CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2014 series

0610 BIOLOGY

0610/32 Paper 3 (Extended), 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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CAMBRIDGE
International Examinations

	Answer	Marks	Guidance for Examiners
1 (a)	**V** – lag (phase) ; **W** – log phase / exponential (phase) ; **X** – stationary / plateau (phase) ;	[3]	
(b)	temperature ; pH ; oxygen concentration ; consistency / turbidity / density ;	max [2]	
(c)	*(Penicillium)* has no (individual) cells / has hyphae ; measuring mass is easier (compared with counting) ; measuring mass is more accurate / valid (compared with counting) ;	max [1]	
		[Total:6]	
2 (a) (i)	**A** – oviduct ; **B** – ovulation ; **C** – zygote ;	[3]	
(ii)	follicle stimulating hormone / FSH ; luteinising hormone / LH ;	[2]	
(iii)	**1** flagellum / 'tail', for swimming / movement ; **2** small / streamlined shape, for (efficient) swimming ; **3** mitochondria, for providing energy ; **4** acrosome / (packet of) enzymes, for digestion of (follicle) cells / to reach ovum ; **5** haploid nucleus to fuse with egg (nucleus) ; **6** nucleus, to transfer genetic information to zygote ;	max [3]	**R** produce / create / forms energy AW ,

	(b)	**1** maintain / increase, population ; **2** allows variation ; **3** (variation) caused by meiosis ; **4** for example through crossing over / independent assortment ; **5** random fusion of gametes ; **6** ability to express recessive traits / AW ; **7** adaptation to new / changed environments ; **8** (allows) natural selection / evolution / formation of new species ;	max [5]	
			[Total:13]	
3	**(a)**	**1** diffusion / osmosis / move, from cell (to air space) ; **2** (water moves) through cell wall / membrane ; **3** evaporates into the air spaces (inside the leaf) ; **4** water vapour moves out through the stomata ; **5** (vapour) diffuses (through stomata) ; **6** transpiration ;	max [4]	
	(b)	**1** water moves through the xylem ; **2** transpiration pull ; **3** water column under tension / negative / less, pressure (in leaves) ; **4** cohesive forces between water molecules ; **5** lowers water potential / water potential gradient from root to leaves ; **6** adhesive forces between water molecules and xylem (wall) ;	max [4]	**Ignore** water concentration
	(c)	**1** osmosis ; **2** down a water potential gradient ; **3** into the root hairs ; **4** through a partially permeable membrane ;	max [3]	**Ignore** water concentration

(d)	**1** filtration / screening to remove large pieces of waste ; **2** flocculation / coagulation to separate suspended particles from water / sedimentation to settle particles ; **3** digestion by, bacteria / fungi / decomposers / microorganisms ; **4** with aeration (tank) / trickle filter / activated sludge ; **5** sludge treated with anaerobic decomposers / anaerobic digestion ; **6** (water) treated with, chlorine / ozone / UV (light) ; **7** distillation / collection of water from evaporator ;	max [3]	
(e)	**1** kill other plants that are not weeds ; **2** harms, insect / animals ; **3** bioaccumulation / AW ; **4** loss of biodiversity / destroy habitat ; **5** run off into, streams / rivers / lakes ; **6** selects for herbicide, resistance / tolerance ; **7** weeds become more difficult to control / AW ;	max [3]	
		[Total:17]	
4 (a) (i)	urea / hydrogencarbonate (ions) ;	[1]	Mark first response on each line **A** lactic acid
(ii)	fibrinogen / insulin ;	[1]	Mark first response on each line
(b) (i)	anaerobic respiration ; oxygen debt / vigorous exercise with insufficient oxygen supply ;	[max 1]	
(ii)	(blood) clotting ; converted into fibrin to form a mesh ;	[1]	

