CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the May/June 2015 series

0610 BIOLOGY

0610/31 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 should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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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)	**E** **A** **B** **D** **C**	**[max 3]**	all 5 correct = 3 marks 3 / 4 correct = 2 marks 1 / 2 correct = 1 mark
(b)	soft body **;** not segmented **;** mantle **;** visceral mass **;** (muscular) foot **; ignore** feet / legs produce slime / have slimy body **; A** mucus radula / rasping tongue / AW **;** hydrostatic skeleton **;**	**[max 2]**	
		[Total: 5]	
2 (a) (i)	maintain constant temperature / prevent heat from the lamp heating the water / absorbs heat from the lamp / heat shield **;** (thermometer) to measure / check / monitor / record, water **;** prevent temperature (change), influencing / affecting, the results / rate of photosynthesis **;** temperature is a, control(led) / standardised, variable **;**	**[max 2]**	1 mark for 'controlling' 1 mark for 'measuring'
(ii)	maintain constant light intensity **;** (light meter) to measure / check / monitor / record, the light intensity **;**		1 mark for 'controlling' 1 mark for 'measuring'

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Question	Expected Answers	Marks	Additional Guidance
	prevent light intensity (change) influencing / affecting the, results / rate of photosynthesis ; make sure the lamp is always, in the same place / at right distance ; light, intensity / level, is dependent on distance ; light intensity is, a controlled / standardised, variable ;	[max 2]	**A** (ruler) to measure the distance between lamp and plant
(b) (i)	rate / photosynthesis / bubbles: increases as carbon dioxide concentration increases and then, levels off AW ; increases to 0.40 % ; **A** rate remains constant above 0.40% little / slow, increase up to 0.1 % ; **ora** one data quote with CO_2 concentration and rate with units ;	[max 3]	units must be used at least once anywhere in the answer to award marking points that require them **A** bpm for bubbles per minute
(ii)	carbon dioxide / CO_2, concentration / % / level / availability ;	[1]	**R** 'amount of carbon dioxide'
(iii)	ref to <u>limiting factor</u> in suitable context ; carbon dioxide (concentration), is no longer limiting / AW ; light, intensity / level, could be limiting / AW ; reference to light providing <u>energy</u> for photosynthesis ; temperature could be limiting / AW ; reference to temperature influencing the activity of enzymes ;	[max 4]	

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Question	Expected Answers	Marks	Additional Guidance
	chloroplast / chlorophyll / number of leaves / size of plant, could be limiting factor ;		
(c)	measure <u>volume</u> (of oxygen / gas) ; use, inverted test-tube / measuring cylinder / syringe (barrel) ; reference to, graduations / markings ; **A** 'take readings from…' / 'record results…' filled with water ; gas collects at the top and pushes out the water / downward displacement of water; gas syringe ; attached by (delivery) tube to, flask / AW ; oxygen sensor ; data logger for any other suitable electronic method ; reference to equilibration / described ; reference to time period ; **A** rate = volume divided by time	**[max 3]**	
(d) (i)	use / combustion / burning, of fossil fuels ; reason for increased demand for energy ; carbon dioxide from, volcanic activity / volcanoes ;	**[max 2]**	**A** named fossil fuel(s) **A** named example, e.g. increased use of cars / heating / air-conditioning

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Question	Expected Answers	Marks	Additional Guidance
	deforestation ; burning of, forests / trees ;		
(ii)	carbon dioxide is a greenhouse gas ; (enhanced) greenhouse effect (in context of carbon dioxide) ; heat / infra-red / long wavelength radiation, radiated / emitted, from / absorbed / trapped / AW, by, carbon dioxide / greenhouse gases ; travels / AW, back to the surface ; heat cannot, leave (from the atmosphere) / pass into outer space ;	[max 4]	**R** 'ozone causes greenhouse effect' **A** reflected as an alternative to radiated **ignore** UV light / visible light / (solar) radiation
		[Total: 21]	
3 (a)	*either* KMJ ; ON ; *or* KMO ; JN ;	[2]	
(b) (i)	release of an, egg / ovum / oocyte ; *either* from, follicle / ovary ; *or* into, oviduct / fallopian tube ;	[2]	**A** 'follicle and egg'
(ii)	zygote ;	[1]	
(c)	zygote / fertilised egg, divides ; mitosis / cell division ;	[max 5]	**ignore** embryo forming after implantation

