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

0610/33 Paper 3 (Extended Theory), maximum raw mark 80

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

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Question		Expected Answers	Marks	Additional Guidance
1	(a)	**A** protein ; **B** RNA / nucleic acid ;	[2]	**A** capsid / protein coat **R** membrane **R** capsule, slime coat **A** DNA
	(b)	lymphocytes stop making antibodies ; *ref to* antibodies stop, bacteria / viruses, spreading / AW ; help phagocytes, ingest / AW, bacteria / AW ; lymphocytes kill infected cells ; AVP ; e.g. another function of antibodies	[max 3]	**A** lymphocytes normally make antibodies **A** in context of lymphocytes and antibodies NOT doing their normal functions **A** pathogens for bacteria **R** 'fight diseases' e.g. clumping bacteria / attaching to antigens
	(c)	(unprotected / AW) sexual intercourse ; across placenta ; at birth ; in breast milk ; sharing, needles / syringes ; in blood products / blood for transfusion / transplants / blood to blood contact ;	[max 3]	**R** saliva **R** other sharps, e.g. razors unless qualified by blood contact **R** using contaminated / dirty / used, needles unqualified **R** donating blood
	(d)	use of, condoms / femidoms ; provide education / suitable example ; publicity campaigns ; needle exchange schemes for drug addicts ; sterilisation of needles / safe disposal / no reuse ; screening blood / blood donors ; AVP ; e.g. HIV+ mothers should bottle feed, limit number sexual partners	[max 3]	 **R** not sharing needles unqualified
		[Total: 11]		

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Question			Expected Answers	Marks	Additional Guidance
2	(a)	(i)	pupil, decreases in size / gets smaller / AW ; circular / iris, muscle contracts ;	[2]	**A** 'is constricted' **A** iris widens **R** if radial and ciliary muscles
		(ii)	reduces light entering the eye ; protects, retina / rods / cones (against damage) ; destruction of pigment ;	[max 2]	**accept** 'too much light damages the retina' **ora** = 2 marks **R** 'damage' unqualified
		(iii)	*rods* detect light of low intensity ; no colour / black and white ; *cones* detect high light intensity ; different colours / give colour vision ;	[2] (1+1)	**maximum 1 mark per cell type**
	(b)		arrows on each neurone in the correct direction ; *from retina to muscle in iris*	[1]	**R** if any one arrow is incorrect
	(c)		muscles, oppose each other / have the opposite actions ; when one contracts the other relaxes ; radial muscle contracts to make pupil, larger / dilate ; circular muscle contracts to make pupil, smaller / constrict ;	[max 3]	

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	(d)	**(i)**	**1** **2** **3** **4** **5** **6**	dangerous situation / or suitable example **;** may have to run away / flight **;** display aggression / anger / fight / AW **;** predator move to catch prey **;** voluntary action **;** e.g. sporting events AVP **;**	[max 3]	'fight and flight' = 2 marks e.g. qualified emotional scenario
		(ii)		hormone travels around the (whole) body **;** no need to transmit impulses to specific places **;** need to stimulate many / simultaneous responses **;** less energy needed **;** (effect/s) last longer **;**	[max 1]	
					[Total: 14]	

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Question			Expected Answers	Marks	Additional Guidance
3	(a)		ref. to limiting factor(s) ; nutrients used up ; no space ; oxygen used up ; build up of waste ; waste is toxic ; pH could change to be unsuitable ;	[max 3]	**A** (fungus) reached carrying capacity **A** food **R** any references to temperature
	(b)		*general* mixes nutrients with fungus ; increases contact between fungus and nutrients ; *air* (provides oxygen) for aerobic respiration ; releases energy for, growth / reproduction ; *ammonia* provide nitrogen for making, amino acids / proteins ; provide alkaline conditions / helps maintain pH ;	[max 3]	**R** 'produce' energy **A** mycoprotein / nucleic acids
	(c)		optimum ; reactions occur at a constant rate ; if higher, enzymes denature ; therefore, no growth / fungus dies / reaction stops; if lower, rate of reactions is (too) slow / enzyme activity slows ; ref. to collisions ; therefore slow growth ; heat is generated during respiration ;	[max 4]	***ignore*** reference to economic consequences / productivity
	(d)		glucose / air / ammonia, continually supplied ; fungus continually removed ; remove, waste product(s) / carbon dioxide ; optimum / AW, temperature, ref. to heat exchanger / cold water ;	[2]	**A** nutrients / raw materials **R** food here **A** unlimited supply **R** mycoprotein removed

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	(e)	improve / give, taste / flavour**;** preservation / lengthen shelf life / AW **;** give colour **;** give texture / shape **;** AVP **;** e.g. improve appearance	[max 2]	**R** add nutrients / named nutrients **R** keep fresh
			[Total: 14]	

