UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2010 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./refs. answer makes appropriate reference to

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

AW alternative words of equivalent meaning

MP marking point (number)

ecf error carried forward

Question	Expected Answers		Marks	Additional Guidance
1 (a)	***5 / 6 RIGHT = 4*** ***4 RIGHT = 3*** ***3 RIGHT = 2*** ***1 / 2 RIGHT =1*** ***0 RIGHT = 0***	go to 2 ; go to 3 ; *Aulostomus maculatus* **F** ; *Gymnothorax moringa* **E** ; go to 4 ; go to 5 ; *Dasyatis americana* **G** ; *Bothus ocellatus* **D** ; go to 6 ; *Epinephelus striatus* **A** ; *Pseudupeneus maculatus* **C** ; *Chaetodon capistratus* **B**	[4]	sequence is: **E** **G** **D** **A** **C** **B** **I** letters placed in grey blocks
(b) (i)	mutation **;**		[1]	
(ii)	**1** retina / pigments, adapted for detecting different, colours / wavelengths **;** **2** colours / wavelengths, for different depths **;** **3** fish are adapted to live at different depths **;** **4** as a group fish will occupy a larger habitat **;** **5** blue/red, retinal detector mates with relevant, type / species / AW **;** **6** avoid competition **;**		[max 2]	**R** simple restatement of the question stem

Question	Expected Answers		Marks	Additional Guidance
(c)	**1** **2** **3** **4** **5** **6** **7** **8**	reduces ability of blue fish to find mates **;** reduces reproduction in blue fish **;** number of blue fish, decrease / become rare / extinct **;** gene / allele, for blue, pigment / receptors, not passed on **;** water has less effect on red fish **;** number of red fish increase **;** red fish have less competition (because fewer blue fish) **;** red fish extend their range **;**	[max 4]	**A** reference to 'shallow' and/or 'deep' water fish in place of blue/red if sufficiently qualified **I** idea of differential predation, effect on plant life, etc.
			[Total: 11]	

Question	Expected Answers		Marks	Additional Guidance
2 (a)	**A** – hair **;** **B** – (temperature) receptor **;** **A** (sensory) nerve ending **C** – sweat gland **;** **D** – fat (cell) **;**		[4]	**R** follicle **A** neuron **R** nerve **A** fat layer / fat tissue / adipose / lipid **R** 'fat droplet'
(b)		*marking points are linked 1 + 2, etc.*		**NB** if structures in (a) labelled incorrectly allow *ecf*
		*hair / **A***		
	1	raises hair + traps air **;** **A** ORA		**if** structure is not on the mark scheme, but correct and appropriate function is given, allow **one** mark (*ecf*)
	2	air is (good) insulator **;**		
		*temperature receptor / **B***		
	3	detects change in temperature **;**		(**BUT** if unqualified letters are used must link to what is given in (a)) *e.g. **D** is an artery/blood vessel in (a) – ✗* *__D__ vasodilates if too hot in (b) – ✓*
	4	impulses to the, CNS / brain / spinal cord **;**		
		*sweat gland / **C***		
	5	secretes / produces, sweat + evaporates from surface of skin **;** ORA		
	6	heat lost from the body / blood cooled / AW **;** ORA		**R** 'signals/messages' in MP 4
		*fat / **D***		
	7	insulator **;**	[max 4]	

Question	Expected Answers		Marks	Additional Guidance
(c)		*mark **(i)** and **(ii)** together to max 5*		
(i)	**1**	(vaso)constriction **;**		**R** vasoconstriction of veins/capillaries
	2	shunt / AW, opens **;**		**Do not accept** 'capillaries move away' / AW *or* ref to muscles in capillaries
	3	less blood flows through the <u>capillaries</u> **;**		
	4	blood diverted away from, skin / surface **;**		
(ii)	**5**	*idea that* blood distributes heat **;**		
		less heat loss		
	6	by radiation **;**		
	7	by convection **;**		
	8	accept by conduction (to the air) **;**	[max 5]	
(d)	**1**	change in, body / skin, temperature **;**		**I** ref. to external temperature changes
	2	acts as a stimulus **;**		
	3	to keep temperature , constant / at 37 ^{o}C / within limits / near set point / at the norm / AW **;**		**A** correct ref. to homeostasis
	4	corrective / opposite / AW, action by the body **;**		the example needs to show how it brings about the corrective action
		e.g. qualified ref to sweating / vasodilation / vasoconstriction / AW **;**	[max 3]	
			[Total: 16]	

Question	Expected Answers		Marks	Additional Guidance
3 (a)	**1** **2** **3** **4** **5** **6** **7**	substrate / sucrose, fits into enzyme **;** <u>active site</u> **;** ref to shape of molecules, fitting together / matching / AW **;** <u>lock and key</u> **;** sucrose and water / molecules, close together within enzyme **;** glucose and fructose produced + enzyme, unchanged / reused **;** lowers energy needed for reaction **;**	[max 3]	**R** similar/same shape **A** form, enzyme substrate complex / ESC
(b) (i)	temperature constant so not another variable / AW **;** (near) optimum temperature **;** denatures at higher temperatures / less or not active at lower temperature **;**		[max 2]	**R** denatures at lower temperatures
(ii)	**1** **2** **3** **4**	increase in activity from pH 3 to pH 7 / ORA**;** optimum pH / peak activity, pH 7 **;** decrease in activity from pH 7 to pH 11 / ORA**;** any rate of activity quoted **;**	[max 3]	**A** pH 6.8 – 7.2 **A** neutral pH **R** 6 – 7 **A** correct ref. to no activity below pH 3 or above pH 11
(iii)		**P** – pepsin / protease **;** **Q** – amylase / carbohydrase **;** **R** – lipase / trypsin / protease / amylase / carbohydrase / maltase / sucrase / lactase **;**	[3]	
(c)	 **1** **2** **3** **4** **5** **6**	*marking points **not** linked – allow ecf* amylase, breaks down starch **;** starch → maltose / glucose / sugar(s) **;** (named) protease, breaks down protein **;** protein → polypeptides / peptides / amino acids **;** lipase, breaks down fats **;** fat → fatty acids <u>and</u> glycerol **;**	[max 4]	**alternatives for MP1**: (named) carbohydrase breaks down (correctly named) carbohydrate **alternatives for MP2:** maltose → glucose / sucrose →glucose <u>and</u> fructose / carbohydrates → sugars
			[Total: 15]	

