UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2012 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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General notes

Symbols used in mark scheme and guidance notes.

/ separates alternatives for a marking point

; separates points for the award of a mark

A accept – as a correct response

R reject – this is marked with a cross and any following correct statements do not gain any marks

I ignore / irrelevant / inadequate – this response gains no mark, but any following correct answers can gain marks.

( ) the word / phrase in brackets is not required to gain marks but sets context of response for credit. e.g. (waxy) cuticle. Waxy not needed but if it was described as a cellulose cuticle then no mark.

Small underlined words – this word only / must be spelled correctly

ORA or reverse argument / answer

ref answer makes appropriate reference to

AVP additional valid point (e.g. in comments)

AW alternative words of equivalent meaning

MP marking point (number)

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<table>
<tr><th>Question</th><th>Expected Answers</th><th>Marks</th><th>Additional Guidance</th></tr>
<tr><td>1 (a)</td><td>jointed / articulated, legs ;
exoskeleton / described ;</td><td>[max 2]</td><td>R antennae / wings
R many legs
R segmentation body</td></tr>
<tr><td>(b)</td><td>6/7 RIGHT = 4
5 RIGHT = 3
3/4 RIGHT = 2
1/2 RIGHT =1

0 RIGHT = 0</td><td>
<table>
<tr><td>go to 2</td><td></td></tr>
<tr><td>go to 7</td><td></td></tr>
<tr><td>Schistocerca gregaria</td><td>A</td></tr>
<tr><td>go to 3</td><td></td></tr>
<tr><td>go to 4</td><td></td></tr>
<tr><td>Drosophila melanogaster</td><td>B</td></tr>
<tr><td>go to 5</td><td></td></tr>
<tr><td>go to 6</td><td></td></tr>
<tr><td>Ephestia cautella</td><td>G</td></tr>
<tr><td>Batrachedra amydraula</td><td>E</td></tr>
<tr><td>Rhynchophorus ferrugineus</td><td>F</td></tr>
<tr><td>Oryctes agamemnon</td><td>D</td></tr>
<tr><td>Microcerotermes diversus</td><td>C</td></tr>
<tr><td>Oligonychus afrasiaticus</td><td>H</td></tr>
</table>
</td><td>[4]</td><td></td></tr>
</table>

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(c)	**1** **2** **3** **4** **5** **6** **7**	kills, harmless / other / non-pest, insects / animals / fish ; ref to, predators / parasites, of pests ; idea that pesticides are concentrated in food chains ; any effect on animals higher up food chain ; e.g. extinction any further detail, e.g. kills birds of prey / egg shell thinning ; pollutes / poisons, streams / rivers / lakes / sea ; AVP ;	[max 4]	**MP5 A** any consequence for food chain/web/ecosystem
(d)		as a control ;	[1]	**A** *idea that* it is used as a reference to see the effect of the pesticide
(e)	**(i)**			
		pesticide		
	1	numbers decreased, immediately (after spraying) / on day 4 ;		
	2	then increased ;		
	3	use of figures – reference to day and density ;		
		fungal spores		
	4	numbers did not decrease immediately / decreased after day 7 ;		
	5	decreased, slowly ;		
	6	did not increase ;		
	7	use of figures – reference to day and density ;		
	8	any comparison to the control ;	[max 5]	

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(ii)	*pesticide* **1** kills nearly all grasshoppers / kills instantly ; **2** on contact / or immediately after ingesting it ; **3** some resistant / some tolerant / some not hit by spray / some not eaten pesticide / some survive ; **4** pesticide decays / removed / not effective for long ; **5** more grasshoppers migrate from neighbouring areas ; **6** more grasshoppers, hatching / AW ; **7** eggs not killed ; *fungal spores* **8** did not kill on contact / did not kill immediately ; **9** spores need to, germinate / grow ; **10** takes several days (must be linked to MP9) ; **11** fungus (produces spores) that infect other grasshoppers ; **12** ref to transmission of fungus ; **13** any grasshoppers that migrate into area are infected (and killed) ;	[max 4]	
		[Total: 20]	
2 (a)	**A** <u>cell membrane</u> ; **B** cytoplasm ; **C** nucleus	[3]	
(b) (i)	retina ;	[1]	
(ii)	fovea / yellow spot ; blind spot / optic disc / end of optic nerve ;	[2]	

