UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2010 question paper

for the guidance of teachers

0610 BIOLOGY

0610/21 Paper 21 (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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International Examinations

General notes

Do not exceed the section sub-totals or question maxima.

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

ORA or reverse argument / reasoning

OWTTE or words to that effect

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 the context of the response for credit. e.g. (waxy) cuticle. Waxy not needed but if it was described as a cellulose cuticle then no mark is awarded.

mitosis underlined words – this word only

1	(a)	(i)	in the blood (stream); [1]	**A** – (named) blood vessel / lymph vessel / lymph gland / heart
		(ii)	palisade layer / in a leaf; [1]	**A** – ref. to any <u>green</u> region of plant **I** – stem unqualified **R** – wrong qualifications
	(b)		wall; cellulose; chloroplasts; vacuole; cell sap; [5]	**R** – words not in list **I** – spelling errors If more than one response in a space then mark the first
	(c)	(i)	kidney / bladder / ureter / urethra labelled; [1]	**A** – named blood vessel **A** – either vertical vessel as aorta or vena cava **A** – any horizontal vessel as renal artery or renal vein More than 1 label – all must be correct for award of mark
		(ii)	*organ* 1 composed of different tissues; 2 (tissues) together carry out a function;	If organ mislabelled on diagram accept this in **(c) (ii)** (error carried forward) **A** – named / described function(s) for organ and / or system
			organ system 3 composed of two / many organs; 4 carrying out separate functions;	**A** – different organs (note plural)
			5 functions combining to achieve major process / description;	**A** – working together for one purpose / OWTTE
			any three – 1 mark each [3]	
			[Total: 11]	

2

class	ear flap	fur / feathers	scaly skin	2 pairs limbs
amphibians				✓;
birds		✓	(✓)	✓;
fish			✓;	
mammals	✓	✓		✓;
reptiles			✓	✓;

each row correct – 1 mark [5]

[Total: 5]

A – yes for a tick

A – (birds) tick in 3rd column but does not have to be present

R – other ticks in any row

I – cross / no in other boxes

3	(a)	(i)	it decreases / falls / OWTTE; [1]	**I** – refs. to growth e.g. grows poorly / less effectively
		(ii)	1 crop removes nutrients / minerals; 2 not replaced (in any way); 3 soil fertility declines / low soil fertility; 4 leaching occurs also; *any two – 1 mark each* [2]	**A** – refs. to named minerals / ions **R** – nitrogen **A** – refs. to no fertiliser added etc. **A** – soil infertile
	(b)	(i)	yield rises; [1]	**I** – refs. to later fall
		(ii)	1 water leaches / carries nutrients / minerals (away from plants) 2 loss / waste of money; 3 (fertilisers) get into watercourses; 4 could cause eutrophication; *any two – 1 mark each* [2]	**A** – refs. to named minerals / ions MP 2 in relation to loss by leaching **A** – streams / rivers / lakes **A** – description of any aspect of eutrophication
	(c)		1 takes time to decay / OWTTE; 2 (steady) release of nutrients / minerals; 3 refs to improving water holding effect; 4 reduces leaching; *any two – 1 mark each* [2]	**A** – refs. to named minerals / ions
			[Total: 8]	

4 (a) level 3 – secondary consumers; level 1 – producers; [2]	**A** – carnivores **I** – responses against levels 4 and 2
(b) (i) level 4 – **A**, **B**, **C**; level 2 – **G**, **H**, **I**; [2]	In both responses all letters (in any order) required for the mark **I** – responses against levels 3 and 1
(ii) *(all responses in context of less mosquito larvae)* 1 less water fleas eaten; more food for hydra so hydra population rises; 2 less food for water boatmen; which eat more hydra so hydra population falls; 3 less food for sticklebacks so they eat more water fleas; less food / water fleas for hydra so hydra population falls; 4 less protozoa eaten so less green algae; thus less water fleas so hydra population falls; *any two pairs – 2 marks each* [4] **[Total: 8]**	**I** – refs. to hydra die **A** – less food for water boatmen so population falls; which eat less hydra so hydra population rises; (this is an alternative approach to 2. Both cannot be awarded in one candidate's responses)

5	**(a)** water / moisture; oxygen; (sun) light; warmth / heat / (suitable) temperature; *any three – 1 mark each* [3]	**A** – humidity / dryness **I** – air **A** – darkness / no (sun) light **I** – sun unqualified **A** – cold *Credit environmental factors but not descriptions of experimental conditions*
	(b) tube **B**; tube **D**; [2]	*If more than two predictions mark first two*
	(c) **(i)** <u>mitosis</u>; [1]	
	(ii) same (number of chromosomes) / all (cells) diploid; [1]	**A** – all (cells) 2N **I** – refs. to chromosome numbers such as 23 / 46
	(d) 1 (dry) mass decreases / falls / OWTTE; 2 (loss) because of respiration; 3 (food) reserves / starch / fats used up; 4 no photosynthesis / respiration greater than photosynthesis; *any three – 1 mark each* [3]	
	[Total: 10]	

