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

0610/31 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.

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General notes

Symbols used in mark scheme and guidance notes.

/	separates alternatives for a marking point
;	separates points for the award of a mark
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 context of response for credit. e.g. (waxy) cuticle. Waxy not needed but if it was described as a cellulose cuticle then no mark.
<u>Small</u>	underlined words – this word only/must be spelled correctly
ORA	or reverse argument/answer
ref./refs.	answer makes appropriate reference to
AVP	additional valid point (e.g. in comments)
AW	alternative words of equivalent meaning
MP	marking point (number)
ecf	error carried forward

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Question	Expected Answers	Marks	Additional Guidance
1 (a) (i)	**A** – pollen tube ; **B** – ovule ; **C** – egg cell / female gamete / female nucleus ;	[3]	**R** egg / ovum
(ii)	**1** (stigma) place where pollen grain, germinates / develops (to form a tube) ; **2** growth of pollen tube (down the style) ; **3** pollen tube / **A**, enters, ovule / **B** ; **4** ref to micropyle ; **5** tip of, pollen tube / **A**, opens ; **6** (male) nucleus / gamete fuses with, female gamete / nucleus / egg cell (nucleus) / **C** ; **7** forms zygote ; **8** diploid ;	[max 3]	**I** lands MP2 **A** male gamete travels down **R** pollen grain moves linked to pollen tube **A** ovum as an *ecf*
(iii)	**max 3 for advantages OR disadvantages** *advantages* **1** *idea that* self-pollination perpetuates variety that is well adapted to habitat ; **2** greater chance of pollination / ensures pollination occurs ; **A** reproduction / fertilisation **3** less wastage of pollen / gametes / energy (in pollen production) ; **4** *idea that* useful if no other plants (of same species) nearby ; **5** no need for pollinating agent ; *disadvantages* **6** less, variation ; **7** ref. to genotype becoming homozygous ; **8** ref. to harmful alleles (**A** genes) ; **9** less chance of adapting to changing conditions / AW ; **10** more susceptible to diseases ; **11** may become extinct ;	[max 4]	**I** faster **R** ref. to clones / genetically identical

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Question	Expected Answers	Marks	Additional Guidance
(b) (i)	*Glycine* ;	[1]	**R** *Glycine max*
(ii)	network / AW, of veins / one (large) central vein ; broad leaves ; two, cotyledons / seed leaves ; flower parts in multiples of, 4 / 5 ; central / main, root ; vascular bundles regularly arranged ; has (true) secondary growth ;	[max 2]	**A** reverse arguments **I** large leaves **R** parts **A** 'not in 3s' **A** vascular bundles **not** irregularly arranged
		[Total: 13]	

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Question	Expected Answers		Marks	Additional Guidance
2 (a) (i)	follicle stimulating hormone / FSH ; oestrogen ;		[2]	
(ii)	ovary ;		[1]	
(b)	**1** **2** **3** **4** **5** **6** **7**	thickens / maintains, endometrium / lining of, uterus / womb ; prepares (endometrium) for implantation ; prevents menstruation / stops menstrual cycle in pregnancy ; promotes development / maintains, blood vessels / glands (in endometrium) ; prevents FSH secretion / inhibits LH ; prevents follicle development ; AVP ; e.g. prevent muscle contraction of uterus wall	[max 3]	**R** wall ecf thereafter **A** stimulates mammary glands
(c)	 **1** **2** **3** **4** **5** **6** **7** **8** **9** **10** **11**	*advantages to max 2* (passive) immunity / antibodies (to baby) ; develops bond between baby and mother ; *idea of* composition matches baby's needs / easier to digest ; reduced risk of cancers (child or mother) ; cost ; AVP ; e.g. milk is sterile / at body temperature / less chance of allergy *disadvantage to max 1* difficulty in producing (enough) milk ; embarrassment ; nipples become painful ; cannot delegate to (male) partner / AW ; AVP ; e.g. HIV, some drugs, nicotine may be transmitted	[max 3]	
			[Total: 9]	

