CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2014 series

0610 BIOLOGY

0610/33 Paper 33 (Extended), maximum raw mark 80

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	Answer		Marks	Guidance for Examiners
1 (a)	DNA / genome is the same / similar ; genes are same ; AVP ; e.g. ref to DNA bases / sequence, same / similar		[max 2]	
(b) (i)	**1** **2** **3** **4** **5** **6** **7** **8** **9**	mitosis ; no fertilisation ; budding off (of spores) / fragmentation ; vertical hyphae ; production of spores ; sporangium bursts / opens / releases ; ref to number of nuclei per spore ; method of spore dispersal i.e. air / water / wind ; AVP ; e.g. DNA replication	[max 3]	
(ii)	(named) favourable characteristics of parent passed on ; dense colonies outcompete other species ; rapid ; less, energy / resources used ; no gametes ; *idea of* only one parent required ;		[max 3]	
			[Total: 8]	

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2 (a)	NO_x / nitrogen dioxide / nitrous oxide / NO_2 / NO_3 ; carbon dioxide ;		**[max 1]**	
(b)	**1** kills / damages (named) plants ; **2** (acidic) soil leaching AW ; **3** released (named) metals ; e.g. aluminium **4** nutrients in soil no longer available to plants ; **5** prevents decomposition ; **6** dissolves limestone / marble / sandstone AW ; **7** acidification of lakes ; **8** (fresh water) fish / invertebrates die ;		**[max 3]**	
(c)	**1** scrubbers / flue gas desulfurisation, in power stations / chimneys / neutralise waste gases with lime ; **2** desulfurisation of coal / oil ; **3** use less fossil fuels ; **4** use low sulfur, fuel / petrol / diesel ; **5** use alternative / renewable / sustainable / green sources of energy ; **6** A gas-to-liquid (methane to petrol / diesel) catalytic **7** converters / use electric cars ; **8** any one method to reduce demand for energy ; idea of international treaty for reducing emissions ;		**[max 3]**	
2 (d) (i)	sharp decrease in both, until 1997 ; more gradual decrease in both, since 1997 ; both follow same trend ; comparative use of data ;		**[max 3]**	
(ii)	fresh mass changes with water content ; dry mass is less variable / more consistent, for comparison ; dry mass is a measure of growth ; *idea that* percentage standardises changes in tissue concentration for comparison ;		**[max 2]**	
			[Total: 12]	

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3 (a)	(the ability to) detect / sense, changes in the environment / stimuli ; to respond / react (to those changes) ;		[2]	
(b)	(voluntary action) involves (brain in) decision making / conscious ; (voluntary action) is slower ; (voluntary action) not reflex / automatic ; (voluntary action) can be learned ; (voluntary action) can give different responses to same stimulus ;		[max 2]	
(c)	sensory (neurone) ;		[1]	
(d)	1st swimmer(s) slower (than rest) ; appropriate use of data, swimmer 1 v. 2 / 3 / 4 ; (mean) reaction times for swimmers 2 – 4 similar ; AVP ; swimmer 3 team 2 is an anomaly / outlier		[max 3]	
(e)	**1** heart rate / pulse increase ; **2** increase in breathing rate / depth ; **3** heighten alertness / faster reaction time / AW ; **4** vasodilation in muscle ; **5** vasoconstriction in digestive system ; **6** diverts blood to muscles / away from digestive system ; **7** (leads to) glycogen to glucose (in liver) ; **8** increased blood glucose (concentration) ; **9** airways expand / increased ventilation ; **10** more respiration for more energy for muscle contraction ; **11** enables faster swimming / enhanced physical performance ;		[max 3]	

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4	(a) (i)	pollen / male gamete ;	[1]	**R** gamete unqualified
	(ii)	chromosome number halved / becomes haploid ; genetic / DNA variation ; new combinations of alleles ; fertilisation restores diploid number in zygote / ensures number of chromosome remains constant in next generation ;	[max 2]	
	(b) (i)	pollen from anther to stigma ; between different plants of same species ;	[2]	
	(ii)	large petals ; pattern / guide lines on petals ;	[max 1]	
	(c) (i)	temperature / warmth ; light ; water availability ; wind ; pollinator life-cycle timings ; CO_2 concentration ; pressure ;	[max 1]	
	(ii)	influence by genes and environment ; range of phenotypes / flowering times results ; (flowering time) is measurable ;	[max 2]	

