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Cambridge International General Certificate of Secondary Education

MARK SCHEME for the October/November 2015 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.

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Abbreviations used in the Mark Scheme

- **;** separates marking points
- **/** separates alternatives within a marking point
- **R** reject
- **ignore** mark as if this material was not present
- **A** accept (a less than ideal answer which should be marked correct)
- AW alternative wording (accept other ways of expressing the same idea)
- underline words underlined (or grammatical variants of them) 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
- ecf credit a correct statement that follows a previous wrong response
- ( ) the word / phrase in brackets is not required, but sets the context
- **ora** or reverse argument
- AVP any valid point

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<table>
<tr><td>1 (a) (i)</td><td>hair / fur / whiskers ;
external ears / pinna(e) ;
nose / snout ;</td><td>max [1]</td><td></td></tr>
<tr><td>(ii)</td><td>
<table>
<tr><td>go to 2</td><td></td></tr>
<tr><td>go to 3</td><td></td></tr>
<tr><td>go to 4</td><td></td></tr>
<tr><td>go to 5</td><td></td></tr>
<tr><td>Phascolarctos cinereus</td><td>C</td></tr>
<tr><td>Vombatus ursinus</td><td>B</td></tr>
<tr><td>Sminthopsis longicaudata</td><td>A</td></tr>
<tr><td>Macropus rufus</td><td>D</td></tr>
<tr><td>Paljara tirarense</td><td>F</td></tr>
<tr><td>go to 6</td><td></td></tr>
<tr><td>Sarcophilus harrisii</td><td>E</td></tr>
<tr><td>Dasyurus maculatus</td><td>G</td></tr>
</table>
</td><td>[3]</td><td>5 or 6 correct = 3
3 or 4 correct = 2
1 or 2 correct = 1</td></tr>
</table>

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(b) (i)	meiosis ;	[1]	
(ii)	maintains / increases, population ; allows variation ; **ora** adaptation to, new / changed, environment(s) ; natural selection / evolution / formation of new species ; AVP ; e.g. two parents contribute to survival of offspring e.g. allows expression of recessive, alleles / traits / genes	max [3]	**ignore** survival unqualified
(c) (i)	gas exchange / named example with direction ; transfer of (dissolved) nutrients, from maternal (circulation) / to fetal ; transfer of excretory products, from fetal / to maternal ; by diffusion ; produces / secretes, (named) hormone ; passive immunity / antibodies, from maternal / to fetal ; prevents / limits, mixing of blood ; ref to regulating blood pressure ; AVP ; e.g. maternal / fetal <u>attachment</u> point e.g. *ref to* counter current flow / maintains concentration gradient e.g. hormone function described	max [4]	**ignore** food / nutrition for nutrients **A** glucose / amino acids / ions / water **A** urea / (nitrogenous) waste **A** progesterone / oestrogen / HCG / HPL / HCS
(ii)	protection from (mechanical) shock (of fetus) ; maintains (constant) temperature (of fetus) ; allows movement (of fetus) ; prevents dehydration ; AVP ;	max [2]	
		[Total: 14]	

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2	**(a)**	hepatic portal vein ;	[1]	
	(b)	(semi lunar) valves ; prevent backflow ; large, lumen ; low, pressure / resistance to blood flow ; thin / less elastic / less muscular, walls (than arteries) ; low blood pressure ; allows vein to be squeezed by (surrounding skeletal) muscles ;	2 + 2 max [4]	in each case the explanation must be linked to a correct feature
	(c)	= (181 – 135) ÷ 135 (× 100) ; = 34 (%) ;;	max [2]	
	(d) (i)	(liver) responds to insulin (from pancreas) ; increased, uptake / respiration, of glucose ; glucose converted to glycogen ; by enzymes ; glycogen is, insoluble / stored ; negative feedback ;	max [2]	**A** glycogenesis **R** hormones carrying out conversions directly **ignore** homeostasis
	(ii)	temperature ; water ; AVP ; e.g. pH / ions / urea / carbon dioxide	max [1]	

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(e)	deamination ; (part of excess) amino acids converted to urea ; (part of) amino acid converted to ammonia ; ammonia converted to urea ; ammonia is harmful ; (rest of) amino acid molecule, releases energy / converted to glucose / glycogen / respired ; (some amino acids) used to make proteins e.g. fibrinogen ; AVP ; e.g. transamination	max [3]	**A** description of amino group removal **ignore** protein converted to urea
(f)	bile production / AW ; breakdown / remove, hormones / red blood cells / toxins / alcohol / drugs ; storage of, iron / vitamin A / vitamin D ; AVP ; e.g. cholesterol, synthesis / AW	max [1]	**R** homeostasis, deamination, protein synthesis, transamination
		[Total: 14]	

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3 (a)	increased blood flow *or* heart, pumps / beats, faster ; more, oxygen / glucose (for muscles) / carbon dioxide removed ; more energy released by respiration ; for muscle contraction ;	max [2]	**ignore** increased, pulse rate / heart rate **R** 'energy produced' / 'energy created'
(b)	increase in, time / exercise intensity / effort, increase in lactic acid concentration ; increase is, steady / proportional ; after exercise lactic acid concentration continues to increase ; after exercise / near end of exercise, concentration levels off / AW ; appropriate use of data ;	max [3]	units must be used at least once
(c) (i)	the release of a relatively small amount of energy ; by the breakdown of glucose ; in the absence of oxygen / without oxygen ;	max [2]	**R** 'produce / AW, energy' **ignore** 'use' unqualified **ignore** air / fermentation unqualified
(ii)	(by) diffusion ;	[1]	
(iii)	(blood) plasma ;	[1]	
(d)	*in trained cyclists* lower <u>anaerobic</u> respiration / more <u>aerobic</u> respiration ; less lactic acid produced (during exercise) ; because more oxygen supplied to muscles ; less <u>oxygen debt</u> ; less oxygen required, to oxidise / breakdown, lactic acid ; (breakdown) to glucose / carbon dioxide and water ; quicker, removal / breakdown, of lactic acid ; appropriate comparative data quote with units ;	max [4]	
		[Total: 13]	

