CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2012 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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Question		Expected Answers		Marks	Additional Guidance
1	(a)	segmented body / segmentation ; jointed, limbs / legs ; exoskeleton / outer skeleton ;		3	
	(b)	*5 / 6 RIGHT = 4* *4 RIGHT = 3* *3 RIGHT = 2* *1 / 2 RIGHT =1* *0 RIGHT = 0*	*Abaliella dicranotarsalis* – **E** go to 2 go to 3 go to 4 *Tegenaria domestica* – **A** *Odielus spinosus* – **G** *Chelifer tuberculatus* – **D** go to 5 *Poecilotheria regalis* – **F** go to 6 *Tyroglyphus longior* – **C** *Ixodes hexagonus* – **B**	4	
				[Total: 7]	

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Question		Expected Answers	Marks	Additional Guidance
2	(a)	(has been through) <u>capillaries</u> (in organs/named organ(s)) ; (has been through) an organ / named organ (beforehand) ; lost oxygen to, (named respiring) tissues / (named) organs / cells / AW ;	2	
	(b)	oesophagus ; stomach ; gall bladder ; duodenum ; ileum ; pancreas ; colon / large intestine / rectum ;	4	***Accept*** small intestine as alternative to duodenum and ileum
	(c)	glucose, amino acids ; (named) vitamin(s) / (named) mineral(s) ; in solution / soluble / in the plasma ; transported from, small intestine / duodenum / ileum site of absorption ; to liver ;	max 3	
	(d)	*to max 4* (when a) high glucose concentration , glucose converted to <u>glycogen</u> ; low glucose concentration , <u>glycogen</u> converted to glucose ; ref to correct role of, insulin / glucagon ; makes plasma proteins ; excess amino acids , deaminated / described ; *to max 3* alcohol, broken down / respired / metabolised ; named toxin, broken down ; **R** toxin unqualified	max 5	

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	(e)		*phagocytes to max 3*		
		1	ingest / engulf , bacteria / pathogens / viruses **; R** 'eat'		
		2	digest / destroy (bacteria / pathogens / viruses) **;**		
		3	using enzymes **;**		
		4	any further detail **;**		
			lymphocytes to max 3		
		5	make / produce / secrete / release, antibodies **;**		
		6	*idea of* specificity / lymphocytes respond to particular pathogen *or* antigen **;**		
		7	effect of antibodies described**;**		
		8	AVP **;**	max 4	AVP for either cell type, could be additional point about antibodies
				[Total: 18]	

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Question		Expected Answers	Marks	Additional Guidance
3	(a)	lowered / flattened / AW ; increases / AW ; decreases / AW ; higher / greater / more ; into / inside; alveoli ;	6	
	(b)	(**A** / goblet cell) secretes / produces, mucus ; sticky ; collects / traps, particles (in the air) ; cilia, move / beat / waft; mucus moves / removes, away from alveoli / out of trachea / towards larynx / towards mouth / AW ;	max 4	 ***ignore*** hairs direction needed
			[Total: 10]	

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Question			Expected Answers	Marks	Additional Guidance
4	(a)		$CO_2 + H_2O$; → $C_6H_{12}O_6 + O_2$; $6O_2, 6CO_2, 6H_2O$;	3	marks for: correct formulae for carbon dioxide and water correct formulae for glucose and oxygen balancing the equation **ignore** word equation
	(b)		4.98 ;	1	
	(c)	(i)	constant light <u>intensity</u> / ora; *idea that* light intensity is not the factor that is varied / not the independent variable / only carbon dioxide is varied / it is a control(led) variable ;	2	**accept**: if changed, would change rate of photosynthesis itself / AW **R** simply 'makes results invalid'
		(ii)	gas / oxygen / air, collects at top of syringe / from plant or photosynthesis ; creates pressure to **force** water down the tube ;	2	**R** CO_2 **A** push
	(d)		concentration of (sodium) hydrogen carbonate / mol per dm^3 + rate of photosynthesis (1000 / t) ; point plotted correctly ; line of best fit ;	3	**A** ecf from **(b)**

