CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2014 series

0610 BIOLOGY

0610/23 Paper 2 (Core 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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	Answer	Marks	Guidance for Examiners
1 (a)	3 pairs of legs / 6 legs; body divided into 3 sections [head / thorax / abdomen];	max [1]	
(b)	**A** = Lilioceris; **B** = Coccinella; **C** = Leptinotarsa; **D** = Otiorhynchus;	[3]	4 correct = 3 marks 2 / 3 correct = 2 marks 1 correct = 1 mark
		[Total: 4]	
2 (a)	**A** = oesophagus; **B** = liver; **C** = stomach; **D** = large intestine; **E** = small intestine;	[5]	**A** *ileum*
(b) (i)	circular *and* longitudinal muscles;	[1]	
(ii)	peristalsis;	[1]	**A** phonetic spelling
(iii)	antagonistic action / one muscle contracts while other relaxes / AW; in waves / AW OR contraction moves the food along (the alimentary canal) / AW;	[2]	

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(c) (i)	**X** to be placed anywhere between time 12 minutes and 2 hours;	[1]	**A** between pH 6.8 and pH 2
(ii)	pH is acidic / pH is decreasing / stomach produces acid / stomach has low pH / AW;	[1]	
(iii)	(pH) 8.0;	[1]	
(d)	small intestine / ileum;	[1]	
		[Total: 13]	

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3	(a)	glucose + oxygen; → (carbon dioxide) + water;	[2]	
	(b)	1 respiration; 2 photosynthesis; 3 feeding / eating; 4 death / decay / decomposition; 5 combustion / burning;	[5]	
	(c) (i)	*cause* cutting down trees / deforestation; *consequence* less photosynthesis / less CO_2 is being 'locked up' in plants / AW / more CO_2 stays in the atmosphere; *cause* *(idea of)* use of (more)(named)fossil fuels / trees / AW; *consequence* burning releases / produces CO_2; unlocks stored carbon (from sink) into atmosphere; *cause* *(idea of)* (increased) industry / transport / AW; *consequence* burning fuel which releases / produces CO_2; *cause* increase in number of animals / growth in human population; *consequence* more respiration releases CO_2;	[4]	

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(ii)	re-forestation / plant more trees / stop deforestation; burn less fossil fuel; use biofuels / renewable energy; encourage people to eat less meat / raise fewer animals; AVP ; e.g. more cycle lanes / grants for insulation	max [1]	
		[Total: 12]	
4 (a) (i)	direction of energy transfer / flow / movement (through the food web);	[1]	
(ii)	they represent different amounts of energy AW;	[1]	
(b)	10 000 kJ;	[1]	
(c)	robin + owl;	[1]	must have both either order
(d)	lost to the surroundings as heat; used during metabolism e.g. respiration (of food) / movement / keeping warm; not all eaten;	max [2]	
		[Total: 6]	

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5 (a) (i)	a substance which, speeds up / alters the rate of, a (chemical) reaction; not changed / not used up, by the reaction;	[2]	
(ii)	protein;	[1]	
(b) (i)	temperature / pH / concentration of substrate / surface area of substrate;	[1]	
(ii)	*for temperature*: idea of increase in temperature increases rate / AW; enzyme has an optimum temperature (at which it works fastest); at high temperatures enzyme, stops working / is denatured; at low temperatures enzyme, slows down / becomes inactive; OR *for pH*: extremes of pH reduces rate of reaction / AW; extremes of pH denatures enzyme / AW; enzyme has an optimum pH at which it works fastest; OR *for concentration / area of substrate:* higher concentration / increase (surface) area, increases rate of reaction; which results in more collisions; until all active sites are being used;	max [2]	
(c)	25;; 100 – (6 + 32 + 37) = 1mark if answer incorrect / not given	[2]	

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(d) (i)	protease; amino acids;	[2]	
(ii)	to reduce the size / make them smaller; increase their solubility; so they are able to diffuse through membranes;	max [2]	
		[Total: 12]	
6 (a)	have 2 alleles which are, the same / identical / homozygous;	[1]	
(b) (i)	(two or more) alternative / different forms of a gene / AW;	[1]	
(ii)	long is dominant / expresses itself in heterozygote AW; short is recessive / hidden in heterozygote AW;	[2]	
(c) (i)	5;	[1]	
(ii)	3:1;	[1]	
(d)	Aa; A and a X A and a; (either order) AA Aa Aa aa; (any order so long as correct re “lines”) long long long short; (order must match genotypes)	[4]	allow ecf if a mistake is made, but each line must correspond to the previous one
(e)	Aa / heterozygote;	[1]	
		[Total: 11]	

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7	**(a)**	root hair; xylem;	[2]	
	(b)	(nitrate) protein synthesis; (magnesium) to make chlorophyll;	[2]	
	(c)	minerals are used for growth and not replaced / minerals are not recycled in this system / AW; plants are getting bigger so need more minerals / AW;	[2]	
	(d) (i)	as time increases, uptake increases; initial uptake is rapid / (graph has a) steep gradient; then rate slows down / (graph) levels out / AW;	[2]	
	(ii)	yield would be much less / halved / smaller tomatoes / AW; plants take up less potassium / AW; so plants would produce fewer flowers (and fruits) / AW;	[3]	
	(e)	(sun) light / light energy; carbon dioxide / CO_2;	[2]	
			[Total: 13]	

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8	(a)	for increased yield / AW; economic reasons; more nutritious potatoes / AW; better taste; better colour; greater disease or pest resistance; faster growth / shorter growing season; drought resistance; need less fertiliser; long storage life; AVP;;	max [2]	
	(b) (i)	F + A; D + B;	[2]	
	(ii)	meiosis / sexual reproduction; produces gametes; random fertilisation; genetically different / have different alleles;	max [2]	
	(c)	genes / alleles / DNA, are all from, one parent / the same; mitosis / asexual reproduction;	[2]	
	(d)	genetic engineering;	[1]	
			[Total: 9]	

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