CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2013 series

0610 BIOLOGY

0610/32 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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Mark schemes will use these abbreviations

- ; separates marking points
- / alternatives
- **R** reject
- **A** accept (for answers correctly cued by the question)
- **I** ignore as irrelevant
- **ecf** error carried forward
- **AW** alternative wording (where responses vary more than usual)
- **AVP** alternative valid point
- **ORA** or reverse argument
- underline actual word given must be used by candidate (grammatical variants excepted)
- ( ) the word / phrase in brackets is not required but sets the context
- max indicates the maximum number of marks

Question	Expected Answer	Marks	Additional Guidance
1 (a) (i)	plasma ;	[1]	
(ii)	excretion ;	[1]	
(b)	***A***		
1	(ultra)filtration ;		
2	small molecules, from blood or glomerulus / into (Bowman's / renal) capsule ;		**A** small particles / examples of relevant small molecules instead of 'small molecules'
3	are forced / pushed (out) / under (high) pressure ;		
	B		
4	(selective) reabsorption ;		
5	back into the blood / capillaries ;		
6	e.g. of any substance that is filtered or reabsorbed ;	[max 4]	
(c) (i)	protein ;	[1]	
(ii)	glucose ;	[1]	
(iii)	urea ;	[1]	
(d)	water has been reabsorbed ;		
	by osmosis ;		
	(in / by) collecting duct / nephron / (proximal convoluted) tubule ;		**A** loop of Henle
	idea that by Z there is no change in, sodium ions / urea / solutes, but volume of water is less ;	[max 2]	

(e) (i) **1** **2** **3** **4** **5** **6**	*either* 0.35 (g per 100 cm^3) **;** same concentration as the blood / to be in equilibrium with the blood / to prevent loss or gain, of sodium ions **;** prevents / reduces, osmosis **;** *or* any figure greater than 0 and less than 0.35 (g per 100 cm^3) **;** excess, sodium / salt, in the blood **;** diffusion, from blood / into dialysis fluid **;**	[max 2]	**Note**: Mpts 2 or 3 linked to correct answer for Mpt 1 **Note**: Mpts 5 or 6 linked to correct answer for Mpt 4
(e) (ii)	red blood cells / erythrocytes **;** white blood cells / lymphocytes / phagocytes **;** platelets / thrombocytes **;** (named) plasma protein(s) e.g. fibrinogen, antibodies **;;** (named) hormones **;;** urea / uric acid **;** amino acids / (named) vitamins / cholesterol / fats / fatty acids / glycerol / bacteria / virus **;;**	[max 2]	**Ignore** protein, cells, plasma, (named) gases, iron, (named) toxins, (named) drugs **R** glucose, (mineral) salt, minerals, sodium, (named) ions, water, carbohydrate, starch, blood, ammonia
(f) **1** **2** **3** **4** **5** **6**	ref to platelets (in correct context of clotting) **;** fibrinogen converted to <u>fibrin</u> **;** soluble to insoluble / fibrin is insoluble **;** thrombin / enzyme, in context **;** mesh / network / web, to trap blood (cells) **;** AVP **;** e.g. ref to prothrombin or involvement of, calcium ions / clotting factors	[max 3]	**A** ref to thrombocytes
		[Total:18]	

2 (a) (i)	all bacteria are, susceptible / sensitive to this antibiotic / not resistant ; (antibiotics) killed the bacteria / stopped bacteria growing / AW ;	[max 1]	**R** immune (as equivalent to resistance)
(ii)	(all) bacteria are, resistant / not affected (by the antibiotic) / ORA ;	[1]	**R** immune (as equivalent to resistance) **ecf** from 2(a)(i)
(iii) **1** **2** **3**	only a few bacteria from the sample are resistant / ORA ; caused, by mutations / genes ; resistant bacteria, grew / reproduced ;	[max 2]	**R** immune (as equivalent to resistance) **ecf** from 2 (a)(i) and 2 (a)(ii) **A** susceptible bacteria did not grow
(b) **1** **2** **3** **4**	person may be infected with bacteria, that are resistant to, some / an, antibiotic(s) ; (test) to find the most effective antibiotic ; that kills all bacteria (in the person) ; prevents antibiotic resistance ;	[max 2]	**R** immune (as equivalent to resistance) No **ecf** from 2 (a)
(c) **1** **2** **3** **4** **5** **6** **7**	prescribe / use, antibiotics less often ; not for, viral / fungal, infections ; make sure people complete the course of antibiotics / AW ; develop new antibiotics ; do not use the same antibiotics for too long / rotate antibiotics / AW ; use combinations of antibiotics ; AVP ; e.g. isolation of patients with antibiotic-resistant infections / good hygiene to prevent spread of infection	[max 4]	

(d) (i)		[1]	
(ii) **1** **2** **3** **4** **5** **6** **7**	 easier / quicker, to supply the demand **;** more cost effective **;** no / less, rejection / allergies / side effects **;** human insulin more effective (than animal insulin) **;** because can be individually modified **;** no risk of transmission of disease from animals **;** ethical / religious / animal welfare consideration **;**	 [max 3]	
		[Total:14]	

3 (a) (i)	Cornea / aqueous humour / vitreous humour / conjunctiva **;**	[1]	
(ii)	retina / fovea / yellow spot / rods and cones **;**	[1]	
(b) (i)	**D** indicating any position along the bottom line of the plot **;**	[1]	**R** ambiguous placing on slopes near bottom line
(ii)	*ciliary muscles* contracts **;** *suspensory ligaments* slacken / less taut / loosen / AW **;**	[2]	**R** relax
(c) **1** **2** **3** **4** **5** **6**	cones (in context of colour vision) **;** *and two from* three different types **;** respond to, different wavelengths / red, green and blue **;** convert light into electrical impulses / signals **;** optic nerve **;** brain interprets impulses in terms of, colours / red, green and blue **;**	[max 3]	**R** messages for impulses
		[Total:8]	

