CAMBRIDGE INTERNATIONAL EXAMINATIONS

Cambridge International General Certificate of Secondary Education

MARK SCHEME for the October/November 2014 series

0610 BIOLOGY

0610/21 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.

Cambridge will not enter into discussions about these mark schemes.

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Abbreviations used in the Mark Scheme

- ; separates marking points
- / separates alternatives within a marking point
- R reject
- I ignore (mark as if this material was not present)
- A accept (a less than ideal answer which should be marked correct)
- AW alternative wording
- underline words underlined 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
- A, S, P, L Axes, Size, Plots and Line for graphs
- O, S, D, L Outline, Size, Detail and Label for drawings
- (n)ecf (no) error carried forward
- ( ) the word / phrase in brackets is not required, but sets the context
- ora or reverse argument.
- AVP any valid point

Question	Answer	Marks	Additional Guidance
1 (a)	<table><tr><th>characteristic of life</th><th>definition</th></tr><tr><td>nutrition</td><td>obtaining nutrients for energy, growth and repair (by eating small animals)</td></tr><tr><td>excretion;</td><td>removal from an organism of toxic materials, the waste products of metabolism or substances in excess of requirements</td></tr><tr><td>reproduction</td><td>processes which make more if the same organism / AW;</td></tr><tr><td>growth;</td><td>a permanent increase in size and dry mass</td></tr></table>	3	**I** egestion
(b)	(reptiles) do not have gills or fins / have legs / have lungs / can live on land / lay shelled eggs / cannot live under water / AVP;	1	**A** the opposite for fish if fish clearly stated
		[Total: 4]	
2 (a)	**A** cuticle; **B** palisade / palisade mesophyll; **C** xylem;	3	**A** vascular bundle (as bracket also contains a sheath cell)

(b) (i)	May comparison: there is more carbohydrate in the leaves than in the new potatoes / 4 times as much or 3 a.u. more; explanation: potatoes have not grown yet / leaves are photosynthesising / starch being used for growth; September comparison: there is more carbohydrate in the new potatoes than in the leaves / 5 times as much or 4 a.u. more; explanation: potatoes are large or fully developed / carbohydrate or glucose or sugar has been sent to new potatoes for storage (as starch) / leaves photosynthesising less or are dying AW;	**4**	must manipulate data for either May or September results, otherwise max 3 **I** starch not stored during May **I** reference to starch transport and storage of glucose
(ii)	starch;	**1**	**A** amylose / amylopectin
(iii)	respiration / to release energy; movement; one example of movement e.g. running or active transport; growth / repair / cell division; synthesis of other chemicals; one named example of synthesis e.g. cellulose or nectar; nutrient for a consumer;	**max 2**	
		[Total: 10]	

3 (a)	0.16;; but (0.18 + 0.15 + 0.15 + 0.16 + 0.16) / 5;	**2**	allow 1 mark for the correct formula / figures if answer incorrect
(b) (i)	receptor / sensor; effector;	**2**	**A** sense organ or named sense organ **A** muscle or gland or named examples **A** if receptor and effecter of a specific reflex given e.g. retina and iris
(ii)	protection of eye surface / cornea (from dust / injury / AVP); protection of retina from bright light; maintaining eye surface moist with tears AW;	**max 1**	
(c) (i)	any substance taken into the body; that modifies chemical reactions in the body / alters the metabolism;	**2**	
(ii)	(heroin is a depressant so could) slow down the transmission of impulses / AW; **or** increase reaction time;	**1**	

(iii)	addiction, withdrawal symptoms, risk of overdosing, risk of death, infection from shared needles, damage to veins, risk of HIV, risk of hepatitis C, criminal behaviour, theft, imprisonment, loss of inhibitions, aggression, violence, more prone to accidents, poor judgement of behaviour, euphoria, mental health problems, social problems, family breakdown, loss of job, loss of home, poor ability to work, emotional problems / AW (e.g. lack of self-esteem), physical health problems, heart attacks, liver damage, brain or neurone damage, respiratory failure, strokes,	**max 3**	**A** more than one from each category
(d)	destroy / kill / inhibit <u>bacteria</u>;	**1**	
		[Total: 12]	
4 (a) (i)	Y in sperm and X in egg;	**1**	both correct for 1 mark
(ii)	zygote;	**1**	
(b)	male is XY and female is XX; idea of random assortment (at meiosis); sperm / male gametes are X or Y and eggs / female gametes are all X; idea of equal chance of an X or Y sperm fertilising an egg / random fertilisation;;	**max 3**	**A** information given in Punnett square

