UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2011 question paper for the guidance of teachers

0610 BIOLOGY

0610/32 Paper 3 (Extended Theory), maximum raw mark 80

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UNIVERSITY of CAMBRIDGE
International Examinations

Question		Expected Answers	Marks	Additional Guidance
1	(a)	**A** left atrium ; **B** mitral / bicuspid / atrioventricular, valve ; **C** semi-lunar valve / pocket valve / aortic valve ; **D** right ventricle ;	[4]	*reject if correct and incorrect answers given for each* **A** atria **A** auricle **A** 'oracle' / 'oricle' **A** if given the plural **A** if given the plural, **A** 'half-moon' valve
	(b)	**E** (superior / anterior) vena cava ; **F** aorta ;	[2]	
	(c)	coronary ; **1** fatty deposit in (wall of) artery ; **2** blocks, artery / restricts, blood flow ; **3** restricts, oxygen / nutrient, supply ; **4** blood clotting occurs ;	[1] [max 2]	**R** cardiac **A** phonetic spellings *ignore incorrect name for MP1–4* **A** atheroma / plaque **A** cholesterol / LDL / fatty acids **A** arteriosclerosis / described **A** 'narrows' artery **R** if 'to body' ***ignore*** high blood pressure
	(d)	heart not pumping blood / keeps blood circulating ; blood is oxygenated ; carbon dioxide is removed from blood ;	[max 2]	**A** blood not pumped to the lungs **A** exchange of oxygen and carbon dioxide for two marks ***ignore*** 'to keep patient alive' / 'supply heart with blood'
	(e)	**1** ref. to (cardiac) muscle ; **2** ref. to myogenic / heart has own pacemaker ; **3** septum (divides heart into two) ; **4** two (separate) ventricles / AW ; **5** ventricle(s), contract / pump ; **6** increase blood pressure ; **7** right ventricle has thin(er) wall / left ventricle has thick(er) wall ; **8** so low(er) pressure / higher pressure ; (in context) **9** to lungs / to rest of body ; (in context)	[max 4]	**R** 'push' **A** bigger , **R** tougher **A** muscle **A** 'to whole body' for LV if blood to lungs described
		[Total: 15]		

Question		Expected Answers		Marks	Additional Guidance
2	(a)	*whole / part of, organism* changes in position / changes in place **;**		[1]	***ignore*** locomotion **A** (moves) from place to place / one place to another
	(b)	**(i)**	antagonistic **;**	[1]	**A** antagonism
		(ii)	*idea of* muscle pull (don't push) **;** biceps contracts **;** triceps relaxes **;** flexion / described as movement of (fore)arm **;** during relaxation muscle is, stretched / passive **;** both contract to maintain position / holding an object **;**	[max 3]	*assume answer is about flexion – credit ora for extension – mark through if both given* if answer does not mention the names of the muscles but has the right idea for one contracts and the other relaxes, then allow one mark for MP2+3 contraction and relaxation of the pair must be linked to the correct movement of the arm. If not, no marks **R** hand **A** named correct bone – radius and/or ulna **A** lengthens
	(c)	**(i)**	*transmits impulses* from, receptor / nerve endings / sensory endings / skin / sensory organ **;** to, CNS / spinal cord / connector neurone / relay neurone **;**	[2]	***ignore*** sensory neurone as question says 'describe' ***ignore*** 'messages' / 'signals' / 'senses the stimulus' **R** 'fingers' / 'hand' **A** interneurone **R** 'brain' / 'brain and spinal cord'
		(ii)	*idea that* impulses stimulate muscle to, contract / move hand **;** (only) biceps contracts (to raise the forearm) **;** ref. to impulse does not cross synapse to **H** **;**	[2 max]	*assume answer is about neurone G, but accept about H*
	(d)	**1** **2** **3** **4**	many / different, stimuli **;** brain, decides / controls / coordinates **;** impulses in motor, neurones / nerves **;** to, (many) muscles / effectors (involved) **;**	[max 2]	**R** if one muscle
			[Total: 11]		

