CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the May/June 2015 series

0610 BIOLOGY

0610/32 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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<table>
<tr><th>Question</th><th>Expected Answers</th><th>Marks</th><th>Additional Guidance</th></tr>
<tr><td>1 (a)</td><td>
<table>
<tr><td>Triticum aestivum</td><td>D</td></tr>
<tr><td>Solanum tuberosum</td><td>G</td></tr>
<tr><td>Glycine max</td><td>C</td></tr>
<tr><td>Manihot esculenta</td><td>F</td></tr>
<tr><td>Ipomoea batatas</td><td>B</td></tr>
<tr><td>Zea mays</td><td>A</td></tr>
<tr><td>Oryza sativa</td><td>E</td></tr>
</table>
</td><td>max [3]</td><td>5 / 6 right = 3
3 / 4 right = 2
1 / 2 right = 1
0 right = 0</td></tr>
<tr><td>(b)</td><td>
<table>
<tr><td></td><td>general features:</td><td>monocotyledon features:</td></tr>
<tr><td>1</td><td>leaf, width / shape ;</td><td>narrow leaves ;</td></tr>
<tr><td>2</td><td>leaf connection to stem / AW ;</td><td>sheath / no petiole ;</td></tr>
<tr><td>3</td><td>number of (named) flower parts ;</td><td>flower parts in multiples of 3 ;</td></tr>
<tr><td>4</td><td>number of, cotyledons / seed</td><td>one cotyledon / seed leaf ;</td></tr>
<tr><td>5</td><td>leaves ;</td><td>fibrous roots ;</td></tr>
<tr><td>6</td><td>type of root ;</td><td>scattered vascular bundles ;</td></tr>
<tr><td>7</td><td>pattern of vascular bundles ;</td><td>no, cambium / woody tissue ;</td></tr>
<tr><td>8</td><td>presence/absence of cambium / AW ;</td><td></td></tr>
</table>
</td><td>max [1]</td><td>Mark answers in context of either general features (first column) or referring to monocotyledonous plants (second column)</td></tr>
</table>

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Question		Expected Answers	Marks	Additional Guidance
(c) (i)	**1** **2** **3** **4** **5** **6** **7**	increase in (soil) water / flooding / waterlogging **;** decrease in (soil) water / desertification **;** soil erosion **;** loss of, habitat / places where organisms live **;** disruption to food chain **;** endangered / extinction, of species or loss of biodiversity **;** AVP **;** e.g. example of named soil organism in context of a function of a soil ecosystem	max [4]	**A** landslides / reduced soil volume loss of nutrients / reduced nutrient cycling
(ii)	**1** **2** **3** **4** **5** **6** **7** **8**	collecting / sorting (of paper) **;** shredding / AW **;** adding water to make, pulp / paste **;** cleaned / de-inked / AW **;** bleached **;** rinsed **;** pressed / rolled / flattened / dried, into sheets **;** any named product made from recycled paper **;** e.g. low quality paper / toilet paper / newspaper	max [3]	
			[Total:11]	

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Question		Expected Answers	Marks	Additional Guidance
2	(a)	(6) CO_2 + (6) H_2O ; $C_6H_{12}O_6$ + (6) O_2 ; balancing ;	[3]	**ignore** word equations
	(b)	acts as heat filter / absorbs heat from lamp / reduces heat effect of the lamp / AW ; maintain constant temperature / make sure temperature is not another variable ;	max [1]	**A** 'improves validity'
	(c)	*colour prediction:* purple *explanation* **1** CO_2 is an acidic gas / forms carbonic acid ; **2** CO_2 been used up / taken in / absorbed (by the algae) ; **3** by photosynthesis ; **4** which causes pH increase / more alkaline / less acidic ; **5** more photosynthesis than respiration ;	max [3]	*no mark for prediction alone*

