UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2011 question paper

for the guidance of teachers

0610 BIOLOGY

0610/32 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.

Mark schemes must be read in conjunction with the question papers and the report on the examination.

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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.
<u>Small</u>	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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Question	Expected Answers	Marks	Additional Guidance
1 (a)	*animals written in the correct boxes in the food web* (Ruppell's) vulture ; cheetah ; mice / mouse ;	[3]	
(b)	(primary) producer ; primary / first consumer ;	[2]	
(c) (i)	Sun / sunlight / light ;	[1]	
(ii)	(lost) to the atmosphere / (lost as) infra red (radiation) / heat / AW ;	[1]	**R** reflect **R** 'lost' only – needs qualifying
(d) 1 2 3 4 5 6 7 8 9 10	*idea that* **small** percentage of energy from sun is 'fixed' by photosynthesis ; most energy from sun not available / reference to wrong wavelength / AW ; energy is lost, between / within, trophic levels / along food chain ; ref. to 10% energy transfer / ORA ; ref. to material that is, inedible / not digestible ; energy lost, in respiration / heat / (named) metabolic process / decomposers ; ref. to (small) total percentage reaching fourth trophic level ; not enough energy in fourth trophic level to support another level ; except parasites ; ref. to another problem of animal that would prey on, top carnivores / scavengers ;	[max 3]	**NB**: **MP3** is for loss with no reference to magnitude, also award **MP4** if magnitude given e.g. '90% lost between trophic levels' is 2 marks **MP5 A** ref to faeces examples for **MP10** animal would have to be very large, would need much energy to catch a cheetah, there would be very small populations

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Question	Expected Answers	Marks	Additional Guidance
(e) 1	feed is expensive / fish is sold at high price ;		No credit for energy losses along the chain as already given in Question 1d
2	more energy efficient to feed humans on, crops / producers / animals used to make the fish food ;		
3	waste from salmon / excess feed, causes eutrophication ;		
4	diseases / parasites, spread easily in (high density of) salmon ;		
5	diseases spread to, wild fish / other organisms ;		
6	chemicals used to control disease also pollutants ;		
7	escapees breed with wild fish ;		
8	*idea of* genetic pollution of wild fish ;		
9	escapees compete with wild fish ;		
10	extinction of wild fish ;		
11	AVP ;	[max 3]	AVP e.g. chemicals / antibiotics / hormones in feed passed on e.g. less waste if humans could eat high protein 'fish food' instead e.g. low quality stock compared with wild (less competition)
		[Total : 13]	

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Question	Expected Answers	Marks	Additional Guidance
2 (a) 1 2 3 4 5 6 7	muscular contraction / movement / pump blood ; maintenance of body temperature ; active transport / described / (passage of) nerve <u>impulses</u> ; metabolic reactions / named example (e.g. excretion / biosynthesis / digestion) growth / replacement / repair ; mitosis / nuclear division / cell division ; making, gametes / sperm ;	[max 3]	**MP1 A** maintain posture **R** 'sitting' unqualified **R** breathing unqualified **MP2 R** heat unqualified **MP4 R** respiration
(b)	aerobic ; respiration ;	[2]	
(c) 1 2 3 4 5 6 7 8 9 10 11	<u>oxygen debt</u> ; oxygen not supplied fast enough (from lung / heart) / ORA more O_2 supplied; to muscles ; removal of excess carbon dioxide ; <u>anaerobic</u> respiration (in muscles) ; lactic acid / lactate ; builds up in muscle / not carried away fast enough in blood ; lowers blood pH ; makes person feel tired / muscle stiffness / fatigue / AW ; muscle cannot contract any more ; lactic acid is, broken down / respired / converted to glucose ;	[max 4]	**A** lactic acid, converted to CO_2 and water / lactic acid oxidised

