries / heart attack / stroke • carbon monoxide • less oxygen carried by blood / CO combines with Hb • damage cilia / alveoli • microbes or correct named e.g. remain in lungs 	<p>For <u>correct use of</u> scientific terms:</p> <p>at least two from: e.g. cancer, mutation, bronchitis, emphysema, arteries, atheroma, carbon monoxide, carcinogen, trachea, bronchus, bronchiole, cilia, alveoli, haemoglobin, mucus, red blood cell, white blood cell, ulcer, angina, nicotine, addiction, etc.</p> <p>annotate as Q ✓ or Q ✗</p> <p>do not accept just tar enters blood</p> <p>accept x from tar gets in the blood</p> <p>nb award less oxygen mark once only</p> <p>do not accept blocked by tar</p> <p>nb award less oxygen mark once only accept no oxygen</p>	<p>1</p> <p>4</p>
total		5	

3415/F Q20

question	answers	extra information	mark
(a)	<p>animal which / it kills/ hunts / catches (other animals)</p> <p>it / animal which eats other animals / it is a carnivore</p>	<p>ignore references to prey</p> <p>animal kills <u>and</u> eats its prey = 2 marks</p> <p>an animal that preys on another animal = 0 marks</p>	<p>1</p> <p>1</p>
(b)	lemming population decreases before / when no owls present	accept converse	1
(c)	<p>any three from:</p> <ul style="list-style-type: none"> • lack of food • due to competition / due to over-eating by lemmings / due to high lemming population • disease • severe weather drought / flood / or too hot / too / very cold • other predators 	<p>nb competition for food = 2 marks</p> <p>accept humans as predators</p>	3
total			6

3415/F Q21

question	answers	extra information	mark
(a)(i)	oxygen / O ₂	do not accept O only	1
(ii)	photosynthesis	accept phonetic spellings	1
(b)	<u>Graph:</u> points	ACCURACY \pm ½-square minus 1 mark per error	2
	line	single line best fit <u>curve</u> , not straight line or ruled point-to-point must attempt to start at origin	1
(c)	any two from: • carbon dioxide (concentration) • temperature / too cold • water / moisture / rain / humidity	accept 'heat' do not accept temperature too high do not accept lack of chlorophyll	2
total			7

3415/F Q22

question	answers	extra information	mark										
	<p>Quality of written communication:</p> <p>any four from:</p> <table border="0"> <thead> <tr> <th>Substance</th> <th>Effect</th> </tr> </thead> <tbody> <tr> <td>carbon dioxide</td> <td> <ul style="list-style-type: none"> • greenhouse effect / global warming / mechanism described • sea-level rise / melting ice-caps / flooding / rainfall change </td> </tr> <tr> <td>sulphur dioxide nitrogen oxides</td> <td> <ul style="list-style-type: none"> • acid rain / lowering soil pH / water acidification • damages leaves / trees kills plants / animals / breathing difficulties / bronchitis / eye irritation / deaths of people / damaging statues / buildings </td> </tr> <tr> <td>carbon monoxide</td> <td> <ul style="list-style-type: none"> • combines with Hb / less O₂ carried in blood </td> </tr> <tr> <td>soot / (smoke) particles</td> <td> <ul style="list-style-type: none"> • reducing light / photosynthesis </td> </tr> </tbody> </table>	Substance	Effect	carbon dioxide	<ul style="list-style-type: none"> • greenhouse effect / global warming / mechanism described • sea-level rise / melting ice-caps / flooding / rainfall change 	sulphur dioxide nitrogen oxides	<ul style="list-style-type: none"> • acid rain / lowering soil pH / water acidification • damages leaves / trees kills plants / animals / breathing difficulties / bronchitis / eye irritation / deaths of people / damaging statues / buildings 	carbon monoxide	<ul style="list-style-type: none"> • combines with Hb / less O₂ carried in blood 	soot / (smoke) particles	<ul style="list-style-type: none"> • reducing light / photosynthesis 	<p>Ideas given in a sensible order: at least one correct named substance linked to its correct effect annotate Q ✓ or Q ✗</p> <p>max 2 for named substances extra wrong substances cancel</p> <p>do not accept just climate change</p> <p>accept reduced mineral availability to plants</p> <p>do not accept toxic unqualified</p> <p>ignore ash</p> <p>correct substance and wrong effect = 1 mark only</p>	<p>1</p> <p>4</p>
Substance	Effect												
carbon dioxide	<ul style="list-style-type: none"> • greenhouse effect / global warming / mechanism described • sea-level rise / melting ice-caps / flooding / rainfall change 												
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total		5											

3415/F Q23

question	answers	extra information	mark
(a)	bones scattered by animals or buried or washed away by rain or water or damaged by (earth movement) or eaten by animals	accept in acid soils or conditions bones can dissolve or break up or similar description do not accept decay	1
(b)(i)	same number of teeth same type of teeth	accept have incisors, canines and molars ignore reference to jaw bone	1 1
(ii)	any one from: <ul style="list-style-type: none"> • jaw of Australopithecus narrower or thinner • teeth of Australopithecus slightly rounder 	if not identified answer must refer to Australopithecus accept Homo sapiens wider or more curved or not so narrow accept Homo sapiens teeth squarer or similar description	1
total			4

3415/F Q24

question	answers	extra information	mark
(a)(i)	any one from: <ul style="list-style-type: none"> both have two muscles both have rigid or hard skeleton 	accept both have muscles or antagonistic muscles	1
(ii)	any one from: <p>muscles external</p> <p>skeleton internal or implied</p> <p>tendons present</p> <p>no membrane joining skeleton</p>	unidentified answers refer to human	1
(b)(i)	muscle A contracts to cause thumb move towards fingers		1
	muscle B contracts to cause movement the other way or away from fingers	accept 'towards' and 'away from' as a description of direction	1
(ii)	(contracting) muscle unable to pull on bone		1
total			5

3415/F Q25

question	answers	extra information	mark
(a)	4		1
	3		1
(b)	Quality of written communication: for correct linking of parts in sequence: scrotum → spongy tissue → penis	accept spongy tissue and penis in correct order	1
	A (scrotum) keeps testes cooler or at 35° so sperm can be made	accept cooler so more live sperm or sperm live longer	1
	C (spongy tissue) fills with blood or more blood enters (spongy tissue)	do not accept blood fills penis or blood enters penis	1
	B (penis) becomes erect (so can reach high in vagina or top of vagina or entrance of uterus)	accept penis stiff or rigid	1
total			6

3415/F Q26

question	answers	extra information	mark
(a)	C – 80 and D – 72	both answers for 1 mark	1
(b)	any one of: <ul style="list-style-type: none"> not enough persons used or only a small group non-smoker has a higher figure than a smoker or no significant difference in the figures 	accept should base conclusion on large or larger numbers accept a similar comment about the conflicting figures e.g. one smoker has the same figure as a non smoker or smoker and non smoker have similar results of 80 and 78 or may have different lifestyles or references to different ages	1
(c)	5040 (cm ³ per minute)	2 marks for correct answer incorrect answer or no answer showing calculation of 72 x 70 allow 1 mark or heart rate × stroke volume	2
(d)	increase in blood supply (to muscles)	accept more oxygen or nutrients (to muscle) or remove waste	1
(e)	heart can pump blood or oxygen to muscles for longer or aerobic respiration can continue for longer	accept delays start of anaerobic respiration accept reduces or stops lactic acid formation accept allows a bigger increase in cardiac output accept can pump more oxygen or glucose	1
total			6