

2805/05 Mammalian Physiology and Behaviour

June 2005

Mark Scheme

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)	(cortex is group of), specialised / similar / same, <u>cells</u> / <u>neurones</u> ; performing, similar / same / named, function ; brain is made of, more than one / different <u>tissue(s)</u> ; carrying out more than one function / AW ;	max 3
(b)	large(r) surface area ; idea of more cells / neurones (in given space) ; idea of more 'processing power' / AW ;	max 2
(c)	'shock absorber' / mechanical protection ; removes (excess) heat / cools the brain ; supplies oxygen ; supplies (named) nutrient ; removes, (named) waste / carbon dioxide ; ref to osmoregulation ; AVP ; (e.g. ref to macrophages or white blood cells)	R protection unqualified max 2
(d)	<u>planning a task</u> ;	1
(e)	<i>accept 'white and grey matter' for neurones throughout</i>	
1	idea of largest, loss of neurones / damage, in rear of brain ;	
2	explains poor understanding of words / poor memory of objects ;	
3	(some / less) damage / loss of neurones, in middle (region) ;	
4	affecting motor control ;	
5	(but) not affecting hearing ;	
6	no damage / increase in neurones, in front (region) ;	
7	speech (production) unaffected ;	
8	ref to paired figures / manipulated figures ;	max 4
		[Total: 12]

Question	Expected Answers	Marks
2 (a)	<p>X = oxyntic / parietal ;</p> <p>Y = chief / peptic ; A zymogen</p> <p>lipase / mucus / water / (Castle's) intrinsic factor / HCO_3^- ;</p>	3
(b) (i)	<p><u>aerobic</u> respiration / supply ATP / supply energy ; R produce energy (for) active transport / pumping ;</p> <p>of hydrogen ions / protons ;</p> <p>exocytosis ;</p>	max 2
(ii)	<p>modification / processing / idea of change in structure, of protein ;</p> <p>packaging / making vesicles ;</p> <p>of, pepsinogen / inactive enzyme / precursor ; R protein or pepsin</p>	max 2
(c) 1	impulses along, parasympathetic / motor, neurone / axon ; A vagus	
2	vesicles move towards membrane ;	
3	release of acetylcholine ;	
4	(causes) release of gastrin (from G cell) ;	
5	gastrin, enters capillary / carried in blood / AW ;	
6	gastrin binds to receptors on E cell ;	
7	(causes) histamine release ;	
8	histamine / gastrin, binds to receptors on, cell X / oxyntic cell / parietal cell ;	
9	<u>exocytosis</u> of, ACh / gastrin / histamine ;	
10	<u>diffusion</u> between cells of, histamine / gastrin / ACh ;	max 5
(d)	<p>idea of complementary shape ;</p> <p>bind to / blocks, (histamine) receptors / histamine binding site ;</p> <p>less / no, secretion of HCl ;</p>	max 2
(e)	<p><i>endopeptidase</i></p> <p>breaks / hydrolyses, peptide bond ;</p> <p>within, polypeptide / protein ; A 'breaks up into smaller pieces'</p> <p><i>hydrolysis</i></p> <p>breaking of, suitable named bond ;</p> <p>using / adding, water ;</p>	max 3

[Total: 17]

- 3 (a) **M** = neural spine / neural process ;
attachment of, ligaments / muscles ; **R** articulates
- N** = neural canal / neural channel / foramen ;
protects / allows passage of, spinal cord ; **R** spine **4**
- (b) support greater, load / weight ; *comparative statement* **1**
- (c) **T** correctly labelled ;
A correctly labelled ; **2**
- (d) *C1 to C14 to max 5*
- C1** osteoarthritis affects cartilage ;
C2 osteoporosis affects bone ;
- C3** osteoarthritis due to 'wear and tear' on joints ; **A** ref to 'load bearing'
C4 vigorous use / overuse, of joints ;
C5 ref to, sport / dance / lifting job ; **A** relevant activity
C6 more cartilage breakdown than replacement ;
C7 less, collagen / glycoprotein ;
- C8** osteoporosis due to loss of bone, mass / density ;
C9 idea of osteoclasts more active than osteoblasts ;
- C10** loss of calcium phosphate / demineralisation ;
C11 ref to, menopause / low oestrogen ;
C12 diet low in, calcium / vitamin D ;
C13 bone density less than 648 mg cm^{-3} ;
C14 AVP ; e.g. smoking / steroid use
- S1 to S6 to max 3*
- S1** pain during movement in osteoarthritis ;
S2 reduced mobility (of joint / limb) ;
S3 inflammation of joint ;
- S4** (increased chance of) fractures in osteoporosis ;
S5 immobility ;
S6 pain qualified ; e.g. sciatica ;
S7 AVP ; **max 7**
- QWC – legible text with accurate spelling, punctuation and grammar ;** **1**

[Total: 15]