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Question	Expected Answers	Marks	Additional Guidance
(d)	*at start of run*		**NB:** All marks should be qualified by reference to stage of the run
1	vasoconstriction;		
2	(constriction / AW) of arterioles ; **A** arteries		
3	decrease in supply of blood to skin capillaries ;		
4	ref. to shunt vessels ;		
5	to increase supply of blood to muscles ;		
6	no / little sweat ;		**R** constriction of capillaries / blood vessels / veins
	later as body temperature increases		
7	vasodilation ;		
8	(relaxation / AW) of arterioles ; **A** arteries		
9	increase in supply of blood to skin capillaries ;		
10	(causes) loss of heat ;		
11	by, conduction / convection / radiation ;		
12	increase in blood flow to sweat glands ;		**R** constriction of capillaries / blood vessels / veins
13	increase production of sweat ;		
14	loss of heat by evaporation ;	[max 5]	
		[Total:14]	

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Question	Expected Answers	Marks	Additional Guidance
3 (a)	**NB**: *one mark for sites of production* *one mark for two 2º sexual characteristics for testosterone* *one mark for two 2º sexual characteristics for oestrogen* sex hormones: testosterone / oestrogen site of production: testis / testes / testicles ; follicle / ovary ; secondary sexual characteristics (1, 2): *any two* • hair on face • body / pubic, hair • increase in muscles • growth of genitals • growth of vocal cords / larynx / deep voice • broad shoulders; / *any two* • growth of breasts • body / pubic, hair • hips widen • fat deposition ;	[3]	
(b) (i)	pituitary (gland) ;	[1]	
(ii)	ovary ;	[1]	
(c) (i) 1 2 3 4 5	increasing concentration, days 0 to 2 / 3 ; (then) decreases until day 10 –13 ; peak at, ovulation / middle of the cycle / day 14 ; decreases / low concentration from days 14 to 22 / 23 / 24 ; (then) increases from day 23 / 24 ;	[max 3]	**A** ref. to levelling out 6 –10 / 11 as part of overall decrease **MP2** **MP3** need peak / max / highest / AW not just up / down
(c) (ii) 1 2 3 4 5 6	FSH stimulates follicle (cells) ; to grow ; to secrete oestrogen ; ref. to, development / maturation of egg ; correct reference to subsequent effect on, oestrogen / LH at ovulation ; low FSH after ovulation, prevents further follicle stimulation ;	[max 3]	
		[Total: 11]	

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Question	Expected Answers	Marks	Additional Guidance
4 (a) 1 **2** **3**	A^C A^Y ; A^CA^Y ; orange-red ;	[3]	**R** – A^cA^c etc **A** – A^c , A^c **MP2** relies on correct **MP1**, allow ECF **MP3** stands alone (**A** orange)
(b)	cross / genotypes of offspring 2 offspring x offspring / A^CA^C , A^YA^Y , A^CA^Y ; 3 offspring x crimson-flowered plant / A^CA^C , A^CA^Y ; 4 offspring x yellow-flowered plant / A^YA^Y, A^CA^Y ;	[3]	Allow ECF from Question 4a
(c) 1 **2** **3** **4** **5** **6** **7**	phenotype of A^CA^Y (offspring of cross 1) is different from either parent / homozygote genotype / AW ; the phenotype, was intermediate / mixture of two colours ; both alleles are expressed ; co / incomplete dominance ; offspring of cross 2 gives three phenotypes not two ; offspring of crosses 3 and 4 both give two phenotypes ; if dominance then cross 3 or 4 would give one phenotype only ;	[max 3]	**MP2** orange / red must be qualified **MP3 R** genes

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Question	Expected Answers	Marks	Additional Guidance
(d) **1** **2** **3**	transfer of pollen from, anthers / stamen , to stigma ; self = within same flower (or flower on same plant); cross = between flowers on different plants (of same species) ;	[2]	**R** fertilisation **MP2**, **3** need ref to **flowers** at some point
(e) **1** **2** **3** **4** **5** **6** **7** **8**	limited / little, variation ; offspring become homozygous (over time) / AW ; variation is due to mutation ; low chance that mutations will be expressed / AW ; offspring will be well adapted to conditions, locally / near parent ; if environment does not change ; limited / no, opportunity for evolution, if environment changes / example of change / will not be able to adapt to change in the environment ; AVP ; e.g. some variation due to meiosis / reduced variation leads to intraspecific competition locally	[max 4]	**R** no variation **MP2** – **A** ref to inbreeding / limited gene pool **MP7 A** ref to disease in context (as a change) **R** parents resistant, therefore offspring resistant /AW
		[Total: 15]	

