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UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2010 question paper for the guidance of teachers

0610 BIOLOGY

0610/22 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 must be read in conjunction with the question papers and the report on the examination.

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General notes

Do not exceed the section sub-totals or question maxima.

Symbols used in mark scheme and guidance notes.

/	separates alternatives for a marking point
;	separates points for the award of a mark
MP	mark point – used in guidance notes when referring to numbered marking points
OWTTE	or words to that effect
ORA	or reverse argument / approach
A	accept – as a correct response
R	reject – this is marked with a cross and any following correct statements do not gain any marks
I	ignore / irrelevant / inadequate – this response gains no mark, but any following correct answers can gain marks.
( )	the word / phrase in brackets is not required to gain marks but sets the context of the response for credit e.g. (waxy) cuticle. Waxy not needed but if it was described as a cellulose cuticle then no mark is awarded.
<u>mitosis</u>	underlined words – this word only
ecf	error carried forward

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1 **(a)** gall bladder correctly labelled; oesophagus correctly labelled; pancreas correctly labelled; [3]		A – above or below overlap of liver A – duct within pancreas
(b) **(i)** (biological) catalyst; made of protein; [2]		A – (chemical / substance) that speeds up reactions
(ii) enzyme **X**; optimum pH / pH2 is in acid conditions / optimum pH found in the stomach; [2]		No credit for **Y** but credit relevant ref. to acidity A – only part of the gut that is acidic is stomach
(iii) (component) starch; (product) maltose; [2]		R – carbohydrate in either answer I – ref. to sugar in either answer I – polysaccharide R – maltase A – glucose
(c) bile; emulsifies fats / oils / OWTTE; increases surface area (for enzyme activity); is alkaline; raises pH / neutralises acidity of material from stomach; any three – 1 mark each [3]		A – reduces surface tension A – ref. to optimum pH in intestines
[Total: 12]		

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2	**(a)**	(covered by) feathers; (has) beak / bill; [2]	A – hard shelled eggs; I – scales / wings
	(b)	(has) three pairs of legs; (has) three regions to body / head, thorax and abdomen; (has) wings; any two – 1 mark each [2] **[Total: 4]**	A – 6 legs A – spiracles I – 1 pair / 2 pairs R – more than 2 pairs of wings
3	**(a)**	ciliary muscle correctly labelled; iris correctly labelled; optic nerve correctly labelled; [3]	
	(b)	detects light (intensity) / colour; changes light energy; into electrical energy / nerve impulses; any two – 1 mark each [2]	A – refs. to functions of rods / cones A – stimulated by / perceives / sensitive to light R – forms image A – forms nerve impulses
	(c)	retina receives too much light / OWTTE; impulse to brain and then to iris (muscles); iris circular muscles contract; iris radial muscles relax; size of pupil reduced; reduces amount of light / light intensity reaching retina; protects retinal cells / retina from damage; any four – 1 mark each [4] **[Total: 9]**	A – ref. to reflex arc A – protects retina

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4	over-fishing; disrupts ocean food chains / can lead to species extinction; discharge of (untreated) sewage / fertilisers / industrial chemicals into oceans / OWTTE; species die / disruption of food chains; oil pollution; marine species damaged / fouling of sea birds; global warming / (local) release of hot water; temperature sensitive species die out / affects food chains; recreational activities / scuba diving / boats; danger to wildlife; extraction of minerals / sand / gravel / fishing methods; destroys bottom habitats / coral reefs etc.; dumping litter / rubbish etc.; animals injured / killed; any three pairs – 2 marks each [6] **[Total: 6]**	Need human action and how this affects the ocean ecosystem A – named examples A – idea of catching other animals A – refs. to plastic / fishing nets / lines etc. A – any other valid response

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5	(a)	(i)	all points plotted correctly (+/– half square); points joined and line labelled / key; [2]	
		(ii)	0–2 (years); [1]	
		(iii)	8.5 (years) / 8 years 6 months; 16.5 (years) / 16 years 6 months; [2]	A – +/– 0.5 years A – +/– 0.5 years
		(iv)	14.5 (years) / 14 years 6 months; [1]	A – +/– 0.25 years
	(b)	(i)	oestrogen; [1]	A – estrogen / estrodiol
		(ii)	onset of menstruation / periods; breasts / mammary glands develop; pubic / axillary hair grows / OWTTE; hip girdle widens; layer of fat develops under skin; any three – 1 mark each [3]	
			[Total: 10]	

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6	**(a)** **(i)**	combustion; [1]	A – burning I – oxidation
	(ii)	bacteria / fungi / decomposers; [1]	
	(iii)	**C**; **E**; [2]	A – label **D**, as respiration in microorganisms occurs during decay
	(iv)	**B**; [1]	
	(b)	carbon dioxide + water; glucose + oxygen; [2]	A – chemical formulae as long as each side of the equation is balanced A – other valid carbohydrates. I – refs. to light, chlorophyll
	(c)	more combustion / use of fossil fuels (for heat / power); more use of (fossil fuels for) vehicles; larger human population respiring; deforestation / OWTTE; leading to less photosynthesis; burning / decay of cut down materials; any three – 1 mark each [3]	A – refs. to homes, factories, electricity production A – for vehicles any named type e.g. cars A – refs. to increased human population In relation to deforestation
		[Total: 10]	

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7	**(a) (i)** 5.25; [1]		I – refs to units
	(ii) 21.01 / 5.25; 4 times; [2]		A – ecf based on candidate's response in **(a)(i)**
	(iii) more energy required for exercise / by muscles; released by respiration; which needs more oxygen; and also more glucose; more carbon dioxide released; delivery / removal needs greater blood flow / volume of blood to / from muscles / OWTTE; any four – 1 mark each [4]		need ref. to "more / increased" <u>at least once</u> in response otherwise MAX 3 I – produced A – ref. to more heat released
	(b) (i) right ventricle; [1]		
	(ii) red blood cell; [1]		A – haemoglobin
	(iii) large surface area; thin / one cell thick surface layer; dense capillary network; [3]		A – large number of alveoli A – short diffusion path A – moist lining to alveoli
	[Total: 12]		

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8 **(a)** **(i)** an allele – is one form / version of a gene; [1]	A – alternative forms of a gene	
(ii) an allele that does not show in phenotype if dominant is present / in heterozygote; [1]	A – allele that only shows in phenotype in homozygote A – only shows in absence of dominant allele	
(b) child 5 has normal number of fingers although neither parent shows this condition / OWTTE; allele must be present in both parents but not showing thus recessive / OWTTE; [2]	A – other correct explanations	
(c) **(i)** ff; [1]	R – other letters used	
(ii) FF; Ff; [2]	A – ecf for alternative letters used in **(c)(i)**	
(d) 3; 4; [2]	A – "the parents" for 2 marks	
(e) change in structure of gene / chromosome / DNA; [1]	A – change in gene / chromosome / DNA A – change in number of chromosomes	
[Total: 10]		

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9	**(a)** stem; [1]		I – stalk, branch A – branch qualified e.g. branch of stem
	(b) phloem correctly labelled; xylem correctly labelled; [2]		
	(c) (phloem) transport of dissolved materials (from photosynthesis / storage); e.g. glucose / sucrose / amino acids;		I – starch A – sugar
	between source and demand / OWTTE; any two – 1 mark each [2]		
	(xylem) transport of water; transport of mineral salts / ions; from roots to leaves / aerial parts; support / strengthens roots / stem / leaves; any two – 1 mark each [2]		A – dissolved minerals / named examples
	[Total: 7]		