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Question	Expected Answers		Marks	Additional Guidance
3 (a)	release of energy, from, food / named food ; with oxygen ;		[2]	**A** word / chemical, equation (even if not balanced) for 1 mark **R** produce / create
(b)	**1** **2** **3** **4** **5**	external intercostal muscles contract ; ribcage raised ; **A** 'expands' volume of, thorax / chest / lungs, increases ; pressure of air decreases ; pressure of atmospheric air is greater than air in lungs ;	[max 4]	MPs 1 and 2 ignore diaphragm **A** space / size allow MPs 3–5 if in context of diaphragm
(c)	**1** **2** **3** **4**	(external) intercostal muscles relax ; ribs, fall / move in and down ; internal intercostal muscles contract ; ref. to elasticity of lungs ;	[max 2]	**R** refs. to diaphragm
(d) (i)	70 ;		[1]	if answer not in Table 3.1 **A** elsewhere
(ii)	**1** **2** **3** **4** **5** **6** **7** **8** **9** **10** **11** **12** **13**	requires more oxygen ; oxygen debt ; lactic acid produced during exercise ; (as a result of) anaerobic respiration ; not enough oxygen supplied, to muscles (during running) ; lactic acid lowers pH of blood ; high concentration of carbon dioxide in blood ; from aerobic respiration ; (carbon dioxide) detected by, brain / receptors ; (carbon dioxide) stimulates high ventilation rate ; (carbon dioxide) increases depth of breathing ; lactic acid is, broken down / respired / converted to glucose ; ref. to homeostasis ;	[max 5]	**A** lactate for lactic acid throughout the answer **A** 'need to remove carbon dioxide'
			[Total: 14]	

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Question	Expected Answers	Marks	Additional Guidance
4 (a)	muscles / surrounding tissues, contract / squeeze, vessels **;** valves, prevent backflow / ensure one way flow **;** ref. to breathing (lowering pressure in chest) **;**	[2]	
(b)	**1** fat / fatty acids (and glycerol), absorbed (in ileum) **;** **2** ref. to making fat water soluble **;** **3** fat enters lacteals **;** **4** lacteals, empty into lymph vessels / are part of lymphatic system **;** **5** AVP **;** e.g. transport of fat in lymph may reduce risk of plaque in arteries	[max 2]	other possible AVP *idea that* not overloading blood with fat / by-passes the liver / goes to adipose tissue first
(c) (i)	mitosis **;**	[1]	
(ii)	antibody **;**	[1]	
(iii)	ref. to antibodies in context of, immobilising / 'marking' / agglutinating, bacteria **;** phagocytosis (by cell **R**) **;** (bacteria) ingested / engulfed **;** into a, vacuole / vesicle **;** digested / broken down **;** by, enzymes / acid **;**	[max 3]	**A** any alternative wording for effect on bacteria **A** cell **R** is a phagocyte **I** 'killed' / destroyed (in question) unless qualified

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Question	Expected Answers		Marks	Additional Guidance
(d)	**1** **2** **3** **4** **5**	positive correlation ; more antibiotics used, more bacteria are resistant ; variation between countries at each dosage ; data quote 1 ; data quote 2 ; e.g. countries with antibiotic use of <1%, less than 10% bacteria are resistant countries with antibiotic use of 3(+)%, more than 40% bacteria are resistant variation – e.g. some countries at 2.5%, with 4.5% and 32.5%	[max 3]	data quotes must have figure (or range) for use of antibiotics and % resistance
(e)		*accept* ora		
	1 **2** **3** **4** **5** **6** **7** **8** **9** **10**	bacteria are resistant to some antibiotic ; ref. to selection ; result of overuse ; some are specific ; some antibiotics used for rare disease(s) ; some only used as last resort ; have (many / unpleasant) side-effects / harmful / cause allergy ; too expensive ; cannot be used on children ; AVP ; ref. to other uses, e.g. on animals	[max 3]	**R** <u>people</u> become, immune / resistant
			[Total: 15]	

