

Biology

Advanced GCE **2805/05**

Mammalian Physiology and Behaviour

Mark Scheme for June 2010

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All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes should be read in conjunction with the published question papers and the Report on the Examination.

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Abbreviations, annotations and conventions used in the Mark Scheme	/ = alternative and acceptable answers for the same marking point ; = separates marking points NOT = answers which are not worthy of credit R = reject () = words which are not essential to gain credit <u> </u> = (underlining) key words which must be used to gain credit ecf = error carried forward AW = alternative wording A = accept ora = or reverse argument
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Question	Expected Answers	Marks
1 (a)	A – mucosa / gastric pit / gastric gland ; B – submucosa ; C – smooth muscle / longitudinal and circular muscle / muscularis externa ; D – serosa / connective tissue ;	4
(b)	ref. to protease / protein digesting / peptidase ; (inactive enzyme) prevents autodigestion / AW ; only activated when food is in stomach / only activated when HCl or acid is present ;	2 max
(c) (i)	pepsin / endopeptidase ; trypsin / chymotrypsin / endopeptidase ; exopeptidase / aminopeptidase / carboxypeptidase ;	3
(ii)	hydrolyses ; peptide bond ; detail of hydrolysis ; e.g. addition of water molecule release of, terminal amino acid / AW ;	3 max

		(iii)	villi / microvilli, increase surface area ; active transport / energy requiring process ; carrier / transport, protein ; R channel protein in cell membrane ; (facilitated) diffusion / move down concentration gradient ; cotransport ; with sodium ion ; AVP ; e.g. many mitochondria	4 max
				[Total:16]

Question			Expected Answers	Marks
2	(a)		A – sinusoid ; B – (branch of) bile duct ; C – (branch of hepatic) portal vein / HPV ; D – (branch of) hepatic artery ;	4
	(b)	(i)	X - urea ; Y – ornithine ;	2
		(ii)	converts, $\text{NH}_3 / \text{NH}_4^+$, to urea ; urea less toxic / $\text{NH}_3 / \text{NH}_4^+$ toxic ; A detoxify	2
		(iii)	ornithine / urea, cycle ;	1

	(c)	M1	ethanol oxidised ;	
		M2	by NAD / AW ; A NAD is reduced	
		M3	ethanol / alcohol, dehydrogenase ;	
		M4	to ethanal / acetaldehyde ;	
		M5	ref. ethanal / acetaldehyde, dehydrogenase ;	
		M6	to ethanoate / acetate / acetyl CoA ;	
		M7	enters Krebs cycle ;	
		M8	ATP produced ;	
		M9	acetyl CoA used for fatty acid synthesis ;	<i>max 5</i>
		E10	excess / too much, reduced NAD / less NAD (for other reactions) ;	
		E11	dehydrogenation / oxidation of fatty acids cannot take place or fatty acids cannot be broken down or other metabolic processes cannot occur ;	
		E12	fatty acids / fats / lipids / triglycerides, accumulate or ref. to fatty liver ;	
		E13	cirrhosis ;	
		E14	inflammation / hepatitis ;	
		E15	hepatocytes / liver cells, die or hepatocytes / liver cells replaced by, collagen / fibrous tissue / connective tissue / scar tissue ;	
		E16	liver blood supply compromised / AW ;	<i>max 4</i>
				7 max
			QWC - clear, well organised, using specialist terms ;	1
			<i>must include at least three of the highlighted words</i>	
				[Total:17]

Question			Expected Answers	Marks
3	(a)	(i)	stimulus causes, increase in tension / twitch ; ref. fluctuation / AW ; ref. overall increase in tension ; ref. figs (must have time units) ;	2 max
		(ii)	state of constant contraction / tension ; R paralysed alone difficulty in ingestion / jaw muscles fixed ; A lockjaw rib / intercostal, muscles remain contracted ; difficulty in, lung ventilation / breathing ; AVP ; e.g. fever / heart failure	3 max
	(b)	(i)	<i>any two of the following for one mark</i> calcium / Ca^{2+} ; phosphate / PO_4^{3-} ; magnesium / Mg^{2+} ;	1
		(ii)	(tropo)collagen ;	1
	(c)		X – (Haversian) canal ; R Haversian system Y - osteocyte / osteoblast / osteoclast ;	2
	(d)		blood (supply) ; A lymph / neurone (supplies) nutrients / oxygen ; removes waste / AW ;	2 max