(c) (i)	alleles must be identical / the same;	**1**	
(ii)	sex / gender; blood group;	**2**	
		[Total: 8]	
5 (a)	<table><tr><th>function of part</th><th>letter labelling part</th></tr><tr><td>protection of the flower when in bud</td><td>G;</td></tr><tr><td>place where pollen is produced</td><td>C;</td></tr><tr><td>site of fertilisation</td><td>F;</td></tr><tr><td>a suitable landing site for pollen</td><td>B;</td></tr><tr><td>attracts insects</td><td>A / C;</td></tr></table>	**5**	
(b) (i)	phenotype genotype; gametes; genotype phenotype;	**3**	both needed and in correct order both needed and in correct order
(ii)	1:1 / equal / 50% : 50% / ½: ½ / 3 : 3 etc.;	**1**	**A** 50% alone
		[Total: 9]	
6 (a) (i)	B;	**1**	**A** liver
(ii)	gall bladder;	**1**	**A** C

	(iii)	(bile is) necessary to emulsify fats / AW; (emulsification) needed to increase surface area; for the action of lipase;	**max 2**	**A** break down into small droplets but **I** breakdown unqualified
	(b) (i)	stomach; small intestine / ileum;	**2**	
	(ii)	no amylase present / protease cannot digest starch; pH too low / too acidic;	**2**	**A** amylase from the mouth is denatured by stomach acid
	(c) (i)	water is removed / reabsorbed (into bloodstream);	**1**	
	(ii)	fibre / roughage;	**1**	**A** any named high fibre food
	(iii)	constipation; diverticulitis; colon / bowel cancer;	**max 1**	**A** cancer unqualified
			[Total: 11]	
7	**(a) (i)**	algae / pond weed;	**1**	
	(ii)	algae → water flea / gnat larvae → ; (diving beetle) → trout → kingfisher;	**2**	both needed for 1 mark in each case **A** use of fish and bird
	(b)	to kill insects; to stop insects eating crops; to increase yield of crops;	**max 1**	**I** reference to killing aquatic insects
	(c) (i)	gnats (larvae) / diving beetles killed by / get insecticide, in their body; trout eat gnats; insecticides persistent / non-biodegradable;	**2**	**I** water fleas
	(ii)	(less predation on trout) so numbers increase:	**1**	

(d)	eutrophication; fertilisers increase growth of algae / aquatic plants; animals eating algae / plants are unable to restrict this growth; algae / plants cover water surface and reduce light to lower layers; algae / plants die; decomposers / bacteria feed on dead plants; decomposers / bacteria (respire) and remove oxygen from the water; fish die as there is insufficient oxygen;	**max 4**	**A** alternative wording throughout mark points independently (in any order)
		[Total: 11]	
8 (a) (i)	bacteria / fungi / saprophytes / saprotrophs / decomposers;	**1**	**I** named organisms e.g. mushrooms
(ii)	temperature / AW; availability of water / AW; pH (of soil); oxygen concentration;	**max 2**	**A** number of decomposers present **I** sunlight / wind
(b) (i)	1025;; but 3050 – (125 + 1900);	**2**	**A** 1 mark for correct formula / figures if answer incorrect
(ii)	maintaining body temperature; movement / e.g. of movement (muscle contraction / active transport); growth / repair of tissues / cell division; synthesis of chemicals / e.g. given;	**max 2**	
(c)	global warming / reference to greenhouse effect / causes climate change;	**1**	**I** pollution

(d)	desertification; species extinction / loss of biodiversity / loss of habitat; soil erosion; flooding; silting of rivers / lakes; increase carbon dioxide levels; climate change / global warming; disruption of water cycle; AVP;	**max 2**	
		[Total: 10]	
9 (a)	<table><tr><th>function</th><th>label letter</th></tr><tr><td>transport oxygen</td><td>**D**</td></tr><tr><td>removes bacteria from the blood</td><td>**B**</td></tr><tr><td>involved in blood clotting</td><td>**A**</td></tr><tr><td>transports urea</td><td>**C**</td></tr></table>	**3**	4 correct = 3 2 or 3 correct = 2 1 correct = 1
(b)	capillary / hepatic vein / pulmonary artery / vena cava;	**1**	
(c)	calcium / phosphorus;	**1**	**A** magnesium / calcium phosphate / magnesium phosphate / strontium **A** chemical symbols
		[Total: 5]	