(iii)	*any two from* dilation of pupils ; reduced blood flow through, digestive system / skin ; increase in, blood pressure or heart rate / pulse / stroke volume ; increase in breathing rate; increase in oxygen concentration in the blood ; increase in glycogen converted to glucose ; increase in glucose / sugar concentration in the blood ; increase in respiration rate ; increase in blood flow through the muscles ; increase in awareness / anxiety / alertness ; broncho-dilation / widen airways ;	max [2]	
(c)	**1** (liver cells respond) to insulin if blood glucose is high ; **2** (enzymes / liver cells) conversion of glucose to glycogen ; **3** glycogen is stored (in the liver) ; **4** (liver cells respond) to glucagon if blood glucose is low ; **5** (enzymes) break down glycogen to glucose ; **6** ref to, homeostasis / negative feedback ;	max [3]	**Reject** reference of insulin / glucagon production in liver
(d) (i)	$\frac{3500-1300}{1300}\times 100$ 169 (%) ;;	[2]	
(ii)	**1** nonspecific immune response ; **2** engulf / ingest / A W, bacteria / pathogens / dead cells ; **A** phagocytosis **3** into vacuole ; **4** use enzymes ; **5** to digest bacteria / pathogens ; **6** identify antigen / pathogens, for lymphocytes ;	max [3]	**Reject** destroy disease

(iii)	**1** recognition tissue is foreign / AW ; **2** ref to antigens ; **3** lymphocytes release antibodies ; **4** phagocytes / lymphocytes, cause tissue destruction ;	max [3]	
		[Total: 17]	
5 (a)	**1** peristalsis ; **2** circular muscles contract (to push to food) ; **3** muscle contraction above food pushes it forward ; **4** circular and longitudinal muscles work antagonistically / AW ;	max [2]	
(b) (i)	**P** – epithelium / epithelial cell ; **Q** – (blood) capillary ; **R** – lacteal / lymphatic vessel ;	[3]	**Reject** ciliated epithelium, epidermis, goblet cell **Accept** epithelium with brush border
(ii)	hepatic portal (vein) ;	[1]	
(iii)	give a large surface area (of membrane) ; to increase / maximise, absorption ; by diffusion / by active transport ;	max [2]	
(iv)	enzymes / proteases / lipases ; (stomach) acid ; physical damage / AW ; parasites / (named) pathogens / toxins ;	max [2]	
		[Total:10]	

6 (a)	**1** antennae ; **2** elongated bodies ; **3** <u>segmented</u> body / many <u>segments</u> ; **4** many (⩾10) legs ; **5** (one or two pairs of) legs on each segment ; **6** exoskeleton ; **7** <u>jointed</u> legs ;	max [3]	
(b)	**1** length of antennae ; **2** number of sections on antennae ; **3** presence / absence, of tail pieces / AW ; **4** length of tail pieces ; **5** length of legs ; **6** number of leg joints ; **7** total number of legs ; **8** position of legs on body ; **9** number of legs per segment ; **10** size / shape of segments ; **11** number of body segments ; **12** length of body ; **13** head shape ; **14** presence / absence 'spots / markings' ;	max [3]	

(c) (i)	nucleus **;**	[1]	**Ignore** chromosomes
(ii)	**1** *idea that* animals are identified accurately **; R** identify unqualified **2** barcoding is, cheap / easy / quick / efficient **;** **3** barcoding is useful if distinguishing characteristics / dichotomous key are difficult **;** **4** identify previously unknown species **;** **5** helps to identify, threatened / endangered species **;**	max [2]	
(iii)	**1** ref to genes **;** **2** codes for (specific) proteins **;** **3** stores genetic information **;** **4** can be copied to pass on information to new cells **;**	max [2]	
(d) (i)	**1** all arrows point from food to feeder **;** **2** millipedes eat dead leaves and fungi **;** **3** food chain : bacteria → nematodes → springtails → centipedes **;** **4** centipedes eat millipedes, springtails and earthworms **;**	[4]	
(ii)	**1** ref to, respiration / decomposition **;** **2** release carbon dioxide **;** **3** carbon dioxide is taken in by, plants / photosynthesis **;**	max [2]	
		[Total:17]	