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

0610/31 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)	*Lilium* ;	1	
	(b)	**A** stigma ; **B** anther ; **C** petal ; **D** style ;	4	
	(c)	parallel veins / AW ; narrow / AW, leaves ; flower parts in, 3s / 6s ;	max 2	**A** non-branching veins / no mid-rib **A** long and thin **A** for any named part **R** one cotyledon
	(d)			

one mark per box – ignore any neutral comments

type of reproduction in flowering plants	advantages	disadvantages
asexual	only one, parent / plant ; fast ; (potential) rapid spread ; less energy required / no gametes needed ; if parent well adapted, offspring will be adapted to surroundings ; **max 1**	competition ; little / no, variation ; less evolution / less able to adapt to change ; may all be killed by same disease ; converse of MP5 for asexual ; **max 1**
sexual	variation ; evolution / formation of new species ; (seed) dispersal ; colonization / able to adapt to change ; **max 1**	may need two plants / pollinating agent; slow ; much pollen / many seeds wasted ; fertilization may not happen; loss of lots of energy ; **max 1**

[Total: 11]

Question		Expected Answers	Marks	Additional Guidance
2	(a)	detect / sense / feel, changes / stimuli ; make response(s) / react / AW ;	2	***ignore*** specific example of response
	(b)	**F** to skin receptor ; **G** to sensory neurone ; **H** to biceps ;	3	Label line to actual part only. **R** lines to motor end plate or neurone
	(c)	automatic ; no thought required / not a conscious action ; stimulus always leads to the same response ;	max 2	***ignore*** refs to speed of response **A** no (higher centres in) brain involved **A** fixed response
	(d)	**1** rapid response ; **2** protective / AW ; **3** mechanical damage / injury ; **4** e.g. ; **5** already present immediately after birth ;	max 3	i.e. before learning can take place
	(e)	**1** heart beats faster ; **2** increased rate of breathing ; **3** trachea / bronchi / bronchioles / airways, dilate / widen **4** vasoconstriction / AW, in gut / skin; **5** vasodilation / AW, in muscles ; **6** stimulates breakdown of glycogen in the liver ; **7** increases blood glucose concentration ; **8** dilate pupils ; **9** heightened sensitivity / increased mental awareness / AW;	max 3	**A** increase pulse (rate) **A** more oxygen to muscles **R** 'adrenaline breaks down glycogen' **A** sharper senses / more alert / AW
			[Total: 13]	

Question		Expected Answers			Marks	Additional Guidance
3	(a)	$C_6H_{12}O_6 + O_2$; $\rightarrow CO_2 + H_2O$; $6O_2, 6CO_2, 6H_2O$;			3	*marks for:* correct formulae for glucose and oxygen correct formulae for carbon dioxide and water balancing the equation ***ignore*** word equation
	(b)	**1** temperature ; **2** mass of soda lime ; **3** volume of air in the syringe ; **4** volume / size, of syringe ; **5** mass of seeds ; **6** *idea of* reading from same edge of droplet (each time) ;			max 3	**A** amount **A** 'number / size'
	(c)	(i)	**1**	moves to the right / towards seeds / syringe ;		
			2	seeds absorb oxygen ;		
			3	give out carbon dioxide, absorbed by soda lime ;		
			4	volume of, air / gas, decreases ;		
			5	pressure of, air / gas, decreases ;	max 3	
	(c)	(ii)	**1**	slows down / stops ;		
			2	rate of respiration decreased ;		
			3	oxygen being used up / AW ;		**A** aerobic respiration stops
			4	aerobic respiration slows / ref. to anaerobic respiration ;	max 2	**R** respiration (unqualified) stops
				[Total: 11]		

Question			Expected Answers	Marks	Additional Guidance
4	(a)		*water jacket*		
		1	maintain optimum / constant temperature ;		**A** prevent overheating
		2	to prevent <u>enzymes</u> denaturing ;		**R** fungus denatures
		3	loss of shape / ref. to active site ;		
		4	(because as) fungus respires ;		
		5	releases heat ;		
		6	so temperature in the fermenter increases ;		MP 6 must be linked to MP4 or 5
		7	which would kill fungus ;		
		8	(therefore) no, product / penicillin / AW ;	max 4	
			addition of acids and alkalis		
		9	maintains pH / keeps pH constant ;		**R** to maintain neutral pH
		10	<u>enzymes</u> need optimum pH ;		
		11	(otherwise) enzyme activity / rate of reaction, slows ;		**R** fungus needs optimum pH
		12	to give maximum yield / AW	max 3 = max 6	**A** stop enzymes denaturing
	(b)	(i)	40–50 / 40–60 / 40–80 ;	1	**R** 40–45 / 50–60 / 60–80
		(ii)	mitosis ;	1	
		(iii)	1 nutrients are used up ;		**A** food
			2 <u>limiting</u> (factors) ;		
			3 explanation of limiting factor ;		**A** factor in shortest supply / AW
			4 waste products accumulate ;		
			5 wastes are toxic ;		
			6 penicillin could inhibit growth ;		
			7 population reaches carrying capacity ;		
			8 AVP ;	max 3	