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Question	Expected Answers	Marks	Additional Guidance
	forms, an embryo ; **A** blastocyst / blastula (hollow) ball / collection / group / AW, of cells ; goes / moves, down oviduct / down fallopian tube / towards uterus ; detail, e.g. ciliary action / peristalsis / muscle contraction ; implants / AW, into, lining of the uterus / endometrium / wall of uterus ; growth / development, of placenta ; follicle becomes, yellow body / corpus luteum / remains of follicle / AW ; yellow body / corpus luteum / ovary / AW, secretes / releases / produces progesterone ; progesterone maintains, endometrium / lining of uterus / wall of uterus / AW ; progesterone, prevents menstruation ; inhibition of FSH (secretion / release) ; prevents, production of more eggs / production of follicles ;		**A** 'embeds / sinks in' **R** 'zygote implants' **A** any suitable description of yellow body
(d)	corpus luteum / yellow body / ovary ; placenta ;	**[2]**	
(e) (i)	(named) drug, injected / taken, early in menstrual cycle ; inhibits action of oestrogen ;	**[max 3]**	e.g. FSH / clomiphene / clomid

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Question	Expected Answers	Marks	Additional Guidance
	stimulates, production / release, of FSH ; makes sure that FSH concentration is high enough ; to stimulate production / development / maturation of, follicles / eggs / ova / oocytes ; more eggs are released ; LH stimulates, ovulation / release of eggs ;		
(ii)	*idea that* stress is associated with difficulty having children ; stated problem with multiple births ; problems with unused embryos (when used with IVF) ; issues with elderly parent(s) ; religious objections to use of fertility drugs ; any reference to cost of the treatment ; increases populations / any negative effect of population increase ; can be used to increase populations / any positive effect of population increase ; e.g. in countries with falling birth rates	**[max 2]**	**ignore** 'interfering with a natural process'
		[Total: 17]	

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<table>
<tr><th>Question</th><th>Expected Answers</th><th>Marks</th><th>Additional Guidance</th></tr>
<tr><td>4 (a)</td><td>
<table>
<tr><td>function</td><td>letter from Fig. 4.1</td><td>name</td></tr>
<tr><td>resists the turgor pressure of the cell</td><td>A</td><td>cell wall ;</td></tr>
<tr><td>controls the activities of the cell</td><td>C</td><td>nucleus ;</td></tr>
<tr><td>site of the chemical reactions of the cell including synthesis of proteins</td><td>D</td><td>cytoplasm ;</td></tr>
</table>
</td><td>[3]</td><td>D – ignore ribosome / mitochondria</td></tr>
<tr><td>(b) (i)</td><td>cytoplasm / vacuole, decreases in, size / volume ;

(some) cell membrane / cytoplasm, pulls away / AW, from cell wall ;

<u>plasmolysis</u> / cells are <u>plasmolysed</u> ;

cells, are flaccid / not turgid / lose turgor ;

cell walls no longer, pushed outward / withstand pressure ;</td><td>[max 3]</td><td>A ‘cell shrinks’
ignore implodes / shrivels up</td></tr>
<tr><td>(ii)</td><td>salt solution has a lower <u>water potential</u> than the cell ; ora

water moves out of the cells, by <u>osmosis</u> ;

down a water potential gradient / from a high(er) water potential to a low(er) water potential ;

through a partially permeable membrane ;</td><td>[max 3]</td><td>ignore ‘water concentration’</td></tr>
</table>

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<table>
<tr><th>Question</th><th>Expected Answers</th><th>Marks</th><th>Additional Guidance</th></tr>
<tr><td></td><td></td><td>[Total: 9]</td><td></td></tr>
<tr><td>5 (a)</td><td>idea that
blood travels through the heart twice during one complete circuit (of the body) ;
or
pulmonary circulation / to the lungs and systemic circulation / described ;</td><td>[1]</td><td>A ‘one cycle / one full circulation’</td></tr>
<tr><td>(b)</td><td>
<table>
<tr><td rowspan="2">organ</td><td colspan="2">blood vessel</td></tr>
<tr><td>delivers blood</td><td>takes blood away</td></tr>
<tr><td>heart</td><td>1 vena cava / coronary artery ;
2 pulmonary vein</td><td>1 aorta
2 pulmonary artery ;</td></tr>
<tr><td>lungs</td><td>pulmonary artery</td><td>pulmonary vein ;</td></tr>
<tr><td>liver</td><td>1 hepatic artery
2 hepatic portal vein ;</td><td>hepatic vein</td></tr>
<tr><td>kidney</td><td>renal artery</td><td>renal vein</td></tr>
</table>
</td><td>[5]</td><td></td></tr>
<tr><td>(c) (i)</td><td>high pressure would, burst / damage, capillaries / AW ;
capillaries / capillary walls, are, thin / fragile / weak / delicate / narrow ;
wall / lining, (of capillary) is one <u>cell</u> thick ;</td><td>[max 2]</td><td>A ‘capillaries cannot withstand pressure’
R thin / thick, ‘cell wall’</td></tr>
</table>