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	(e)	rate of photosynthesis increases as concentration of carbon dioxide increases (up to 0.07 mol per dm^3); **;** data quote **;** carbon dioxide (concentration) is limiting factor **;** <u>after 0.07 mol per dm^3</u> :- rate of photosynthesis remains (near) constant ; data quote **;** carbon dioxide (concentration) is **not** the limiting factor **;** light intensity / temperature, is limiting factor **;**	max 5	**A** increases very little
			[Total: 16]	

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Question					Expected Answers	Marks	Additional Guidance
5	(a)				carbon dioxide CO_2 ; rice fields / cattle / land fill / rotting rubbish / oil extraction / coal mines / gas fracking sites / AW ;	2	
	(b)				(named) greenhouse gases ; trap / absorb, heat / (infra red / IR) radiation ; radiated back towards the Earth's surface / heat kept near surface / prevents heat escaping (to space) / AW ; ref to long wavelength cannot 'escape' Earth's atmosphere / AW ;	max 3	**R** UV radiation
	(c)	(i)	**1**		increases until 1975 ;		
			2		decreases from 1980 ;		**Accept** reaches a peak in 1975-1980
			3		to levels in 1930s / less than 1940;		
			4		*idea that* slow rate of increase to 1940 ;		
			5		faster rate of increase from 1945 ;		
			6		decrease between 1940–1945 ;		
			7		comparative data quotes ;	max 4	year and emission must be given for each point, units mentioned once
		(ii)	**1**		lowers pH of, soil / water;		**A** acidifies lakes
			2		kills / damages, leaves / plants / trees ;		
			3		salts / minerals / ions, lost from soils ;		
			4		toxic to / kills, fish / animals in waters / lakes / rivers ;		
			5		damages, limestone buildings / bronze statues ;	max 3	**A** marble, gravestones, etc.

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		(iii)	use, alternative / renewable / green / AW , sources of energy **;** **A** example(s) use low sulfur fuels / ORA**;** reduce use of coal **;** flue gas desulfurisation / 'use scrubbers' / chimney electrostatic precipitators / neutralise waste gases with lime **;** catalytic converters **;** (named) international treaty for reducing emissions **;** AVP **;** e.g. any method to reduce demand for energy	max 3	car sharing / more public transport / cycle paths / AW
				[Total: 15]	

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Question		Expected Answers	Marks	Additional Guidance
6	(a)	self-pollination, occurs within same flower / between flowers of same plant **;** cross-pollination, occurs between flowers on different plants **;**	2	
	(b)	wastage of pollen **;** wastage of energy **;** explanation **;** depends on presence of pollinator **;** need a pollinating / other, plant (nearby) **;** long time for next generation to develop **;** seeds scattered to places where they cannot grow **;** variation leads to plants that are not adapted to place where parents grow / seeds end up **;**	max 4	**A** idea of pollen does not reach a stigma
	(c)	*round* **RR** *wrinkled* **rr** **;**	1	

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(d)

	cross	phenotype of seeds in the seed pods: round seeds	phenotype of seeds in the seed pods: wrinkled seeds	ratio of round to wrinkled seeds
1	pure bred for round seeds x pure bred for wrinkled seeds	✓	✗	1:0
2	offspring of cross 1 self pollinated	✓	✓	**3:1 ;**
3	offspring of cross 1 x pure bred for round seeds	✓	✗	**1:0 ;**
4	offspring of cross 1 x pure bred for wrinkled seeds	✓	✓	**1:1 ;**

3

(e) controlled by (a) gene alone **;**
limited number / two, (pheno)types **;**
no intermediates **;**

max 1

A (just) two types / round & wrinkled

(f) **1** colonisation / spread to new areas **;**
2 where might be able to grow better **;**
3 better (named) condition(s) **;**
4 less competition **;**
5 less (chance of) disease **;**
6 *idea that* allows breeding with wider variety of plants**;**
7 AVP **;**

max 3

light / water / minerals / CO_2 / space

e.g. bigger gene pool / more alleles / AW

e.g. Some survive a localized disaster / AW

[Total: 14]

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