Question	Expected Answers	Marks	Additional Guidance
4 (a)	(both have a) lag phase **;** (both have an) exponential / log, phase **;** (exponential / log phase) not yet ended / AW **;** no, deceleration phase / stationary phase / plateau **;** no, decline / death, phase **;**	[max 3]	credit use of the terms lag and log / exponential if the comparison is implied do not credit description of data in Fig 4.1 if no attempt at comparison
(b) (i)	*award two marks if correct answer (8.1) is given,* *if no answer given or answer is incorrect or answer given to more than one decimal place, award one mark for working* 520 – 478 / 520 x 100 8.1 **;;**	[2]	
(ii)	*clear land for* housing / buildings **;** farms **;** roads **;** fuel **;** paper **;** AVP **;** e.g. building materials	[2]	**R** logging unqualified

Question	Expected Answers	Marks	Additional Guidance
(c)	*2 marks max per aspect of environment to total max of 8* ***number of species*** loss of habitat ; loss of species / decrease / extinction / endangered ; AVP ; e.g. less food available / disruption to food chain ***soils*** increase in water content / waterlogging ; increase in flooding ; soil erosion / described ; loss of, topsoil / nutrients ; **A** soil becomes less fertile AVP ; ***rivers*** soil washed into rivers ; more silt ; more nutrients ; rivers flood ; AVP ; ***atmosphere*** drier / less water vapour ; less transpiration ; more carbon dioxide ; trees are burnt ; less oxygen ; ref. to photosynthesis (in context of carbon dioxide or oxygen) ; less rainfall ; global warming / climate change qualified ;	[max 8]	AVP – **A** correct ref. to eutrophication but ignore further detail

Question	Expected Answers		Marks	Additional Guidance
(d)	**1** **2** **3** **4** **5** **6**	*idea of* limited resources **;** less, mining / plastic manufacture / deforestation **;** less waste to, land fill / rubbish tips **;** recycling uses less energy than, making paper / making plastic / mining / smelting **;** ref. to pollution qualified e.g. toxic gases from burning plastic **;** AVP **;**	[max 3]	**A** qualified ref. to global warming
			[Total: 18]	

Question	Expected Answers	Marks	Additional Guidance
5 (a)	**A** – cell wall ; **B** – cytoplasm ; **C** – vacuole ;	[3]	
(b)	*NB paired marking points* *1st point of each pair can be free standing* *2nd marking point must be linked correctly* large surface area ; to maximise absorption / AW ; membrane with, carriers / proteins ; for active transport (of ions) ; vacuole with high concentration of, salts / sugars / solutes ; to give, low(er) water potential / water potential gradient ; **A** promotes osmosis <u>thin</u> cell wall ; short distance for diffusion ; (more) mitochondria ; to provide, energy / ATP, + for active transport ;	[2 + 2]	**R** produce energy
(c)	produced by photosynthesis (in leaves) ; from breakdown of starch stores ; <u>translocation</u> ; in the phloem ; as sucrose ;	[max 2]	
		[Total: 9]	

Question	Expected Answers	Marks	Additional Guidance
6 (a)	**X** – menstruation / described **;** **Y** – ovulation / described **;**	[2]	**R** ova produced
(b)	*stimulates* **1** repair of the, endometrium / lining of uterus **; A** womb **2** thickening / building up, of endometrium **;** **3** development / AW, of blood (vessels) / glands **;** **4** prepares (uterus) for, implantation / reception of 'egg' *or* embryo **;** **5** release of LH **;** **6** inhibits release of FSH (from pituitary) **;** **7** stops, production / release, of more eggs **;** **8** causes change in cervical mucus **;**	[max 4]	**R** repair/thickening of uterus wall in MP1 and 2 **A** ref to uterus (alone) for MP 3 and 4
(c) (i)	FSH is, given / taken / injected, at beginning of the cycle **;** stimulates development of, follicles / eggs **;** many / several / more than one **;** reason women may be infertile is not producing, any / enough, FSH **;** enables IVF **;**	[max 2]	**R** ova produced/made **A** follicles produced/made **A** FSH causes more ova to be released
(ii)	allows infertile couples to have children **;** may not treat infertility successfully **;** expense of fertility treatment **;** may lead to multiple births **;** AVP **;** e.g. ref. to adverse effects	[max 1]	**I** ref. to religious beliefs
(d)	so no more eggs released **;** no fertilisation **;** no more embryos **;** *idea that* do not have, embryos / fetuses / 'babies', at different stages of development in the womb at the same time **;**	[2]	
		[Total: 11]	