UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2009 question paper for the guidance of teachers

0610 BIOLOGY

0610/02 Paper 2 (Core 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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UNIVERSITY of CAMBRIDGE
International Examinations

General notes

Symbols used in mark scheme and guidance notes.

/ separates alternatives for a marking point

; separates points for the award of a mark

MP mark point – used in guidance notes when referring to numbered marking points

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

OWTTE or words to that effect

ORA or reverse argument/answer

ref./refs. answer makes appropriate reference to

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Mark Scheme Instructions	Guidance
1 reptiles; birds; mammals; amphibians; [4] **[Total: 4]**	A – singular forms of terms A – reptilia, aves, mammalia, amphibia A - mixed use of common and scientific names R – two or more responses in an answer space unless both correct I – named individual examples
2 **(a)** 1 cell wall added and labelled; 2 nucleus added and labelled; 3 vacuole added and labelled; 4 cytoplasm labelled; 5 mitochondria / mitochondrion added and labelled; Any four – 1 mark each [4] **(b)** 1 in leaves; 2 near upper surface / upper mesophyll layer / above the spongy mesophyll / just below (upper) epidermis; [2] **[Total: 6]**	A – nuclear membrane label A – vacuole membrane / tonoplast label I – any shading or stippling to represent cytoplasm / nucleus / vacuole I – refs. to stem A – MP shown on candidate's labelled diagram if attempted
3 **(a)** micronutrient deficiency symptom calcium; → rickets vitamin C; → scurvy vitamin D; → rickets iron; → anaemia For each correct link – 1 mark [4] **(b)** 1 (iron) used to make / part of haemoglobin; 2 present in red blood cells; 3 used to carry / transport / hold oxygen; 4 component of myoglobin / some enzymes / electron carriers; 5 (myoglobin) present in muscle cells Any three – 1 mark each [3] **[Total: 7]**	Award marks on basis of lines leaving the micronutrient R – any micronutrient from which more than one line is drawn I – multiple lines that arrive at a deficiency symptom

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4	**(a)**	*substrate* *enzyme* *product* *(fat)* lipase; *(glycerol +)* fatty acids; protein; *(protease)* amino acids; starch; amylase; *(maltose)* each correct insertion – 1 mark [6]	R – multiple responses in any box I – qualifications of amylase with salivary or pancreatic
	(b) **(i)**	plasma; [1]	
	(ii)	respiration; [1]	I – any qualifications such as cellular / tissue / anaerobic
	(iii)	<u>glycogen</u>; [1]	I – starch
	(iv)	liver; [1]	I – muscles
	(v)	adrenaline / <u>glucagon</u>; [1]	A – epinephrine
		[Total: 11]	
5	**(a)** **(i)**	**D**; [1]	
	(ii)	**A**, **C** / **A** and **C**; [1]	R – **A–C** / **A** to **C** / any ref to **B**
	(b) **(i)**	1 (plenty of) food / water; 2 (plenty of) space; 3 (plenty of) mates; 4 lack / few predators; Any two – 1 mark each [2]	A – if no marks gained for MPs 1, 2, 3 or 4 then award 1 mark for ref. to more born than die A – sensible named example A – 1 logical ref to seasonal changes
	(ii)	1 insufficient food available / competition / overcrowding (for food) / OWTTE; 2 arrival of a predator / increase in predators; 3 outbreak of disease / increase in parasites; Any two – 1 mark each [2]	A – sensible named example A – hunting (by humans) A – sensible named example A – 1 logical ref. to seasonal changes
		[Total: 6]	

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6	**(a)** **(i)**	1 produce / release ova / egg cells / female gametes; 2 produce oestrogen; 3 progesterone; Any two – 1 mark each [2]	A – eggs I – refs. to storing A – female hormones for 1 mark if neither hormone named I – hormones unqualified
	(ii)	feed / provide oxygen / protect fetus / embryo; [1]	A – refs. to implantation / placenta / place for development / growth A – baby for fetus
	(iii)	receive sperm / semen / intercourse / act as birth canal; [1]	A – exit for menstrual flow
	(b)	1 develop / release new ovum (each cycle) / OWTTE; 2 prepares new uterus lining (prior to ovulation); 3 maintains lining if zygote / fertilised ovum / embryo implants / pregnancy; 4 sheds lining (if ovum is not fertilised / no pregnancy); Any three – 1 mark each [3]	A – descriptions of early changes / lining of womb A – endometrium A – ref. to (lining) thickening / vascularised / OWTTE A – refs. to menstruation / period
		[Total: 7]	