Question			Expected Answers	Marks	Additional Guidance
	(c)	(i)	fungus grows when no penicillin produced ; during first 20 hours ; only nutrients and fungus added at the beginning / no penicillin added ;	max 2	
		(ii)	penicillin production stopped / no more penicillin produced ;	1	**accept** yield stays the same
	(d)		purifying / separating, penicillin ; from, waste / toxins / AW ; concentration ; making into, pills / packaging / AW ; AVP ; e.g. colour / taste	max 3	**R** 'make into a medicine'
	(e)		viruses are not cells ; viruses have no metabolism ; *idea that viruses have* no target for antibiotics ; antibiotics stop cell wall growth ; viruses have no cell wall ; antibiotics stop enzymes working ;	max 2	***ignore*** 'viruses are not alive' **A** viruses do not have ribosomes **A** viruses have no enzymes
			[Total: 19]		

Question			Expected Answers	Marks	Additional Guidance
5	(a)	1	fewer red blood cells ;		
		2	less elastic / less flexible, red blood cells ;		
		3	less haemoglobin ;		
		4	haemoglobin / blood, less efficient at transporting oxygen ;		**R** no oxygen
		5	less respiration ;		**R** no respiration
		6	less energy / fatigue / exhaustion / less active / feeling faint / breathlessness ;		
		7	capillaries are blocked ;		
		8	increased chance of thrombosis ;		
		9	pain ;		
		10	death of tissues linked to oxygen supply ;		
		11	'sickle cell crisis' ;		
		12	slow / poor, growth ;		
		13	reduced life span ;		
		14	AVP ; e.g. susceptible to infections / kidney damage	max 5	
	(b)	(i)	Hb^AHb^S × Hb^AHb^S		*allow **ecf** following a mistake in the genetic diagram after the parental genotypes, but 'mistake' must be worked correctly*
			Hb^A , Hb^S + Hb^A , Hb^S ;		
			Hb^AHb^A , Hb^AHb^S, Hb^AHb^S, Hb^SHb^S ;		*do not allow genotypes for parents or children that are single alleles*
			normal, sickle cell trait, sickle cell anaemia ;		*phenotypes must match genotypes, i.e. must be in the same sequence*
		(ii)	chance is 1 in 4 / 25% / 0.25 / 0,25 ;	3+1	**R** 1:4 or 4:1

Question		Expected Answers	Marks	Additional Guidance
	(c)	resistance to / less chance of getting malaria ;	1	**R** immunity to malaria / stops you from getting malaria
	(d)	*idea that* both alleles / Hb^A and Hb^S, are expressed ; both alleles make two different forms of haemoglobin ; if dominant / recessive, then only one form of haemoglobin in heterozygous people ; three phenotypes (not two) / sickle cell trait is a different phenotype from normal and sickle cell anemia ;	max 2	
		[Total : 12]		

Question		Expected Answers	Marks	Additional Guidance
6	(a)	group of organisms / individuals, of same species ; can interbreed ; live in same area / habitat (at same time) ;	max 2	**R** 'people'
	(b)	**1** numbers of brown plant hoppers remain low, up to 40 days / day 40 ; **2** low numbers when spraying occurs (days 15 to 38) ; **3** rapid increase when spraying stopped / AW ; **4** then, crash / decrease ; **5** any population figure with unit ; e.g. to maximum of over 1000 per m^2	max 3	***ignore*** ref. to resistance
	(c)	pesticide absorbed by the plants ; transported through the plant in the phloem ; ingested / AW, by insect when it, eats / sucks ; toxic / poisonous, to insect ;	max 2	**A** 'eats the plant'
	(d)	**1** no population explosion / AW ; **2** effective at reducing the numbers / AW ; **3** ref. to comparative figures from the graph ; **4** no pollution / damage to environment ; **5** no killing of harmless species ; **6** no concentration of pesticide in food chain ; **7** no pesticide left in foods / no harm to humans from the spray ; **8** no development of resistance to pesticide ; **9** less cost / economic benefits ; **10** AVP ; e.g. accept part of natural food chain	max 3	

Question		Expected Answers		Marks	Additional Guidance
	(e)	1	decreased rainfall ;		
		2	flooding ;		
		3	erosion / loss of (top)soil ;		
		4	desertification ;		
		5	silting of rivers ;		
		6	loss of (plant) nutrients / soil fertility ;		
		7	disruption to food chain ;		
		8	loss of habitat ;		
		9	extinction / loss of biodiversity ;		**A** species become, rare / endangered
		10	effect on carbon dioxide in the atmosphere ;		**A** increase or decrease if justified e.g. leading to global warming
		11	justification for effect ; **A** unproductive forest / productive crop		
		12	AVP ;	max 4	
				[Total : 14]	