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Question			Expected Answers	Marks	Additional Guidance
4	(a)		root hairs ; large surface area ; water moves, from high water potential to low water potential / down water potential gradient ; by osmosis ; through partially permeable membrane ; protein pores ;	[max 3]	**A** water concentration
	(b)	(i)	decrease in growth ; description of curve ; e.g. sigmoid no growth at 600 units ; any other figure from the graph ;	[3]	MP2 linked with MP1 i.e. growth
		(ii)	**1** salt lowers the water potential ; **2** plants absorb less water ; **3** loss of turgidity / AW ; **4** no water for new cells ; **5** no, elongation / AW, of cells ; **6** no / less, water for chemical reactions ; **7** no / less, water for photosynthesis ; **8** no / less, water for transport ; **9** stomata close ;	[max 4]	**A** hypertonic **A** water moves out
	(c)		pH 4.0 – phosphate ; pH 11.0 – iron ;	[2]	

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Question			Expected Answers	Marks	Additional Guidance
	(d)		***each ion to max 3***		
			magnesium ions		
		1	needed for making chlorophyll **;**		
		2	without chlorophyll plant, not green / yellow **;**		
		3	cannot absorb (much) light **;**		
		4	little / no, (energy for) photosynthesis **;**		
		5	little / no, sugars / organic compounds produced / energy available **;**		
			nitrate ions		
		6	needed to make amino acids **;**		**A** proteins **or** nucleic acids
		7	amino acids to proteins **;**		
		8	protein needed for growth **;**		**R** 'hormones' **A** suitable use for nucleic acids e.g. genetic material
		9	suitable use of protein **;** e.g. membranes / enzymes	[max 4]	
			[Total: 16]		

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Question		Expected Answers	Marks	Additional Guidance
5	(a)	*T. castaneum* **1** wet / AW **;** **2** *any evidence from the table* e.g. hot: (A) 100% – (B) 10% / warm: (C) 86% – (D) 13% / cold: (E) 29% – (F) 0% **;** **3** in **wet** conditions, **decreasing** survival with decreasing temperature **;** **4** *any suitable two points from the table* (i.e. (A) 100% – (C) 86% – (E) 29%) **;** *T. confusum* **5** dry / AW **;** **6** *any evidence from the table* e.g. hot: (A) 0% – (B) 90% / warm: (C) 14% – (D) 87% / cold: (E) 71% – (F) 100% **;** **7** in **wet** conditions, **increasing** survival with decreasing temperature **;** **8** *any suitable two points from the table* (i.e. (A) 0% – (C) 14% – (E) 71%) **;**	[max 4]	**Note: marking points are linked in pairs e.g. MP1 pairs with MP2** **Note: at least two data points within species are required as 'evidence'** **ignore** ref. to temperature for MP1 and MP2 **ignore** ref to temperature for MP5 and MP6

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Question			Expected Answers	Marks	Additional Guidance
	(b)		competition ; example of competition (food / space) ; one species better adapted / AW ;	[2]	**R** 'survive better' unqualified **A** survival of the fittest in context of adaptation
	(c)	1	red-brown black , Aa x aa ;		**Note:** marking points 1, 2, 3 are free-standing. MP 4 is linked to MP 3.
		2	A , a + a / a,a ;		***allow* ECF from MP1 to MP2**
		3	Aa , aa		***allow* ECF from MP2 to MP3**
		4	red-brown, black ; 1:1 / AW ;	[4]	***allow* ECF from MP3 to MP4**
	(d)		mutation ; mutation, rare event ; (white) allele is recessive / ***ora*** ; only expressed in homozygote recessive ; selection ; disadvantage / AW ;	[max 2]	**R** gene **A** correct ref to parents – both must be heterozygous / homozygous / one of each **A** reason for being so
	(e)		decomposition ; bacteria / fungi, release enzymes / digest ; breakdown protein (in faeces) → amino acids ; deamination ; amino acids → ammonia ; breakdown urea → ammonia (+ carbon dioxide) ; (undigested) carbohydrate (in faeces) respired ;	[max 4]	**A** bacteria / fungi are decomposers **A** feed saprophytically
				[Total: 16]	

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Question			Expected Answers	Marks	Additional Guidance
6	(a)		*Gallirallus* ;	[1]	**R** *Galliralus calayanensis*
	(b)		*(clearing land for)* agriculture ; roads / transport ; housing ; fuel ; timber qualified ; e.g. for building material AVP ; e.g. mining / industrialisation	[max 3]	**A** furniture manufacture / paper
	(c)		*decrease* habitat loss ; fewer nesting sites ; less reproduction ; ref to, camouflage / exposed to predation ; less food / food chain disrupted ; more competition ; higher temperature / more exposure to storms / AW ; *increase* fewer predators ; more food ; fewer competitors ; simpler food web ;	[max 3]	**No credit for** 'decrease' / 'extinction' / 'increase' without qualification

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	(d)	*Question asks for reasons why conserving species is important – answers must be in this context* *ecological* ref to food chain / food web **;** interdependence / AW **;** *aesthetic* species are unique / AW **;** (eco)tourism **;** ref to biodiversity **;** retain genes / maintain gene pool / AW **;** qualified potential use for humans **;** AVP **;** e.g. ethical considerations for future generations to appreciate	[max 2]	**R** 'become extinct' without further qualification **A** maintain / balance ecosystem **A** 'knock-on' effects / possible example / AW
		[Total: 9]		

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