CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the May/June 2015 series

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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Abbreviations used in the Mark Scheme

- **;** separates marking points
- / separates alternatives within a marking point
- **R** reject
- **ignore** mark as if this material was not present
- **A** accept (a less than ideal answer which should be marked correct)
- AW alternative wording (accept other ways of expressing the same idea)
- underline words underlined (or grammatical variants of them) must be present
- max indicates the maximum number of marks that can be awarded
- mark independently the second mark may be given even if the first mark is wrong
- ecf credit a correct statement that follows a previous wrong response
- ( ) the word / phrase in brackets is not required, but sets the context
- **ora** or reverse argument
- AVP any valid point

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Question	Expected Answers	Marks	Additional Guidance
1 (a) (i)	go to 2 / go to 5 / *Gymnopis multiplicata* **B** / go to 3 / *Triturus cristatus* **C** / go to 4 / *Necturus maculosus* **D** / *Ambystoma tigrinum* **G** / go to 6 / *Oreophrynella quelchii* **E** / *Polypedates leucomystax* **F** / *Rana temporaria* **A**	[max 3]	5 / 6 right = 3 3 /4 right = 2 1 /2 right = 1 0 right = 0
(b)	**1** habitat, destruction / change **;** **A** examples of destruction, e.g. deforestation, soil erosion **2** (named) pollution **;** **A** global warming / climate change / acid rain **3** (fungal) disease **;** **4** hunting (for pet trade / food) **;** **5** lack of food / starvation **;** **ignore** competition for food **6** competition, with alien / introduced / exotic, species **;** **7** predation by introduced species **;** **8** roadkill **;** **9** AVP **;**	[max 3]	
	Total:	**[6]**	

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Question	Expected Answers	Marks	Additional Guidance
2 (a) (i)	passive / does not require energy ; substances move down a concentration gradient ; does not have to occur across a membrane ; occurs with gases ; no need for protein, carrier / channels / pumps ;	[max 2]	
(ii)	root hair (cells) ; through carrier molecules / AW ; large / increased, (surface) area (for absorption) ; roots grow continually (to find new sources of ions) ; AVP ; e.g. extensive root network / branching roots ;	[max 2]	
(b) (i)	*two marks for the correct answer – if no answer, an incorrect answer or an answer without the minus sign award one mark for the correct working* 183 – 175 = 8 ; $\frac{8}{183} \times 100 = -4.4$;	[2]	**A** – 4.37
(ii)	start mass of the onions is, different / not all the same ; (idea that) allows for (valid / fair) comparison ; to determine water potential of the onion ;	[max 2]	
(c) (i)	line finished to - 4.4 / **A** ecf from (b)(i) ;	[1]	**R** extrapolation past 200 g dm^{-3}
(ii)	44 ± 1 ; g dm^{-3} ;	[2]	

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Question	Expected Answers		Marks	Additional Guidance
(d)	1 2 3 4 5	movement of water ; by osmosis ; through partially permeable membrane(s) ; *gain* – onion has lower water potential / solution has higher water potential ; *loss* – onion has higher water potential / solution has lower water potential ;	[max 4]	**A** 'down a water potential gradient' if direction is correct and clear **ignore** references to 'concentrations of water'
3 (a)	1 2 3 4	carbon dioxide uptake of **J** is higher (at all temperatures except at 10 °C) ; peak / optimum / maximum / best, uptake of **J** is at a higher temperature **ora** ; data recorded in **J** between 35 – 40 °C / AW (but not for **H**) ; correct use of comparative data between **J** and **H** with correct units ;	[max 3]	**A** peak uptake for **J** is higher than **H** correct units must be stated at least once
(b) (i)	1 2 3 4 5 6	temperature is a limiting factor ; increases, (kinetic / heat) energy / the movement of molecules / diffusion ; more collisions between substrate and enzymes ; to speed up chemical reactions ; stomata open wider ; therefore increased carbon dioxide entering the leaf / AW ;	[max 2]	
(ii)	1 2 3 4	enzymes are denatured ; enzymes are no longer active / AW ; stomata close ; therefore reduced carbon dioxide entering the leaf / AW ;	[max 2]	

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Question	Expected Answers		Marks	Additional Guidance
(c)	**1**	plant growth is likely to increase **;**		'more' need only stated once
	2	higher rate of photosynthesis **;**		
	3	means more glucose / starch, is produced **;**		
	4	glucose is used for respiration to provide energy (for growth) **;**		
	5	more cellulose for cell walls **;**		
	6	more protein for, enzymes / cell membranes **;**		
	7	other limiting factors / CO_2 no longer limiting **;**		
	8	carbon dioxide is a greenhouse gas / reference to (enhanced) greenhouse effect **;**		
	9	increase in global temperatures increases rate of photosynthesis **;**		**A** 'global warming'
	10	reference to effect of temperature on enzymes **;**		
	11	any relevant consequence of global warming **;**		
	12	AVP **;** e.g. relevant use of data	[max 5]	
4 (a) (i)	**1**	removal from the, body / organism / cell **;**		
	2	(of) poisons / toxins / harmful substances **;**		
	3	named example (or) waste products of, metabolism / respiration / deamination / chemical reactions in cells **;**		
	4	substances in excess (of requirements) / AW **;**	[max 3]	
(ii)	carbon dioxide / water (vapour) **;**		[1]	
(iii)	**1**	deamination (of amino acids) **;**		
	2	removal of nitrogen-containing part of amino acids **;**		
	3	to produce urea **;**		
	4	urea / AW, passes into blood **;**		
	5	breakdown of, hormones / toxins / drugs / excess vitamins **;**		
	6	breakdown of, worn out red blood cells **;**		
	7	excretory products put in bile **;** e.g. cholesterol	[max 3]	