4 (a)	narrow leaves ; parallel / unbranched, <u>veins</u> on leaves ; sheath / no petiole ; flower parts in multiples of 3 ; one cotyledon (in the seed) ; fibrous roots ; scattered vascular bundles ; no, cambium / woody tissue ;	[max 2]	**Ignore** long and thin unqualified
(b) (i)	*pollination* pollen transferred, from anther, to stigma ; *fertilisation* gametes / sex cells / ova and pollen nuclei / sperm and egg, fuse / join / combine together ;	[max 2]	**Ignore** pollen unqualified **Ignore** meet / mix
(ii) **1** **2** **3** **4** **6** **7** **8**	less variation / reduced gene pool / uniform crop ; less chance, for evolution to occur / adaption to new environment ; more chance to pass on genetic disease ; well adapted to environment ; no external agent of pollination required / more chance of fertilisation ; single plant can reproduce ; whole crop would be susceptible to adverse factors e.g. drought / disease ;	[max 2]	**R** no variation **R** no evolution **R** clones / asexual reproduction inferred
(c) **1** **2** **3** **4** **5** **6** **7** **8**	zygote (is formed) ; divides by mitosis ; to form embryo ; formation of radicle and plumule ; formation of, cotyledons / seed leaf / food reserve ; formation of, testa / seed coat ; ref to endosperm ; seed formed from ovule ;	[max 4]	

4 (d)			
1	energy is lost, between / within, trophic levels / along food chain **;**		
	either		
2	animals are, at second trophic level / primary consumers		
	or		
	plants are, autotrophs / producers / first trophic level **;**		
3	(energy lost) in animal respiration / heat / (named) metabolic process / movement **;**		
4	ref to (more) material that is, inedible / not digestible (in longer food chains) **;**		
5	ref to 10% energy transfer / ORA **;**		
6	livestock require additional resources / cost for their maintenance **;**	[max 3]	
		[Total:13]	

5 (a)

chemical digestion (max 2)

1 ref to breakdown of molecules **;**

2 breaking bonds **;**

3 using enzymes **;**

4 insoluble to soluble **;**

mechanical digestion (max 2)

5 ref to breakdown of, particle / molecule **;**

6 ref to increase surface area (for chemical digestion) **;**

7 to, mix /churn ;

[max 3]

(b)

function	*name of the part*	*letter from Fig. 1.1*
produces bile	*liver*	***J***
most soluble food is absorbed into the blood	small intestine / ileum	**E ;**
indigestible food is egested	anus / anal canal	**F ;**
hydrochloric acid is produced	stomach	**C ;**
protease, lipase and amylase are produced	pancreas	**D ;**

[4]

one mark per correct row

(c) **1** **2** **3** **4** **5** **6** **7**	 less / no bile, secreted / released **;** (so) no / less, bile salts **;** enter small intestine / duodenum **;** no / less, emulsification of fat **;** less / no, increased surface area of fat (globules / AW) for lipase **;** slower / harder, digestion **;**	 [max 3]	 **R** no digestion
(d) **1** **2** **3** **4** **5** **6** **7**	 coronary heart disease / CHD / heart attack / cardiac arrest / angina / myocardial infarction **;** reduced blood flow / blockage of artery *or* arteries **;** damaged / hardened artery wall / atheroma / atherosclerosis **;** (blood) clot / thrombus / thrombosis / (coronary) aneurysm **;** causes high blood pressure **;** reduced supply of, oxygen / nutrients, to heart tissue / muscle **;** muscle respires anaerobically **;**	 [max 3]	 **Ignore** cardiovascular disease / CVD **A** narrowing of artery reduces blood flow
		[Total:13]	

6 (a) **1** **2** **3, 4** **5** **6**	 (CO_2) is a greenhouse gas / causes (increase in) (enhanced) greenhouse effect **;** global warming **;** any two qualified examples of environment effects of global warming e.g. flooding, extreme weather conditions, qualified habitat change, reduced biodiversity **;;** increase in rate of photosynthesis **;** causes increase in, plant growth / crop yield / vegetation **;**	 [max 4]	 **Ignore** *descriptions* of greenhouse effect **Ignore** *descriptions* of global warming **Ignore** ref to deforestation
(b) **1** **2** **3** **4** **5** **6** **7** **8**	*nitrate ions (max 3)* needed to make amino acids **;** amino acids to proteins **;** protein needed for growth **;** suitable use of protein ; e.g. membranes / enzymes *magnesium ions (max 2)* needed for making chlorophyll **;** to absorb (much) light **;** for (energy for) photosynthesis **;** for producing sugars / organic compounds produced / energy available **;**	 [max 4]	**Mpt 1 A** proteins or nucleic acids
(c) (i)	eutrophication **;**	[1]	
(ii) **1** **2** **3**	 dead plant material **;** decomposed by, bacteria / microorganisms / decomposers **;** use oxygen in (aerobic) respiration **;**	 [max 2]	

(d) **1** **2** **3** **4** **5** **6**	 sedimentation / filtration / screening ; digestion by, bacteria / fungi / decomposers / microorganisms ; with aeration (tank) / trickle filter ; second settling tank (to remove / collect microorganisms) ; treated with, chlorine / ozone / UV ; collection of water from evaporator ;	 [max 3]	
		[Total 14]	