CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the May/June 2013 series

0610 BIOLOGY

0610/33 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
- **D, L, T, Q** quality of: drawing / labelling / table / detail as indicated
- max indicates the maximum number of marks

	Answer	Marks	Guidance for Examiners
1 (a)	segments ; antennae / 'feelers' ; projections over whole of the body / AW ; *idea of* heads / tails ; **A** not parasitic / free living / AW ;	max [3]	**A** 'sections' / 'divisions' / 'rings' / 'parts' / 'sub-parts' **A** bristles / chaetae / hairs **R** feet / legs / AW
(b)	genus / generic (name) ;	[1]	**A** 'genus part of species name'
(c) (i)	(all the) organisms / community ; in a given area / AW ; and non-living factors / abiotic factors AW ; *idea of* interacting together ;	max [3]	**A** place / location / region / habitat **R** ecosystem i.e. physical factors / named e.g. feeding (***ignore*** feeding on each other)
(ii)	arrows point from food → feeder ; organisms in correct sequence ; plankton → annelid / named → wading bird(s) → bird of prey = 2 marks	[2]	
(iii)	shows complex feeding relationships / AW ; all organisms in the ecosystem ; **A** (many) more / part of / wide range of each species has more than one food source / AW ; each species has more than one predator / AW ; AVP ; e.g. shows possible chain reaction to an animal's population change	max [2]	**A** all possible connections

(d)	many, sperm and eggs / gametes, released at the same time **;** increases chances of gametes fusing **;** (many individuals so more genetic) variation **;** may occur at a time when food is available **;** for development of, young / offspring **;** or when there are currents to disperse young **;** smaller proportion of, eggs / zygotes / embryos, eaten by predators **;** AVP **;**	max [3]	**R** fewer predators
(e)	*assume answer is about meiosis unless told otherwise* *mark differences between meiosis and mitosis to max 3* 1 two divisions **;** 2 four, cells / nuclei / gametes, produced **;** 3 halves chromosome number **;** 4 (diploid to) haploid **;** 5 variation (between cells / nuclei / gametes) **;** 6 gametes have different <u>alleles</u> **;** 7 gives (more) variation in offspring **;** 8 so chromosome number remains the same in next generation **;**	max [4]	***ignore*** quoted numbers of chromosomes **R** genes **A** number does not double with each generation / full pairs of chromosomes when fertilized / AW **A** ***ora*** *for mitosis*
		[Total:18]	

2 (a) (i)	light intensity ; constant ; **A** control(led) variable ref to limiting factor ; intensity / amount of light, will affect (rate of) photosynthesis	max [2]	***ignore*** refs to temperature change
(ii)	raw material for / 'is needed for' / AW, photosynthesis ; maintain suitable concentration ; carbon dioxide, concentration / AW, is / could be / wasn't a limiting factor ;	max [2]	**A** 'amount' for concentration, **A** fixed quantity
(b)	*rate of photosynthesis ('it')* general description – increases and decreases ; peak / maximum rate, at 30 °C ; optimum temperature is 30 °C ; use of two figures from the table to illustrate, including units ;	max [3]	***ignore*** droplet movement unqualified
(c)	if no enzymes then rate should increase as temperature increases ; but rate decreases, above 30 °C / at high temperatures ; enzymes are denatured ; ref to active site destroyed ; substrate no longer fits into active site ; reaction not catalysed / AW ;	max [4]	**A** (30 °C) optimum temperature / described
(d)	ref to fewer limiting factors ; higher temperatures / hot temperatures; higher rates of photosynthesis ; more food for, growth / reproduction ; no, grazers / animals to feed on it ; more suitable habitats / more fertile soils / more nutrients ; no disease ; fewer / no, competitors ; AVP ;	max [2]	This MP is dependent on making point 3. **A** no predators **R** space
		[Total:13]	

3 (a)	**A** – controls the cell / contains DNA / contains genes **;** **B** – makes protein / makes insulin / respiration / storage / contains the insulin (that will be released) **;** **C** – controls movement of (named) substance(s), in / out, of cell **;**	[3]	**A** contains code for insulin / controls cell development ***ignore*** just … provides protein
(b)	glucose is soluble, glycogen is insoluble **;** glucose in blood would, lower water potential / AW e.g. (cause) hyperglycemia **;** water leaves cells **;** by osmosis **;** much larger quantities can be stored **;** can be stored for (much) longer **;** glucose would not be reabsorbed in the kidney **;** (and would be) excreted / lost, in the urine **;** AVP **;**	max [2]	**A** affect water potential / affect blood glucose concentration / AW **A** urinated
(c) (i)	*stimulates liver cells* to break down glycogen <u>and</u> release glucose **;**	[1]	**A** glycogen → glucose *for breakdown*
(ii)	(in the) blood / plasma / circulatory system **;**	[1]	**A** via hepatic portal vein
(d)	oestrogen **;** progesterone **;** testosterone **;**	max [2]	