	(e)	<p><i>assume hyaline cartilage and ora for bone</i></p> <p><i>any two from:</i> not as hard / softer / more flexible / compressible / elastic ; slippery / smooth ; (matrix is) chondrin / not inorganic ; (presence of) chondroblasts / chondrocytes ; no Haversian, canals / system ; no blood vessels ; receives nutrients by diffusion ;</p>	2 max
	(f)	<p>bone loses mass / bone density decreases ; figs ; e.g. <648 mg cm⁻³ / >7% per year balance between osteoblasts and osteoclasts disrupted / bone broken down faster than replaced ; action of parathormone ; calcium / phosphate, lost ; bone more, porous / brittle ; <i>max 3</i></p> <p><i>any two from:</i> pregnancy ; menopause / drop in female hormone concentration ; reduced exercise ; high intake of, caffeine / protein / salt ; smoking / alcohol in excess ; steroids ; Vit D / calcium, deficiency ; anorexia / malnutrition ; genetic factors ; <i>max 2</i></p>	4 max
			[Total: 17]

Question			Expected Answers	Marks
4	(a)		peripheral (ns) ; autonomic (ns) ; spinal cord ; cerebrum ; cerebellum ;	5
	(b)		(electrically) insulated / AW ; saltatory conduction / AW ; speeds up conduction of, impulses / action potentials ;	2 max
	(c)	(i)	heat transfer ; water has high heat capacity / water can absorb (a lot of) heat ; circulation / movement, (of CSF) ;	2 max
		(ii)	blood has lower water potential than CSF ; because of blood proteins ; osmosis occurs (from CSF to blood) ; A water moves down water potential gradient	3
	(d)		<i>accept 'white and grey matter' for neurones throughout</i> poor understanding of words / poor memory of objects is due to large loss of neurones / damage, in rear region ; no affect on hearing / loss of fine motor control is due to some loss of neurones / damage, in middle region ; speech (production) is unaffected due to increase in neurones / no damage, in front region ; figs comparing unaffected with hydrocephalic children in at least one region ;	4
				[Total: 16]

Question			Expected Answers	Marks
6	(a)		<p>X – tympanum / ear drum ;</p> <p>passes vibrations to, ossicles / hammer (malleus) ;</p> <p>Y – <u>Eustachian</u>, tube / canal ;</p> <p>equalises pressure, on both sides of tympanum / between middle ear and atmosphere ;</p> <p>R inside and outside the ear</p>	4
	(b)		prevent damage to, ossicles / cochlea / organ of Corti / sensory hair cells ;	1
	(c)	(i)	<p>little difference / similar results, up to 1 000 Hz ;</p> <p>for A there is no, loss of hearing / increase in volume of test sound ;</p> <p>for B (above 1 000Hz) there is increasing, hearing loss / volume of test sound ;</p> <p>for C at <u>4 000</u> Hz there is large, hearing loss / volume of test sound ;</p> <p>figs ;</p>	3 max
		(ii)	<p>loud / damaging, sound was of, one frequency / 4 000Hz ;</p> <p>hair cells damaged in <u>one</u> region ;</p> <p>of, basilar membrane / organ of Corti ;</p>	2 max
		(iii)	<p>(testing) apparatus ;</p> <p>background noise / have no background noise ;</p> <p>time of day ;</p> <p>same number of tests at each frequency ;</p> <p>same range of frequencies ;</p> <p>alertness of patient ;</p>	2 max
				[Total:12]

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