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	(c)	1 2 3 4 5 6 7 8 9 10	light absorbed (by a pigment) ; rods detect low light (intensity) ; give 'black and white' vision / do not detect colour ; provide night vision / AW ; cones detect high light (intensity) ; cones detect colour ; any detail, e.g. three different types of cone ; convert light into (electrical) <u>impulses</u> ; <u>impulses</u> sent to brain ; via, neurones / sensory nerve / optic nerve ;	[max 4]	
				[Total: 10]	
3	(a)	1 2 3 4 5 6	carbon dioxide is required for photosynthesis ; (more carbon dioxide) more, glucose is produced ; carbon dioxide <u>concentration</u> is a <u>limiting</u> factor ; more carbon dioxide = faster rate of photosynthesis ; prevents concentration falling below that of atmosphere / AW ; ref to more, growth / yield ;	[max 2]	
	(b)		carbon dioxide will diffuse out of the glasshouse ; carbon dioxide is wasted ; *idea that* extra, growth / yield, does not cover the cost of the carbon dioxide ;	[max 2]	

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(c) (i)	plants respire at night and do not photosynthesise ;	[1]	*both ideas are needed for the mark*
(ii) 1 **2** **3** **4** **5** **6** **7** **8**	decrease temperature on hot days / AW / avoid plants overheating ; denaturing of enzymes ; avoids plants wilting ; *idea that* open to allow carbon dioxide to enter during the day / ref to **F** ; *idea that* open to allow oxygen to enter at night ; to allow plants to respire ; allow water vapour to escape / avoids air becoming too humid ; reduces chances of (fungal) disease ;	[max 4]	
		[Total: 9]	
4 (a)	*glucose* – **R** ; *oxygen* – **Q** ; *urea* – **P** ;	[3]	
(b)	amino acids used to make proteins ; deamination ; removal of, nitrogen-containing group / amino group / amine group / AW ; formation of urea ; rest of molecule / carbohydrate, is, respired / stored as glycogen / converted to fat / used for energy ;	[max 3]	**R** the liver produces amino acids
(c) (i)	(stimulates liver cells to) absorb more glucose ; **A** sugar store / convert, glucose ; to glycogen (for storage) ;	[max 2]	
(ii)	(stimulates liver cells to) breakdown glycogen ; to glucose ; release glucose ;	[max 2]	**A** convert to / AW

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	(iii)	fatty liver / build up of fat deposits ; hepatitis ; fibrous tissue ; cirrhosis ; liver cancer ; liver failure ;	[max 2]	
	(d) **1** **2** **3** **4** **5** **6** **7**	bile contains bile salts ; <u>emulsify</u> (fats) / <u>emulsification</u> (of fats) ; break large globules of fat into smaller globules / AW ; mechanical / physical, digestion ; increases surface area ; for digestion by lipase ; (chemical) digestion of fat, takes longer / is harder ;	[max 4]	
			[Total: 16]	
5	**(a)**	$\frac{34/35/36\text{mm}}{0.14}$ answer = (x) 243 to 257 ;;	[2]	
	(b)	no, flagellum / tail ; no, acrosome / (digestive) enzymes ; has, food / energy, store ; more cytoplasm ; larger nucleus ; more membrane / larger surface area ;	[max 3]	*only accept structural points*
	(c)	reduces / halves, number of chromosomes ; so number of chromosomes does not double each generation ; gives variation ;	[max 2]	

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(d)	*man* cannot produce sperm ; sperm cannot swim / defective sperm / AW ; few sperm / low sperm count ; blockage of, epididymis / vas deferens ; result of, STD / named STD ; AVP ; had a vasectomy / problem with ejaculation / not enough nutrient in semen *woman* low concentration of / no, FSH ; follicles do not develop / cannot ovulate ; damaged / blocked / cut, oviduct ; AVP ; e.g. post menopause / embryo cannot implant / uterine lining does not thicken	[max 1] [max 1]	
(e)	to increase chances of fertilisation ; fertilisation occurs in the oviduct ; sperm can only survive for a few days (in the oviduct) ; placed in the uterus and not in the vagina as sperm less likely to die / AW ; AVP ; e.g. ref to female's immune system takes 1–2 days for sperm to reach, egg / oviduct	[max 3]	
(f)	to maintain, endometrium / lining of uterus ; for implantation ; prevent loss of embryo (through menstruation) ; inhibits, secretion / release, of FSH / LH ; no development of (more) follicles / AW ;	[max 3]	

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	(g)	number of women who become pregnant out of all women who have AI ; as a percentage / out of every 100 ;	[2]	
			[Total: 17]	
6	**(a)**	decrease number of trees used / less deforestation ; any consequence for biodiversity ; less carbon dioxide produced (by burning) ; **A** ora ref to greenhouse gas / global warming ; less energy needed to recycle compared to making paper from trees ;	[max 3]	
	(b)	bacteria continue to, secrete / release / produce, enzymes / lipase ; (therefore) maintain / increase, concentration of lipase ; (over time) lipase may become, inactive / 'used up' / denatured ; bacteria reproduce ;	[max 3]	
	(c) **1** **2** **3** **4**	no enzyme activity ; bacteria (killed so) do not produce any enzymes ; enzymes are denatured ; destruction of, active site / shape of enzymes ;	[max 2]	
			[Total: 8]	

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