Question		Expected Answers		Marks	Additional Guidance
3	(a)	1	root hairs ;		
		2	water moves from high(er) <u>water potential</u> to low(er) <u>water potential</u> ;		**A** down a water potential gradient ***ignore*** water concentration **R** dilute and concentrated
		3	osmosis ;		
		4	through partially permeable <u>membrane</u> ;		**A** semi-permeable / selectively permeable
		5	ref. to protein pores ;	[max 3]	
	(b)	1	large surface area ;		**A** minerals for ions
		2	thin (cell) walls ;		**A** thin wall as 'cell' is in the question
		3	(many) mitochondria ;		
		4	ref. respiration ;		
		5	provide / release, energy, for active transport ;		**A** active, uptake / transport, uses energy **A** active uptake **R** if water also taken up by active uptake
		6	proteins / carriers / channels, for, diffusion / active transport (of ions) ;	[max 3]	**A** 'moving against concentration gradient' for active transport
	(c)	*in appropriate boxes*			
		adult and zygote = 90 ; ovum = 45 ;		[2]	**A** ***ecf*** if half incorrect diploid number *only allow ecf if **both** diploid numbers are the same*

Question		Expected Answers	Marks	Additional Guidance
	(d)	*advantages **for plants***		**R** refs to number of plants produced
		only one, parent / plant **;**		**R** 'does not require male and female gametes'
		fast / new plants establish themselves quickly **;**		**A** 'more likely to leave offspring' idea
		(potential) rapid spread close to parent / AW **;**		
		less energy required **;**		***ignore*** refs to avoiding mutations unqualified
		no wastage of gametes **;**		
		(if parent well adapted) offspring will be adapted to surroundings **;**		**A** 'good' traits / e.g., passed on **R** 'good' genes
		plants grow in a suitable place / no wastage **;**		
		AVP **;** e.g. greater chance of reproduction	[max 2]	*do not accept advantages for humans*
		disadvantage for plants		
		plants too crowded / overcrowding **;**		
		(lots of) competition for resources **;**		
		little / no, (genetic) variation **;**		
		disease transmitted directly to offspring **;**		*genetic or infectious disease*
		less evolution / less able to adapt **;**		
		(all identical so) can be wiped out by the same disease **;**		**A** 'disease can spread easily'
		no / little, dispersal **;**		
		AVP **;**	[max 1]	
		[Total: 11]		

Question			Expected Answers		Marks	Additional Guidance
4	(a)	(i)	lymphocyte ;		[1]	***ignore*** leucocyte **A** phonetic spellings
		(ii)	**1**	attach to, bacteria / viruses / pathogens ;		**A** antigens
			2	cause them to, aggregate / stick together / AW ;		
			3	stop them spreading ;		**R** 'fight' against *anywhere in the answer*
			4	help phagocytes engulf them ;		**A** opsonisation / described **A** 'makes bacteria more detectable by phagocytes'
			5	cause bacteria to burst / kill bacteria / destroy bacteria ;		***ignore*** 'dissolve bacteria
			6	stop bacteria moving / immobilise bacteria ;		
			7	neutralise, toxins / poisons / harmful substances ;		**A** 'detoxify'
			8	stop, viruses / bacteria, entering cells ;	[max 2]	
	(b)	(i)	**1**	when blood clots / following a cut / when wounded / AW ;		**A** injury
			2	when blood vessels are damaged ;		
			3	on exposure of, blood / fibrinogen, to air ;		
			4	flows over rough surfaces / AW ;	[max 1]	
		(ii)	**1**	(fibrinogen is converted into) insoluble (fibrin) ;		*assume answer is about fibrin*
			2	forms, mesh / net / network / strands ;		
			3	traps, (red) blood cells / platelets ;		**A** 'gauze' / threads / fibres / web
			4	(dries) to form a scab ;		
			5	prevents, loss of blood / more bleeding ;		
			6	prevents infection / AW ;		**A** prevents entry of (named) pathogens
					[max 3]	**R** foreign bodies

Question			Expected Answers	Marks	Additional Guidance
	(c)	(i)	5°C – low (kinetic) energy / slow movement of molecules ; low frequency of / few, collisions ; 70°C – enzyme <u>denatured</u> ; ref. to active site / shape of enzyme ;	[max 3]	*accept that 'it' refers to the enzyme* denatures active site = 2 marks, **A** thrombin for enzyme **R** if 'die' / 'die and denature'**A** 'deformed' / AW, active site / enzyme
		(ii)	time taken for fibrin to form / liquid to become sticky / AW ; time taken for fibrinogen / substrate to disappear ; how much fibrin produced in, unit time / stated time ; how much fibrinogen converted, in unit time / stated time ;	[max 1]	**A** rate of fibrin production / how long it takes blood to clot / form a mesh / to reach same viscosity **R** 'how long it took a scab to form' **A** product for fibrin **A** substrate for fibrinogen
		(iii)	pH ; volume of, enzyme / thrombin (solution) ; concentration of, enzyme / thrombin (solution) ; volume of, substrate / fibrinogen (solution) / blood ; concentration of, substrate / fibrinogen (solution) ; calcium ions ; AVP ; e.g. equilibration time	[max 2]	**R** temperature **A** 'amount' for concentration **A** 'amount' for concentration **R** blood **R** size of fibrinogen / substrate
			[Total: 13]		