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Question		Expected Answers	Marks	Additional Guidance
(d)	1	as distance increases / light intensity decreases, time taken for colour change increase / photosynthetic rate decreases **;** **ora**	max [5]	
	2	rate of change slows, at low light intensity / furthest from lamp **;**		
	3	no change in rate, at high light intensity / close to lamp **;**		
	4	credit appropriate use of comparative figures with units stated at least once **;**		
	5	as distance (from lamp) increases, light intensity decreases **;** **ora**		
	6	light (intensity) is limiting (factor for photosynthesis) **;**		
	7	at high light (intensity), another factor could be limiting photosynthesis **;**		
	8	light provides energy (for photosynthesis) **;**		
	9	light is absorbed / trapped by, chlorophyll / chloroplast **;**		
			[Total:12]	
3 (a)		transports, oxygen / gases **;**	[1]	
(b) (i)	1	controls activities in the cell / AW **;**	max [1]	
	2	contains, chromosomes / genes / alleles / genetic information / DNA **;**		
	3	controls how cells, develop / divide / reproduce / grow **;**		
(ii)		more space for haemoglobin **;** to enable greater oxygen carrying capacity / AW **;** more flexible shape (to move through capillaries) **;**	max [1]	

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Question		Expected Answers	Marks	Additional Guidance
(c) (i)		*0.15 mol dm^{-3}* (red blood cells) are normal shape / biconcave ; *0.20 mol dm^{-3}* (red blood cells) have shrunk / crenation / AW ;	max [2]	
(ii)	**1** **2** **3** **4**	osmosis ; (diffusion / osmosis) of water molecules into cells ; down a water <u>potential</u> gradient / from high water <u>potential</u> (of solution) to low water potential (in cells) ; across partially permeable membrane ;	max [3]	
(iii)		cell wall (offers resistance) ; water potential (of plant cells) could be equal / higher / less negative (than 0.1 M solution) (so no net osmosis) ;	max [1]	
(d) (i)		0.15 mol dm^{-3} ; no net movement of water / (red blood) cells will remain normal shape / AW ;	[2]	units must be included **A (**red blood) cells won't be damaged / isotonic (with solution)
(ii)	**1** **2** **3** **4** **5** **6**	ref to platelets ; fibrinogen converted to fibrin ; soluble to insoluble / fibrin is insoluble ; thrombin / enzyme in context ; mesh / network / web, to trap blood (cells) ; AVP ; e.g. reference to prothrombin or involvement of calcium ions	max [3]	
			[Total: 14]	

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Question		Expected Answers	Marks	Additional Guidance
4 (a) (i)		bronchus / bronchiole(s) ;	[1]	
(ii)	1 2 3 4	goblet cells, release / produce, mucus ; mucus traps, dirt / particles / pathogens ; cilia, beat / AW ; to move, fluid / AW, up / out (of airway) ;	max [3]	**R** 'cilia trap dirt'
(b) (i)	1 2 3 4	diffusion ; across (cell / permeable) membranes ; high concentration to low concentration (of O_2) / down concentration gradient ; moist lining / AW / O_2 is dissolved ;	max [3]	
(b) (ii)	1 2 3 4 5 6 7 8	external intercostal muscles contract ; internal intercostal muscles relax ; lifts ribs, upwards / outwards ; diaphragm contracts ; diaphragm, flattens / drops ; volume of, thorax / lungs / chest, increases ; pressure in, thorax / lungs / chest, decreases ; air flows in down a pressure gradient ;	max [4]	**A** ribcage expands
(iii)		carbon dioxide ; water vapour ;	max [1]	

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Question	Expected Answers		Marks	Additional Guidance
(c)	**1** **2** **3** **4** **5** **6** **7** **8** **9** **10** **11**	tar / carcinogens ; carcinogenic / can cause, lung cancer ; sticks to / blocks / damages, (named) air passages / alveoli / cilia ; (trigger) production of, more / excess, mucus ; (smoke) particles ; trigger white blood cells ; irritant / causes asthma / prone to infection ; phagocytosis described ; carbon monoxide ; combines with haemoglobin (permanently) ; reduced oxygen transport (of blood) ;	max [4]	*component must be linked to correct effect*
			[Total: 16]	