Question	Expected Answers	Marks
4 (a)	ref parasympathetic NS / AW ; sympathetic NS less active / AW ; more impulses in vagus nerve / less impulses in accelerator nerve ; more acetylcholine / less noradrenaline ; effect on SAN ;	max 3
(b)	<i>any two of</i> fibrinogen ; R fibrin prothrombin ; R thrombin albumin ; A albumen (named) globulin ; R immunoglobulin or antibodies AVP ; e.g. transferrin	max 2
(c)	<i>similarities</i> 1 production of urea ; 2 urea transported in blood ; 3 urea filtered from blood ; 4 synthesis of proteins from amino acids ; <i>differences (assume refs are to brown bears unless otherwise stated)</i> 5 amino acids synthesised from ammonia ; 6 <u>all</u> urea reabsorbed ; 7 from kidney <u>and</u> bladder ; 8 urea converted to ammonia by <u>bacteria</u> ; 9 AVP ; e.g. (humans) less tolerant to high ammonia (in blood)	max 5
(d)	component of cell membranes / AW ; ref to, mechanical stability / impermeability / fluidity ; production of, steroid hormone / named hormone ; production of vitamin D ; production of bile salts ;	<i>ignore rigidity</i> max 3
(e)	increases high density lipoproteins (HDLs) ; reduces low density lipoproteins (LDL) ; prevents, deposition of cholesterol / plaques / atherosclerosis ;	max 2
		[Total: 15]

Question	Expected Answers	Marks
5 (a)	ulna ;	1
(b)	rapid / almost immediate / AW ; automatic / no conscious thought / does not involve brain ; (co-ordinated by) spinal cord / (only) three neurones involved ; no learning / innate / instinctive / AW ;	max 3
(c)	<ol style="list-style-type: none"> 1 depolarisation of spindle ; 2 generator / receptor, potential ; 3 ref to threshold ; 4 action potential / impulse ; 5 sensory neurone ; 6 synapse with, relay / intermediate, neurone ; 7 exocytosis of, neurotransmitter / ACh ; A description of exocytosis 8 diffusion (of neurotransmitter / ACh) across cleft ; 9 action potential in motor neurone ; 10 to, end plate / neuromuscular junction ; 11 binding of transmitter to <u>receptors</u> (on sarcolemma) ; 12 depolarisation of sarcolemma / AW ; 13 spreads down T-tubules ; A T-tubes 14 calcium ions released from, sarcoplasmic reticulum / SER / cisternae ; 15 calcium ions bind to troponin ; 16 tropomyosin moves ; 17 exposes myosin binding site (on actin) ; 18 ref to, sliding filaments / cross-bridges / ratchet mechanism ; 19 AVP ; e.g. sarcomere shortens / ATPase involved 	max 8
	QWC – clear well organised, using specialist terms ;	1
	<i>award the QWC mark if four of the following are used in correct context</i>	
	depolarisation T-tubules	
	threshold sarcoplasmic reticulum	
	synapse troponin	
	sarcolemma tropomyosin	
(d)	<ol style="list-style-type: none"> 1 proteins needed for repair / AW ; 2 more transcription of, DNA / genes ; 3 more translation ; 4 protein synthesis ; 5 named protein ; e.g. actin / myosin / troponin / tropomyosin <p><i>ignore all refs to muscle contraction</i></p> <ol style="list-style-type: none"> 6 more <u>aerobic</u> respiration ; 7 so more, energy released / ATP produced ; 8 (energy required for) condensation / anabolic, reactions ; 9 (energy required for) formation of peptide bonds ; 10 (energy required for) formation of extra mRNA ; 	max 5

[Total: 18]

Question	Expected Answers	Marks
6 (a)	<p>X = tympanum / tympanic membrane / eardrum ; passes vibrations to, ossicles / malleus / hammer ;</p> <p>Y = Eustachian, tube / canal ; equalises pressure (on either side of tympanum) ;</p>	4
(b)	<p>prevent damage to ossicles ; prevent damage to, cochlea / organ of Corti / sensory hair cells ;</p>	2
(c) (i)	<p>1 little difference / similar results, up to 1,000 (Hz) ; R no difference 2 no, loss of hearing / increase in volume of test sounds, for person A ; 3 increasing, hearing loss / volume of test sounds, for person B (above 1,000Hz) ; 4 large, hearing loss / increase in volume of test sound, for person C at <u>4,000</u> (Hz) ; 5 quote fig(s) with both units ;</p>	max 3
(ii)	<p>loud / damaging, sound was of, one frequency / 4 000 Hz ; (causes) damage to / loss of, stereocilia / hair cells ; in (only) one region ; of, basilar membrane / organ of Corti / hair cells ;</p>	max 2
(iii)	<p>(testing) apparatus ; background noise / no background noise ; time of day ; same number of tests at each frequency ; same range of frequencies ; AVP ; e.g. alertness of patient R gender, age</p>	max 2

[Total: 13]