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7	(a)	(i)	hogweed ➔ aphids ➔ wrens ➔ kestrels;; ivy ➔ aphids ➔ wrens ➔ kestrels;; oak tree ➔ aphids ➔ wrens ➔ kestrels;; oak tree ➔ caterpillars ➔ wrens ➔ kestrels;; Any one food chain – 1 mark for four organisms in the correct sequence and 1 mark for indicating direction of energy flow [2]	food chains must start with producer pyramid format – **MAX** 1 mark
		(ii)	1 herbivore eats only plant material / producers / OWTTE; 2 named example from food web; 3 carnivore eats animal material / meat / consumers; 4 named example from food web; Any three – 1 mark each [3]	A – bank voles / goldfinches / aphids / caterpillars I – refs. to food examples A – wrens / kestrels / fleas I – refs. to food examples
		(iii)	fleas; [1]	
	(b)		<u>wrens</u> 1 numbers down; 2 same food as ladybirds / competition; 3 amount of aphids drop / less food for wrens; <u>bank voles</u> 4 numbers up; 5 kestrels have fewer wrens to feed on; 6 fewer kestrels survive to eat bank voles; **OR** 7 numbers down; 8 kestrels have fewer wrens to feed on; 9 kestrels eat more bank voles as alternative; (Max 3 from one version of bank vole or one version of wren prediction) Any four – 1 mark each [4]	A – wren numbers stay the same A – eat more caterpillars A – more caterpillars as more food available / aphids eat less oak tree A – alternative approaches that are logical from food web and involve e.g. aphids, hogweed, goldfinches, grass and bank voles. This can be argued for both rise or fall in bank voles
			[Total: 10]	

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8	**(a)**	1 inspired air has more oxygen (than expired air) / ORA; 2 inspired air has less carbon dioxide (than expired air) / ORA; 3 inspired air is (normally) colder (than expired air) / ORA; 4 inspired air is (normally) drier (than expired air) / ORA; Any three – 1 mark each [3]	R – no oxygen in expired air R – no carbon dioxide in inspired air treat unqualified responses as ref to inspired air I – refs. to dust, pollen, microorganisms, other gases
	(b)	large surface area; thin wall / OWTTE; rich blood supply / OWTTE; Any three – 1 mark each [3] **[Total: 6]**	A – refs. to counter current action A – moist / wet surface

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9	**(a)** **(i)**	1 movement / diffusion of water; 2 from a high (water) concentration to a low / lower one; 3 through a partially permeable membrane;[3]	A – down a concentration gradient A – differentially / selectively / semi-permeable membrane A – across for through A – alternative terminology e.g. water potential if correctly used
	(ii)	1 (diffusion) is movement of other particles / ions / molecules / not just water; 2 partially permeable membrane not necessary / OWTTE; [2]	A – named examples A – semi-permeable membrane
	(b) **(i)**	1 water concentration (in root hair cell); 2 lower than that in soil / soil water; 3 cell membrane is partially permeable; Any two – 1 mark each [2]	A – ref. to cytoplasm / vacuole A – for MP1 and 2 ORA A – vacuole membrane / tonoplast A – alternative terminology as per **(a)**
	(ii)	1 (now) soil water has lower water concentration; 2 because of more salts in sea water / OWTTE; 3 cell has lower salt concentration; 4 water flows out of cell / plant / into soil / exosmosis; 5 plant wilts / dies; 6 ref. to roots waterlogged / anaerobic conditions; Any four – 1 mark each [4]	I – refs. to salt being toxic A – MP2 and 3 responses in terms of water concentration / water potential
		[Total: 11]	

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10 (a) (i) short (wing); [1]	
(ii)	mark each line <u>independently</u>
1 (phenotypes) long (winged) short (winged);	R – use of X and Y as alleles A – alternative symbols if clear as to meaning with **MAX** 4
2 (genotypes) **RR;** **rr**;	I – Rr **NB** 2 marks for this line A – ECF from Rr erroneous genotype
3 (gametes) **R R r r**;	(2nd row) to 3rd row
4 (genotypes) **Rr Rr Rr Rr**; [5]	R – ECF from MP 3 to MP 4 If candidate ignores printed answer space and uses blank space below accept Punnet's square approach
(iii) 464 / 4;	A – If answer correct but no working shown then award 2 marks,
116; [2]	A – If answer wrong but correct working shown then award first mark only
(b) 1 (phenotypes) short winged (female) long winged (offspring);	No ECF from **(a) (ii)** A – Punnet's Square approach
2 (genotypes) **rr** **Rr**;	**NB** 1 mark this line
3 (gametes) **r** **R** **r**;	A – **r r R r**
4 (genotypes) **Rr rr Rr rr;**	A – 50 : 50 etc.
5 (phenotypes) half with long, half with short wings;	
Any four – 1 mark each [4]	
[Total: 12]	

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