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<table>
<tr><th>Question</th><th>Expected Answers</th><th>Marks</th><th>Additional Guidance</th></tr>
<tr><td>5 (a) (i)</td><td>
<table>
<tr><td>Y</td><td>W</td><td>V</td><td>T</td><td>S</td><td>X</td><td>U</td></tr>
</table>
</td><td>[2]</td><td>2 wrong = 1 mark
more than 2 wrong = no marks</td></tr>
<tr><td>(ii)</td><td>
<table>
<tr><th>letter from Fig. 5.2</th><th>name</th><th>function during pregnancy</th></tr>
<tr><td>P</td><td>amniotic sac</td><td>encloses the amniotic fluid</td></tr>
<tr><td>Q</td><td>umbilical cord ;</td><td>attaches the placenta to the fetus</td></tr>
<tr><td>N</td><td>amniotic fluid</td><td>protection / maintains temperature / allows fetus to move / AW ;</td></tr>
<tr><td>M</td><td>uterus (wall) ;</td><td>contracts to push the baby through the birth canal</td></tr>
<tr><td>R</td><td>placenta</td><td>immune protection / exchange of (named) nutrients or wastes or gases / secretes hormone to maintain lining / separates blood of mother and fetus ;</td></tr>
<tr><td>O</td><td>cervix ;
A vagina / birth canal</td><td>widens during labour to allow the head of the baby to pass</td></tr>
</table>
</td><td>[5]</td><td>each correct row = 1 mark</td></tr>
<tr><td>(b)</td><td>difference:
protein ;

similarity:
lipid ;
energy content ;
lactose ;</td><td>max [2]</td><td>1 mark for difference and 1 mark for similarity</td></tr>
</table>

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Question	Expected Answers		Marks	Additional Guidance
(c) (i)	**1** **2** **3** **4**	increase in, size / length / mass / volume / AW **;** increase in dry mass **;** increase in cell number **;** ref to permanent **;**	max [2]	**A** reference to cell division / mitosis / reproduction of cells or tissues **ignore** development
(ii)	**1** **2** **3** **4** **5** **6**	lower mass / slower growth, of breast-fed babies **; ora** both (babies) show same increasing trend **;** appropriate use of comparative data from table or figure with units stated at least once **;** because less protein / less energy (in breast-fed milk) **; ora** (protein / energy) is required for growth **; ora** lower volume of milk drunk (by breast fed babies) **; ora**	max [4]	

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Question		Expected Answers	Marks	Additional Guidance
(iii)		*advantages:*		
	1	provides, best / complete / most suitable / AW, food **;**		*maximum 3 marks for advantages*
	2	easy to digest / less risk of colic **;**		
	3	no additives / less risk of allergies / child less likely to develop diabetes **;**		
	4	contains antibodies / reference to colostrum / provides passive immunity / provides protection against, pathogens / diseases / microorganisms **;**		
	5	sterile / less risk of infection **;**		
	6	is at, body / correct, temperature **;**		
	7	no preparation / always available **;**		
	8	bonding with mother **;**		
	9	it's free / 'cheap' **;**		
		disadvantages:		*maximum 3 marks for disadvantages*
	11	time consuming **;**		
	12			
	13	transfer of, viruses / HIV / hepatitis B **;**		
	14	painful / sore nipples / mastitis **;**		
	15	stressful / may be embarrassing / AW **;**		
	16	mother may not be able to produce enough milk **;**		
	17	cannot see how much baby has consumed **;**		
	18	task cannot be shared with other parent **;** medications / drugs / alcohol, can pass to baby **;**	max [4]	
			[Total: 19]	

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Question		Expected Answers	Marks	Additional Guidance
6 (a)		log / exponential (phase) ;	[1]	
(b)	1 2 3 4 5	decomposition of waste ; by bacteria / microorganisms ; reduces oxygen available ; eutrophication / algal bloom ; results in death of (aquatic) plants and animals ;	max [3]	**ignore** pollution / contamination unqualified
(c)		secondary consumer / third trophic level ;	[1]	
(d)	1 2 3 4 5 6 7 8	seaweed at a lower trophic level (than salmon) ; **ora** energy is lost, between / within, trophic levels / along food chain ; reference to 10% energy transfer / **ora** ; (energy lost in) respiration / heat / (named) metabolic process ; (energy lost in) movement / muscle contraction ; reference to (more) material that is, inedible / not digestible (in longer food chains) ; (energy lost in) excretion / urine ; *idea that* less fuel required to farm seaweed / AW ;	max [3]	**A** seaweed are producers / first trophic level
			[Total: 8]	

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