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

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UNIVERSITY of CAMBRIDGE
International Examinations

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 <u>phagocytes</u>, 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]		

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]	

	(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]		

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 <u>aerobic</u> respiration ; releases energy for, growth / reproduction ; *ammonia* provide <u>nitrogen</u> for making, amino acids / proteins ; provide alkaline conditions / helps maintain pH ;	[max 3]	**R** 'produce' energy **A** mycoprotein / nucleic acids
	(c)		<u>optimum</u> ; reactions occur at a constant rate ; if higher, enzymes <u>denature</u> ; 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

	(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]		

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]	

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]		

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

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]		

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

	(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]		