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Question	Expected Answers	Marks	Additional Guidance
(ii)	contraction of muscles (in the legs) / movement of legs ; pushing / squeezing, blood ; (semi-lunar) valves, ensure blood flows towards heart / prevents backflow ; negative pressure in the, chest / thorax / right atrium / atria / heart ; *idea of* residual pressure from the heart ;	[max 3]	**R** 'muscles in the, veins / wall of veins' **A** 'one way flow'
5 (d)	thick wall ; withstands / AW, (blood) pressure ; muscular (tissue) ; (vaso)constriction / (vaso)dilation / resisting rupture / withstands pressure ; elastic (tissue) ; stretches to allow blood surge / AW *or* recoils to maintain (blood) pressure / smooths out blood flow ; folded / crinkly, endothelium / lining ; allows artery to stretch / allow larger volume of blood to flow / AW ; small lumen ; maintains (blood) pressure ; fibrous (tissue) ;	[max 3]	**R** 'thick cell wall' **A** resist rupture **R** increase

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Question	Expected Answers	Marks	Additional Guidance
	maintains shape / prevents bursting ;		
		[Total: 14]	
6 (a) (i)	willow (tree) and / or aquatic plants → moose → wolf arrows point from food to feeder ; organisms are in the correct order in the food chain ;	**[2]**	**ignore** the Sun at the start of the food chain
(ii)	*the three organisms can be in any order in the table* willow tree / aquatic plants / shoots / plants – producer / 1st / 1 ; moose – primary consumer / 2nd / 2 ; wolf – secondary consumer / 3rd / 3 ;	**[3]**	**ignore** autotroph **ignore** herbivore **ignore** carnivore / top consumer
(iii)	competition ; food supply / food for moose / food for wolves ; water ; shelter / 'nest' sites / space / territory ; mates ; competition with other types of predators ; disease / parasites ; hunting / poaching ; pollution ; rate of reproduction ; habitat, loss / destruction ; AVP ;	**[max 2]**	**A** intraspecific competition **A** numbers of other competitors **A** interspecific competition **R** predation / new predator

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Question	Expected Answers			Marks	Additional Guidance
6 (b) (i)	*two marks for the correct answer* *if no answer or incorrect answer, one mark for correct working*				
	answer for two marks	1.3 **;; A** 1.30	1.4 **;; A** 1.42		
	working for one mark	*either* $\frac{56\,000}{4\,320\,000}$ (x 100) *or* **A** 1.296 / 1.2963, etc. **ignore** 1.29	*either* 4 320 000 – 380 000 = 3 940 000 *or* = $\frac{56\,000}{3\,940\,000}$ (x100) *or* **A** 1.421 / 1.4213, etc.	**[2]**	

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6 (b) (ii)	*this question can be answered in terms of energy flow (left column) or predator-prey relationships (right column)* energy is lost, between / within, trophic levels / along food chain ; **A** from moose to wolf energy lost, in respiration / as heat / in metabolism ; use of figure with units from Table 6.2 to illustrate / 1.3% / 1.4% ; **A** ecf from (b)(i) energy used in maintaining body temperature ; moose / wolf, is an, endotherm / homeotherm ; energy lost in movement ; energy used in muscle contraction ; energy in food, not eaten / egested / passed out in faeces ; energy lost in, excretion / urine ; wolves not very successful at catching prey ; more energy available for moose (than for wolf) ; no other source of food for wolves but, moose ; AVP ; e.g. some / AW, energy is not used for growth	low numbers of wolves ; **A** wolves die little predation ; more moose, reach reproductive age / have offspring ; numbers of moose increase ; more food for wolves ; more wolves, reach reproductive age / have offspring ; numbers of wolves increases ; more predation ; greater competition between wolves ; *idea that* wolf population reaches carrying capacity / reaches maximum for resources available ; **A** not enough energy available for more than 50 wolves **[max 5]**	
		[Total: 14]	

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