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Question	Expected Answers	Marks	Additional Guidance
5 (a)	*for*		**NB:** Max 2 (argument for)
1	(fluoride) helps to strengthen tooth <u>enamel</u> ;		
2	available to all / treats whole population ;		
3	free (to people) / cheap to supply ;		
4	AVP ;		
	against		**NB:** Max 2 (argument against)
5	ref. to allergies / qualified side effects ;		
6	bad taste (in water) ;		**MP5** ONLY accept these possible side effects: gastric disturbance / AW, cardiovascular problems, headache, fits
7	dosage not controlled for individuals / no individual choice ;		
8	mottled / discoloured teeth / fluorosis ;		
9	AVP ;	[max 3]	**MP8 A** any colour effect here
(b)	*sugar consumption*		
1	Chile – increased to 1997, decreased (slightly) ;		**MP1 A** peaks in 1997
2	Australia – increased to 2000, decreased / decrease till 1995, then steady ;		**MP2 A** peaks in 2000
3	any **two** figures with units **and** years ; *either for the same country or for both countries*		**MP3 A** units given only once
	tooth decay		
4	Chile – decreases 1977 to 1990, then increases to 1995 ;		
5	Chile – decreases from 1995 / AW ;		**MP4 A** peaks in 1995
6	Australia – keeps decreasing (from 1977) ;		
7	**any** two figures **with** units and years ; *either for the same country or for both countries*	[max 4]	**MP7 A** units given only once **A** a difference in tooth decay for any two years

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Question	Expected Answers	Marks	Additional Guidance
(c) 1 2 3 4 5 6 7	sugar remains on teeth ; bacteria, grow on teeth / feed on sugar / form plaque ; bacteria respire ; (lactic) acid formed ; wear away <u>enamel</u> ; exposes softer dentine ; AVP ;	[max 4]	
(d) 1 2 3 4 5 6 7 8	*similarities (tooth decay decreases in both countries)* decrease in tooth decay is not related to decrease in sugar consumption ; better, oral hygiene / dental care / awareness / AW ; diet contains less sugar / reduction in sugary drinks for children ; fluoride toothpastes ; AVP ; *differences (tooth decay in Australia decreases before that in Chile / tooth decay in Australia is lower than in Chile)* fluoridation (of water supply) in Australia may be responsible ; better dental service / awareness / education in Australia / AW ; AVP ;	[max 3]	**NB:** All explanations should be qualified **MP6** – ORA Chile
		[Total: 14]	

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Question	Expected Answers	Marks	Additional Guidance
6 (a) 1 **2** **3**	broad leaves ; network of veins ; five petals ;	[3]	
(b)	*one mark for mesophyll cells, one mark for guard cell* **NB:** Each extra tick (over 3) penalise by one mark	[2]	**NB:** B + E = 1 mark F = 1 mark

features	cells that carry out photosynthesis
A	
B	✓
C	
D	
E	✓ ;
F	✓ ;
G	

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Question	Expected Answers	Marks	Additional Guidance
(c) 1 2	upper epidermis is transparent / thin ; lets light through to palisade, cells / mesophyll ;		
3 4	palisade cells with many chloroplasts ; **A** lots of chlorophyll absorb as much light as possible / AW ;		**NB:** Paired MPs (i.e. explanation must be linked to correct feature)
5 6	palisade cells arranged lengthways ; less cell walls to scatter light / AW ;		If a letter is given rather than named feature then allow the explanation mark if relevant
7 8	palisade cells close together ; absorb as much light as possible ;		**MP3** – need ref. to **more**, lots of / AW **MP4** – light qualified – much as possible etc.
9 10	spaces in spongy mesophyll ; allow (diffusion of) carbon dioxide to mesophyll cells ; **A** each cell has surface for gas exchange		
11 12	guard cells / stomata ; allow (diffusion of) carbon dioxide into leaf ;		
13 14	xylem ; to provide water (as raw material) ;		
15 16	phloem ; to remove products of photosynthesis ;	[2 + 2]	
(d) (i)	<u>sucrose</u> ; **R** sugar amino acids ; hormones / plant growth substances / auxin(s) ;	[max 2]	
(ii)	leaf ; two of the following for one mark stem, root, bud, flower, fruit, seed, storage organ ;	[2]	
		[Total: 13]	

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