6 **(a)** **X** – placed clearly on oviduct; [1]	**A** – **X** with label line clearly indicating oviduct
(b) **(i)** M – placenta / villi; N – umbilical cord; [2]	**A** – umbilicus
(ii) 1 has large surface area; 2 for diffusion; 3 of oxygen from mother / to fetus; 4 of carbon dioxide from fetus / to mother; 5 two blood supplies very close to one another; *any three – 1 mark each* [3]	**A** – baby / embryo **A** – baby / embryo
(c) (O / uterus wall / muscle) contracts to push baby (out); (P / cervix) dilates to allow exit of baby / OWTTE; [2]	**A** – vagina
(d) **(i)** 1 virus may pass across / through placenta; 2 virus may be carried by blood leakage (during pregnancy / birth); 3 from mother to fetus *any two – 1 mark each* [2]	must be in context of leakage and not the misconception of joint blood systems
(ii) 1 eating a balanced / varied diet; 2 extra iron / calcium / protein in diet: 3 not smoking (tobacco); 4 not drinking (alcohol); 5 not taking drugs; 6 checks with health team; 7 taking exercise / antenatal exercises; 8 any other valid point; *any two – 1 mark each* [2]	**I** – healthy diet **A** – vitamin C / folic acid **A** – named (illegal) drugs Ignore numbering of answer spaces and read as a paragraph. **I** – inadequate / irrelevant answers and award up to 2 marks
[Total: 12]	

7 **(a) (i)**	**A** – canine (tooth); **B** – incisor (tooth); [2]	**A** – eye tooth **I** – K9 Note **(a) (i)** could be answered on the diagram but if answered in diagram and answer spaces mark as per the answer spaces only
(ii)	back of (jaw); [1]	**A** – end of (jaw) / after or behind canine / premolar Diagram can be interpreted by candidates as either molar or premolar **R** – back of mouth
(b)	removes (remains of) food; removes plaque; removes bacteria; prevents build up of acid; stimulates blood flow to gums / teeth; *any three – 1 mark each* [3]	**A** – prevents build up of plaque **I** – ref to kills bacteria **I** – refs to toothpastes / fluoride etc.
(c)	1 chewing breaks food up / OWTTE; 2 mixes (food) with saliva; 3 increases surface area (for enzyme action); 4 enzymes break up large / complex / insoluble molecules; 5 into small / simple / soluble molecules; 6 that can be absorbed; 7 prepares food for swallowing / lubricates food; *any four – 1 mark each* [4]	**A** – named digestive enzyme **A** for MP4 and 5 – any named digestive process for enzyme named in response e.g. amylase breaks down starch to maltose / glucose gets MP4 and 5
	[Total: 10]	

8	(a) (i)	**A** – left atrium; **B** – left ventricle; [2]	**A** – auricle If left is omitted in both responses but the chamber identities are correct award 1 mark **R** – right
	(ii)	a vein / vena cava; it is carrying blood to the heart; [2]	**R** – other named veins **I** – correct qualifications of blood e.g. deoxygenated **R** – incorrect qualifications of blood
	(b) (i)	blood in **C** has less oxygen (than **E**) as oxygen is added at the lungs / ORA; blood in **C** has more carbon dioxide (than **E**) as this gas is lost at the lungs / ORA; **C** has more glucose than **E** as heart / lung cells absorb / use it; *any two – 1 mark each* [2]	Ignore numbering of answer spaces and read as a paragraph. **I** – inadequate / irrelevant answers and award up to 2 marks Responses must be in context of comparisons between **C** and **E** To award mark difference and explanation must be given
	(ii)	vessel **F** (will have the highest pressure); [1] (left) ventricle has thickest muscle / wall; (left) ventricle creates more pressure on contracting; *any one – 1 mark* [1]	**A** – aorta **A** – chamber **B** **A** – chamber **B** *Note 1 mark for identification and 1 mark for explanation*
		[Total: 8]	

9 **(a)** eye + light; ear + sound / gravity / movement; nose + smell / chemicals (in the air); tongue + taste / chemicals (in solution); skin + touch / pressure / temperature (change) / pain; *any two – 1 mark each* [2]		**A** – noise **I** – seeing, hearing, smelling, tasting, touching as these are actions not stimuli
(b) **(i)** a growth (response); to a directional stimulus; [2]		**A** as alternative – directional growth (response); to a stimulus; Must be general definition of tropism. **I** – examples
(ii) gravity – geotropism; shoot grows away from (the pull of) gravity / upwards; light – phototropism; shoot grows towards light; [4]		**A** – geo (as tropism is in column heading) **I** – refs to positive and negative **A** – photo (as tropism is in column heading) **I** – refs. to positive and negative
[Total: 8]		