(e) (i)	grow faster so keep animals for shorter time **;** can provide less food (for animals)**;** better economic return **;** *however expressed* less waste / described **;** fewer problems with waste disposal / described / example **;**	[2]	**R** more meat (in Q)
(ii)	cattle produce, methane / carbon dioxide (greenhouse gases) **;** (if more food converted to meat), less is excreted / egested / less waste / less carbon dioxide / less methane **;** if eat less food, then less emissions **;** if growth rate is higher, do not to keep them for as long **;** fewer cattle means that less methane is released **;**	max [2]	if 'less methane' award mp1 too
(f)	health risk / hormones may have adverse effect, in humans **;** any e.g. **;** faster growth rate / early puberty / cancer ref to animal welfare / kill animals **;** harm to animals of fast growth rates **;** any likely health issue in animals **;** AVP **;** e.g. protect European farmers	max [2]	**A** ill / sickness / increased mass **A** men's gender effect **R** bacteria (that make the hormone) making cattle / humans ill
		[Total:15]	

4 (a) (i)	red blood cell **;**	[1]	
(ii)	plasma **;**	[1]	
(iii)	capillary **;**	[1]	
(b)	oxygen **;** carbon dioxide **;** water **;** glucose **;** sodium ions **;** amino acids **;** urea, (named) hormone(s) **;** AVP **;;;** e.g. lactic acid	max [3]	
(c) (i)	1150 (%)	[1]	look in the space for working if answer is not in table
(ii)	increase in energy demand in muscle **;** for contraction (of muscle) **;** increase in respiration in muscle **;** *increase in blood flow supplies* more oxygen **;** for aerobic respiration **;** more glucose **;** more, fat / fatty acids **;** *increase in blood flow removes* carbon dioxide **;** lactate / lactic acid **;** from anaerobic respiration **;**	max [5]	**A** lot of energy **A** lot of oxygen **A** conversion of lactic acid

(iii)	*max 3 for increase blood flow* vasodilation ; muscle in wall relaxes ; arterioles / arteries ; widen / dilate ; more blood flows to capillaries ; *max 3 for decrease blood flow* vasoconstriction ; muscle in wall contracts ; arterioles / arteries ; narrow / constrict ; less blood flows to capillaries ;	max [4]	**R** 'blood vessels' once only ***allow* ecf** for 'blood vessels'
		[Total:16]	
5 (a)	pollen (grain) germinates / pollen (grain) grows pollen tube ; pollen tube grows down the style ; reaches the ovule ; (tip of) pollen tube breaks open ; male gamete(s) travels down the pollen tube ; male gamete(s) / (male) nucleus / nuclei, enter ovule ; (male gamete) fuses with female gamete / ovum ; zygote forms ;	max [3]	**A** pollen grain gametes / nucleus **A** fertilization / fusion, occurs inside the ovule

(b)	*protection* (amnion / uterus / amniotic fluid) 1 provides protection against, mechanical damage / 'knocks' **;** 2 provides sterile environment / no entry of pathogens **;** 3 backbone provides protection against, jolts / AW **;** 4 placenta provides a barrier to (named) pathogen(s) / AW **;** 5 placenta prevents mixing of blood between fetus and mother *constant temperature* 6 ref to blood flow to the, uterus / placenta / amnion **;** 7 brings heat from elsewhere in mother's body **;** 8 removes heat from amniotic fluid **;** 9 fetus enclosed inside, any named structure / the mother's body **;** 10 named structure(s), acts as insulators / reduces heat loss **;** *nutrients* 11 across placenta / through placenta **;** 12 diffusion / active transport **;** 13 between mother's blood and fetal blood / into fetal blood**;** *excretion of metabolic waste* 14 across placenta / through placenta **;** 15 diffusion of, urea / carbon dioxide **;** 16 from fetal blood to mother's blood / into mother's blood **;** *nutrients / excretion* **A** once only 17 umbilical cord transports, nutrients / excretory products **;**	max [8]	**max 3** from each section **A** baby for fetus **R** amniotic sac as insulator **R** absorbed by placenta
		[Total:11]	

6 (a)	group of organisms of the <u>same species</u> **;** in the same area / at the same time **;**	 [2]	**A** 'of a kind' / <u>a</u> species **A** same habitat / ecosystem / community
(b) (i)	greater predation by owls / more predators / more owls**;** lack of food / starvation / more competition for food **;** adverse (named) weather condition (s) **;** disease / sickness / illness**;** emigration **;** AVP **;** habitat destruction	 max [3]	**R** climate change
(ii)	**1** owl population increases, after / AW, vole population increases **;** **2** owl population crashes (in year 7) **;** **3** immediately after crash in vole population **;** **4** vole population crashes / decreases (in year 6) **;** **5** when there are most owls **;** **6** if owls ate (much) other prey there would not be a close relationship / AW **;** **7** ref to numbers of owls from the graph **;**	 max [2]	**if MP1 and MP2** not given accept the idea that 'owl population follows changes in vole population' if answer does not refer to the increase or decrease
		[Total:7]	