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(d)	1 2 3 4 5 6 7 8 9 10	different environments have different selection / competition pressures ; variation occurs (at fertilization / meiosis) ; ref to mutation ; best adapted organisms most likely to survive ; (those that survive) pass on their alleles / genes ; competition for survival ; cross pollination ensures more variation (than self-pollination) ; reproductive isolation (by different flowering times) ; changes enhanced over generations ; no cross-pollination between low and high altitude plants ;	**[max 5]**	**A** Survive and reproduce *Idea of* best adapted
			[Total:14]	
5 (a)	**E** – cortex ; **F** – medulla ; **G** – ureter ;		**[3]**	
(b)	1 2 3 4 5 6	(ultra)filtration ; high blood pressure assists filtrate to pass through glomerulus / capsule ; proteins / blood cells, too big to move out of capsule / glomerulus ; filtrate / named example, small enough to move through ; filtrate consists of water and dissolved salts / ions / named ion / glucose / urea ; ref to capillaries ;	**[max 3]**	
(c)	movement of (ions / large molecules) through the cell membrane ; (ions/large molecules) against a concentration gradient ; using energy (from respiration) ; use of protein / carrier in membranes ;		**[max 2]**	**R** along the concentration gradient
(d)	water ; salt(s) / ions / minerals / named ion ;		**[max 1]**	

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(e) (i)

Substance	Blood before dialysis	Concentration in **used** dialysis fluid	Concentration in fresh dialysis fluid
glucose	normal	same	same ;
salt	high	high	low ;
urea	high	high	none ;
toxins	high	high	low

[max 3]

(ii)

1 dialysis membrane is partially permeable ;
2 minerals / salts / ions / urea, move by diffusion ;
3 from high concentration to low concentration / down a concentration gradient ;
4 water, moves by osmosis ;
5 (osmosis is the movement of water) from high water potential to low water potential across membrane ;
6 proteins / blood cells too large to move across membrane ;
7 glucose is not removed by dialysate (same concentration) ;
8 fresh dialysate maintains a concentration gradient ;

[max 4]

(f)

fewer diet / fluid intake restrictions ;
no need for regular visits to hospital ;
less unwell / tired / nausea / headaches / less pain (after surgery) ;
no needles / no fistula, permanently in arm ;

[max 3]

(g)

avoid rejection ;
stop immune system attacking new kidney ;

[max 1]

[Total: 20]

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6 (a)

	part of cycle	carbon compound found in each part
P	atmosphere / air	carbon dioxide / CO_2 ; **R** carbon monoxide
Q	(named) plant(s) / flora / producers	glucose / $C_6H_{12}O_6$ / starch / cellulose / any organic compound found in plants ; **R** glycogen
R	(named) animal(s) / fauna / consumers	glucose / maltose / glycogen / fats / fatty acid / glycerol / amino acid / protein / nucleic acid ; **R** starch
S	(named) decomposer(s) / saprophytes	glucose / glycogen / fats / fatty acid / glycerol / amino acid / protein / nucleic acid ;
T	fossil fuels, e.g. natural gas	Methane

[max 4]

(b)

1 CO_2 enters leaf ;
2 CO_2 diffuses to (cells) ;
3 carbon dioxide and water / $CO_2 + H_2O$;
4 chlorophyll / chloroplasts, traps light energy ;
5 light energy is used to make glucose / carbohydrates ;
6 oxygen is present ;
7 $6CO_2 + 6H_2O \rightarrow C_6H_{12}O_6 + 6O_2$;

[max 5]

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(c)	**1** **2** **3**	***factor:–*** light intensity **or** duration / carbon dioxide concentration / temperature **;** ***effect of factor:–*** less photosynthesis, due to low light / low CO_2 / non optimum temperature **;** ***explanation:–*** light provides energy / CO_2 substrate for photosynthesis / temperature effects enzyme activity **;** ref to limiting (factor) **;**	**[max 3]**	
(d)		***carbon dioxide (enrichment)* –** burning / CO_2 gas cylinder **;** ***light (intensity)* –** supplemental / artificial lighting / shading **;** ***temperature* –** heating / cooling / ventilation / spray water **;** ***water* –** irrigation / watering / hydroponics described **;** ***pests / disease* –** (named) pesticides / biological control of pests **;** ***minerals (named)* –** hydroponics / added to water supply / soil **;** ***humidity* –** limiting ventilation / watering / humidifier or de-humidifier **;** ***pollination* –**adding insect (named) pollinators **;**	**[max 3]**	Mark is for the mechanisms of control in each case
			[Total: 15]	

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