Question	Expected Answers	Marks	Additional Guidance
5 (a)	wings ; beak ; feathers / plumage ; scales on, legs / feet ;	[3]	***ignore*** adjectives such as grey / long / sharp
(b) (i)	quantitative (feature) ; range between two extremes ; ref. to (many) intermediates ; not in distinct groups ; influenced by the environment (and genotype) ;	[2]	**A** answer in context of wing length
(ii)	length of …… *anything suitable* (body) mass ; age ;	[max 1]	**A** height **R** any discontinuous variable, e.g. colour **A** weight **R** size / size of ….. **A** height
(c) (i)	**1** largest number of / most, birds trapped ; **2** oldest (mean age for) birds trapped ; **3** comparative data quote for numbers ; *accept fraction / percentage / proportion of total* **4** comparative data quote for age ; **R** 'greater life expectancy'	[max 4]	*assume answer is about birds trapped unless stated otherwise* wing length at ringing / mm / number of birds trapped / mean age at trapping / days less than 63 / 24 / 253 64 / 72 / 256 65 / 130 / 297 66 / 183 / 346 67 / 167 / 349 68 / 106 / 270 69 / 66 / 237 more than 70 / 23 / 199 total = 771

Question			Expected Answers		Marks	Additional Guidance
		(ii)				*look for types of evidence, not assertions*
			1	number of young birds of each wing length ;		**R** wing length of newly hatched birds
			2	wing lengths of birds that died ;		
			3	length of life / length of life after trapping ;		
			4	results for birds in West Africa ;		
			5	effects of migration ;		
			6	wing lengths of birds that breed ;		
			7	number of times each bird is trapped ;		
			8	effect of trapping on behaviour ;		
			9	larger sample ;		**R** 'study should be repeated'
			10	other locations in, Sweden / anywhere in Europe ;		
			11	AVP ;		
			12	AVP ;		e.g. number of eggs laid by birds of each wing length / test which birds fly furthest / test which birds best at catching food
					[max 3]	
		(d)	birds with wing length 66–67, survive / live longer ;			
			breed / reproduce / have offspring ;			
			pass on their allele(s) for wing length ;			**A** gene(s) *wing length may be implied*
			birds with smaller and larger wings, die ;			**A** 'the others'
			do not reproduce (as successfully) ;		[max 4]	
				[Total: 17]		

Question		Expected Answers	Marks	Additional Guidance
6	(a)	amylase ; prote(in)ase ; lipase ;	[3]	**R** carbohydrase **R** trypsin / pepsin / peptidase **R** 'protase', **A** 'proteas'
	(b)	**1** prevents spread of (named) disease / AW ***ora*** ; **2** avoids pollution / removes harmful substances ; **3** makes, water / sewage / effluent, safe / AW ; **4** avoids smells ; **5** recycling of water ; **6** AVP ; e.g. ref. to eutrophication	[max 1]	**A** removes harmful microbes / bacteria **R** 'germs' **A** examples no need to specify for whom or what it is safe, but **R** 'safer' unqualified, treat 'marine organisms' as 'aquatic'
	(c)	**1** mixes microorganisms with sewage ; **2** good contact between microorganisms and solids ; **3** more collisions ; **4** (aerobic) respiration ; **R** if anaerobic respiration **5** microorganisms produce carbon dioxide ; **6** gain / release / transfer, energy ; **7** (for) growth ; **8** (for) reproduction ; **9** to make enzymes ; **A** ref. to digestion	[max 4]	**A** microbes / bacteria
	(d)	to start the breakdown of the sewage quickly ; continuous process ; do not have to, breed / buy, the microorganisms ; *idea of* without waiting for the lag phase ;	[max 3]	**A** 'the right organisms to digest the sewage' **A** ref. to cost / less wastage of microbes **A** keeps the population of microbes constant *idea* **R** 'to save time' unqualified **R** 'to use over and over again'
	(e)	destroys / kills, bacteria / microorganisms ; prevents spread of, disease / pathogens ; makes water suitable for drinking ;	[max 2]	**R** disinfection **R** 'removes bacteria'
		[Total: 13]		