GradeMax

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

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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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Question	Expected Answers	Marks	Additional Guidance
4 (a)	<table><tr><th>function</th><th>letter from Fig. 4.1</th><th>name</th></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>	[3]	**D** – **ignore** ribosome / mitochondria
(b) (i)	cytoplasm / vacuole, decreases in, size / volume ; (some) cell membrane / cytoplasm, pulls away / AW, from cell wall ; plasmolysis / cells are plasmolysed ; cells, are flaccid / not turgid / lose turgor ; cell walls no longer, pushed outward / withstand pressure ;	[max 3]	**A** 'cell shrinks' **ignore** implodes / shrivels up
(ii)	salt solution has a lower water potential than the cell ; **ora** water moves out of the cells, by osmosis ; down a water potential gradient / from a high(er) water potential to a low(er) water potential ; through a partially permeable membrane ;	[max 3]	**ignore** 'water concentration'

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<table>
<tr><th colspan="2">Question</th><th>Expected Answers</th><th>Marks</th><th>Additional Guidance</th></tr>
<tr><td colspan="2"></td><td></td><td>[Total: 9]</td><td></td></tr>
<tr><td>5</td><td>(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></td><td>(b)</td><td>
<table>
<tr><th rowspan="2">organ</th><th colspan="2">blood vessel</th></tr>
<tr><th>delivers blood</th><th>takes blood away</th></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)</td><td>(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 ;		**R** 'muscles in the, veins / wall of veins'
	pushing / squeezing, blood ;		**A** 'one way flow'
	(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]**	
5 (d)	thick wall ;		**R** 'thick cell wall'
	withstands / AW, (blood) pressure ;		**A** resist rupture
	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 ;		**R** increase
	fibrous (tissue) ;	**[max 3]**	

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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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