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<table>
<tr><th>Question</th><th>Expected Answers</th><th>Marks</th><th>Additional Guidance</th></tr>
<tr><td>(b)</td><td>
<table>
<tr><td>Function</td><td>Name</td><td>letter from Fig.4.1</td></tr>
<tr><td>blood is filtered</td><td>cortex</td><td>K ;</td></tr>
<tr><td>concentration of urine is determined</td><td>medulla</td><td>L</td></tr>
<tr><td>urine flows to the bladder</td><td>ureter</td><td>N ;</td></tr>
<tr><td>blood is carried into the kidney</td><td>renal artery</td><td>P ;</td></tr>
<tr><td>blood flows out of the kidney</td><td>renal vein</td><td>O ;</td></tr>
</table>
</td><td>[4]</td><td>one mark for each correct name and matching letter</td></tr>
<tr><td>(c) (i)</td><td>urea ;
ammonia ;
uric acid ;
creatinine ;
(named) salt / ions ; e.g. Na^+, Cl^-, Mg^{2+}, Ca^{2+}, HCO_3^-
water ;
(named) toxins ;
hormones ;</td><td>[max 2]</td><td>ignore glucose / sugar / urine / amino acids</td></tr>
<tr><td>(ii)</td><td>advantage
1 patients do not need to return to clinic for dialysis / AW ;
2 can eat normally / do not need to eat a restricted diet / AW ;
3 periods of feeling unwell reduced / absent ;

disadvantage
4 need, immunosuppressant / AW, drugs ;
5 risk of death / infection, during / after, the operation ;
6 rejection of kidney ;
7 finding a compatible donor ;
8 AVP ; e.g. water retention</td><td>[max 2]</td><td>one mark for an advantage and one mark for a disadvantage</td></tr>
<tr><td></td><td>Total:</td><td>[15]</td><td></td></tr>
</table>

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Question	Expected Answers	Marks	Additional Guidance
5 (a) (i)	**R** – corpus luteum / yellow body ; **S** – (Graafian) follicle ;	[2]	
(ii)	ovulation ;	[1]	
(b) (i)	(o)estrogen ;	[1]	
(ii)	progesterone ;	[1]	
(c) (i)	**1** flagellum / tail / streamlined ; **2** motile / swim / AW ; **3** smaller / reference to actual sizes ; **4** acrosome / enzymes in packet on head ; **5** no food store ; **6** less cytoplasm ; **7** contains X or Y (chromosome) ; **8** AVP ;	[max 3]	**A** contains Y chromosome
(ii)	haploid ;	[1]	
(iii)	oviduct ;	[1]	**A** fallopian tube
(iv)	**1** (acrosome) enzymes break down, jelly layer / AW ; **2** sperm, head / nucleus, enters egg ; **3** fertilisation membrane forms / no more sperm can enter ; **4** (haploid) nuclei, fuse / join ; **5** (diploid) zygote formed ; **6** mitosis / cell division ; **7** (2 / more – celled) embryo forms ; **8** (hollow) ball of cells / embryo / zygote / fertilised egg, moves down the oviduct ; **9** ciliary movement / peristalsis, in the oviduct ;	[max 4]	

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Question	Expected Answers		Marks	Additional Guidance
(d) (i)	**1** **2** **3** **4**	no / slight, change, at first / AW ; then exponential / AW, increase ; then levels off / peaks (after 1992) ; comparative use of figures with correct units stated at least once ;	[max 2]	
(d) (ii)	**1** **2** **3** **4**	provide (named) fertility drug early in menstrual cycle ; e.g. when follicle(s) are developing / 14 days before AI collect, sperm / semen (from male) ; place, semen / sperm, into uterus / vagina / through cervix ; around the time of ovulation ;	[max 3]	
		Total:	**[19]**	
6 (a) (i)	autotrophic (organism) ; organism that makes its own organic nutrients / food ; (usually) using energy from the Sun / by photosynthesis ;		[2]	
(ii)	**1** **2** **3** **4** **5**	all arrows point from food to feeder ; elephant grass added (at the producer level) ; phytoplankton and elephant grass arrows go to fish ; mulberry trees arrow goes to silkworms ; vegetables and fish arrows go to humans ;	[5]	
(b)	**1** **2** **3** **4** **5**	not all of the plants are edible / some not digested ; faeces / egestion ; eaten by, pests / AW ; dead leaves / AW, to decomposers ; plants lose energy as a result of respiration ; AVP ; e.g. some energy not used for growth	[max 3]	

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Question	Expected Answers		Marks	Additional Guidance
(c)	**1** **2** **3** **4** **5** **6**	(another) source of income **;** provides source of, protein / vitamins **;** feed on waste materials / elephant grass cuttings / phytoplankton (from the dykes) **;** so do not need feed bought in / no waste removal required **;** makes use of large quantities of available (delta) water **;** AVP **;** e.g. constant source of water (for irrigation) / reduced risk of eutrophication / biological control / less need for dredging	[max 3]	
		Total:	**[13]**	

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