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4 (a)	root hairs ; water moves, from high water potential to low water potential / down water potential gradient ; by osmosis ; through partially permeable membrane ; through protein pores (in membrane) ;	max [4]	
(b) (i)	movement of gas / oxygen / carbon dioxide, into and out of leaf ; for, photosynthesis / respiration ; allows transpiration ; enables water to be pulled up the plant / AW ;	max [2]	**ignore** air **A** transpiration pull
(ii)	greater density / more stomata, in variety A ; four times more ;	[2]	
(iii)	more stomata / AW, in variety A ; more transpiration in variety A ; **ora** greater opportunity for loss of water vapour through stomata in variety A ; **ora** by evaporation, from surfaces of (mesophyll) cells / into air spaces (in leaf) ; loss of water from leaf (cells) lowers water potential ; (this) pulls on / creates tension (in water column in xylem) ; cohesion of water molecules / AW ;	max [3]	**A** transpiration pull **A** 'stick together' / ref to polar

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(c)	sunken stomata ; hairs ; fleshy / succulent, leaves ; thick cuticle ; small surface area ; few / shedding of, leaves ; AVP ; e.g. rolling of leaves / reflective surfaces	max [2]	**ignore** ref to stems / roots
(d)	water vapour <u>condens</u>es to form, clouds / fog / dew ; precipitation ; rainwater drains into rivers ; seeps / AW, into soil / forms ground water ;	max [2]	
		[Total: 15]	

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5 (a)	increases, landfill / rubbish heaps / AW ; swallowed / ingested / eaten / cannot be digested ; trapped / entangled / suffocate / injure / cut / strangle / AW ; plastic blocks light for photosynthesis ; release, toxins / poisons ; large pieces of plastic may block flow of water (in a river) ; reducing (concentration of) dissolved oxygen ; habitat / ecosystem, destruction / creation ; persistent / cannot decompose ; AVP **;** e.g. bioaccumulation / production of plastic pollutes the environment / eyesore	max [3]	**ignore** dies unqualified mp6 and 7 are linked
(b) (i)	more waterborne and airborne (chemical) waste to make paper bags ; plastic needs oil (extraction) ; **ora** for paper bags paper bags require trees (to be felled) ; more energy needed to make paper bags ; **ora** for plastic bags appropriate comparative use of data with units ;	max [3]	**A** deforestation / **ora** for plastic bags
(ii)	(heavy metals / acid) are toxic / harmful to organisms ; bioaccumulation / biomagnification (of heavy metal) / description ; decreases <u>pH</u> ; (acid) burns, shells / skin / plants ; aquatic, habitat / ecosystem, destruction ; AVP ; any qualified consequence of a named heavy metal	max [2]	**ignore** acid rain throughout **ignore** 'polluted' unqualified e.g. Minimata disease caused by mercury

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(c) (i)	more energy used to make than recycle (plastic bags) ; 594 kJ to make and 17 kJ (per bag) to recycle (plastic bags) ;;	max [2]	577 kJ (per bag) difference
(ii)	deforestation / description ; two examples of the effects of deforestation e.g. soil erosion / habitat loss / soil fertility / reduced biodiversity ;; increase in carbon dioxide (from deforestation / coal / oil, power stations) ; carbon dioxide is a greenhouse gas ; causes global warming / enhanced greenhouse effect ; two examples of the effects of global warming e.g. rising sea levels / climate change / desertification / increased yield ;; AVP ; e.g. increased use of fossil fuels ref to power stations, affecting breathing / asthma / causes acid rain	max [4]	
		[Total: 14]	

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6 (a)

taking a, gene / DNA / allele, from one species ;
inserting it into another organism ;

OR

changing the, genetic material / chromosome of, an organism / cell ;
by removing / changing / inserting, genes / DNA / alleles ;

max [2]

(b)

Letter from fig	Name	Description
M	chromosomes	threads of DNA found in the nucleus
N	gene / allele ;	section of DNA removed from human cell
Q	plasmid	vector / loop / circle, of DNA (that can carry a foreign section of DNA) / separate piece of DNA (from chromosome) ;
R	bacterial (cell) ; **A** yeast	type of cell that is genetically engineered
O	insulin / protein ;	specific chain of amino acids coded by the section of DNA removed from the human cell
P	fermenter	(container in which) bacteria / microorganisms / cells, reproduce / grow / produce insulin ;

[5]

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(c)	clone / (genetically) identical ; rapid / less energy to reproduce (asexually) / only one parent / no gametes ; large quantity of insulin produced ; all bacteria, have the insulin gene / produce insulin ; same insulin produced ; once cells are engineered does not have to be repeated ; AVP ; e.g. cheap / ethical *or* religious reasons / less allergic reaction / no immune rejection / more efficient / no risk of disease (transmission)	max [3]	**A** no variation only accept in context of comparisons with animal insulin extraction methods
		[Total: 10]	

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