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Question	Expected Answers		Marks	Additional Guidance
5 (a)	**1** – producer **;** **2** – secondary / 2nd level / 2nd order , consumer **;**		[2]	
(b)	**1** **2** **3** **4** **5** **6** **7** **8**	*idea that* energy is lost, along the food chain / at each trophic level / between trophic levels **;** *idea that* 90% lost between trophic levels / 10% passed on **;** respiration / movement / heat loss / metabolism **;** excretion **;** food not eaten / food not digested / ref. to egestion / AW **;** tuna / top carnivores, are in smaller numbers **;** more energy available in, trophic level 2 / herbivorous fish, than in, level 4 / tuna or dolphins **;** AVP **;**	[max 3]	
(c)	**1** **2** **3** **4** **5** **6** **7** **8** **9** **10** **11**	*idea that* if not conserved they would become extinct **;** ref. to, maintaining numbers of other species in food web / disruption of food web / maintaining balance in food web **;** maintaining (bio)diversity **;** so increase in number of, carnivorous fish / squid / trophic level 3 **;** reduction in, herbivores / herbivorous fish / zooplankton / tropic level **;** less food available for, consumers / AW **;** would be less, tuna / food, for humans **;** aesthetic reason (for conserving) / AW **;** economic reason (for conserving) / AW **;** AVP **;** AVP **;**	[max 4]	**A** 'extinguished'
(d)	**1** **2** **3** **4**	persists / not broken down / does not decay **;** eaten by animals **;** fish / turtles / mammals, get entangled / trapped / suffocate **;** AVP **;**	[max 2]	

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Question	Expected Answers	Marks	Additional Guidance
		[Total: 11]	
6 (a)	line at 1 until end of May **;** exponential increase from June to 100 000 at beginning of July **;** **A** a straight line decrease at end of August to around 10 000 **;** remains about 10 000 until beginning of November **;**	[max 3]	if points are plotted, but no line or block graph used = max 1
(b)	eaten by, predator / fish **;** not enough food **;** too cold **;** pollution **;** AVP **;**	[max 2]	**A** eutrophication
(c)	**1** *accept ref. to* limiting factor(s) *once in the answer* **;** *lag phase* (*March April May*) **2** slow reproduction rate / BR = DR **;** **3** no food / too cold / AW **;** *exponential / log, phase (June)* **4** reproduction rate increases / BR > DR **;** **5** increase in temperature **;** **6** food available **;** *steady / stationary / AW, phase* (*September October November*) **7** reproduction rate slows / BR = DR **;** **8** decline phase **;** **9** (reached) carrying capacity / AW **;** **10** DR > BR **;** **11** predation **;** **12** less food / competition for food**;**	[max 4]	**I** refs. to numbers and descriptions rather than explanations for MP2 – 12 must be clear which period of the graph or phase is being described

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Question	Expected Answers		Marks	Additional Guidance
			[Total: 9]	
7 (a)	(positive) geotropism / gravitropism ;		[1]	**R** negative geotropism
(b)	seedlings also respond to light ; to make sure there was only one stimulus / variable ; may show phototropic response ;		[max 1]	
(c)	**1** **2** **3** **4**	seeds grown, under / in, soil ; shoots (grow upwards) to reach, light / air ; *idea that* seedlings will photosynthesise (as soon as possible) ; roots (grow downwards) to reach water / minerals ;	[max 2]	**I** ref. to support
(d)	**1** **2** **3** **4**	auxins made in shoot tip ; auxins, move to / concentrate on, lower side of shoot ; stimulate, cell expansion / elongation ; cause bending (upwards) / AW ;	[max 3]	**R** auxin produced on lower side **A** water absorption by cells **A** more growth on lower side
(e)	**1** **2** **3** **4** **5** **6**	absorbed ; enter phloem ; translocated ; movement in the phloem is up and down plant ; ref. to diffusion ; through cell membranes / from cell to cell ;	[max 2]	**R** xylem and phloem
			[Total: 9]	

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