

**Subject: Mammalian Physiology and Behaviour**  
**Code: 2805/05**

**Session: January Year: 2002**

**Mark Scheme**

<b>MAXIMUM MARK</b>	<b>90</b>
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## ADVICE TO EXAMINERS ON THE ANNOTATION OF SCRIPTS

1. Please ensure that you use the **final** version of the Mark Scheme.  
You are advised to destroy all draft versions.
2. Please mark all post-standardisation scripts in red ink. A tick (✓) should be used for each answer judged worthy of a mark. Ticks should be placed as close as possible to the point in the answer where the mark has been awarded. The number of ticks should be the same as the number of marks awarded. If two (or more) responses are required for one mark, use only one tick. Half marks ( $\frac{1}{2}$ ) should never be used.
3. The following annotations may be used when marking. No comments should be written on scripts unless they relate directly to the mark scheme. Remember that scripts may be returned to Centres.
  - x = incorrect response (errors may also be underlined)
  - ^ = omission mark
  - bod = benefit of the doubt (where professional judgement has been used)
  - ecf = error carried forward (in consequential marking)
  - con = contradiction (in cases where candidates contradict themselves in the same response)
  - sf = error in the number of significant figures
4. The marks awarded for each part question should be indicated in the margin provided on the right hand side of the page. The mark total for each question should be ringed at the end of the question, on the right hand side. These totals should be added up to give the final total on the front of the paper.
5. In cases where candidates are required to give a specific number of answers, (e.g. 'give three reasons'), mark the first answer(s) given up to the total number required. Strike through the remainder. In specific cases where this rule cannot be applied, the exact procedure to be used is given in the mark scheme.
6. Correct answers to calculations should gain full credit even if no working is shown, unless otherwise indicated in the mark scheme. (An instruction on the paper to 'Show your working' is to help candidates, who may then gain partial credit even if their final answer is not correct.)
7. Strike through all blank spaces and/or pages in order to give a clear indication that the whole of the script has been considered.
8. An element of professional judgement is required in the marking of any written paper, and candidates may not use the exact words that appear in the mark scheme. If the science is correct and answers the question, then the mark(s) should normally be credited. If you are in doubt about the validity of any answer, contact your Team Leader/Principal Examiner for guidance.

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<b>Abbreviations, annotations and conventions used in the Mark Scheme</b>	/ = alternative and acceptable answers for the same marking point ; = separates marking points NOT = answers which are not worthy of credit ( ) = words which are not essential to gain credit <u>      </u> = (underlining) key words which <b>must</b> be used to gain credit ecf = error carried forward AW = alternative wording ora = or reverse argument
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Question	Expected Answers	Marks
1 (a) (i)	A: hepatic vein; B: (hepatic) portal, vein / vessel;	2
(ii)	highest level of carbon dioxide: A; highest level of oxygen: C; highest level of insulin: B, highest level of glucose soon after eating: B; highest level of glucose 12 hours after eating: A;	5
(b) (i)	<i>any 4 of the following</i> bile pigments / biliverdin; bilirubin; bile salts / Na glycocholate; Na taurocholate; cholesterol; (inorganic) salts / NaHCO <sub>3</sub> ;	4 max
(ii)	allows lipids to form an emulsion; decreases surface tension of, fats / oil droplets; increases surface area of droplets; allows more efficient breakdown by lipase; neutralises the acidic, chyme / stomach contents; method of excretion; and detail, e.g. products of haemoglobin breakdown; <b>A</b> bile salts 'activate' lipase;	4 max
<b>[Total: 15]</b>		

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<b>Question</b>	<b>Expected Answers</b>	<b>Marks</b>
<b>2 (a) (i)</b>	D: cerebrum / cerebral hemisphere (frontal lobe); E: medulla (oblongata); <b>A</b> pons (Varolli) F: cerebellum; G: corpus callosum;	<b>4</b>
<b>(ii)</b>	D: conscious thought / co-ordination of voluntary activity / learning / reasoning / intelligence / association of incoming information;  E: regulation of autonomic activities / heart rate / blood pressure control / breathing rate / pharyngeal activity e.g. coughing;  F: co-ordination of balance / muscle co-ordination / reflex control of posture / control of locomotory actions;  G: (nerve fibre tract) linking left and right hemispheres / AW;	<b>4</b>

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(b) *changes to max 5*

- 1 neurones have shorter / fewer neural connections / synapses / dendrites / axons with other neurones;
- 2 tangled clumps of microtubules / tau in cytosol / neurofibrillary tangles;
- 3 disrupt cell metabolism;
- 4 (beta) amyloid / protein plaques develop between neurones;
- 5 lower than normal amounts of, neurotransmitter / ACh;
- 6 deficiency of choline acetyltransferase;
- 7 enlarged ventricles;
- 8 neurones, lost / die steadily;
- 9 qualification e.g. brain 10% mass loss after 80y;
- 10 ref to possible inherited cause by mutated beta amyloid gene on chromosome (21); max 5

*symptoms to max 4*

- 11 loss in memory;
- 12 in hippocampus / base of cerebrum / cerebral hemispheres / fore-brain;
- 13 important for short term memory / short term memory 'circuits' destroyed; recent memory cannot be transferred to long-term memory;
- 14 deterioration in language;
- 15 loss of cognitive function / loss of awareness;
- 16 possible personality changes;
- 17 loss of social skills / described; max 4
- 18

**max 8**

**Q – legible text with accurate spelling punctuation and grammar;**

**1  
max 9**

**[Total: 17]**

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<b>Question</b>	<b>Expected Answers</b>	<b>Marks</b>
<b>3 (a)</b>	secreting into a duct / secretions <u>not</u> carried away by blood system;	<b>1</b>
<b>(b)</b>	to carry away pancreatic juice / AW;	<b>1</b>
<b>(c)</b>	duodenum / small intestine;	<b>1</b>
<b>(d) (i)</b>	trypsin(ogen); chymotrypsin(ogen); (pro-) carboxypeptidase; lipase; amylase; (exo) peptidases; nucleases;	<b>4 max</b>
<b>(ii)</b>	contains $\text{NaHCO}_3$ / $\text{HCO}_3$ ; used to help neutralise the chyme / stomach contents; provide right pH for enzymes;	<b>2 max</b>
<b>(e)</b>	<i>problems to max 3</i> lack of fat digestion; greasy faeces; poor / less, protein digestion; more mucus; lack of neutralisation of chyme;  <i>treatment to max 2</i> <i>provide capsules with</i> proteases; with lipases; with alkaline compounds;	<b>5 max</b>
		<b>[Total: 14]</b>

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<b>Question</b>	<b>Expected Answers</b>	<b>Marks</b>
4 (a) (i)	M;	
(ii)	K;	
(iii)	J;	
(iv)	L;	4
(b)	c <sub>1</sub> 425 nm; c <sub>2</sub> 530 nm;	2
(c)	peak sensitivity at 560-70 nm is in the yellow/green band, not red;	1
(d)	white;	1
(e)	blue requires, peak / much, stimulation of 'blue' cones <u>and</u> , low / weak, stimulation of green cones; violet colour perceived due to stimulation of blue cones alone;	2
(f) 1	autonomic nervous system controls 'smooth' muscle of iris;	
2	iris has 2 sets of muscles, circular muscles and radial muscles;	
3	work antagonistically;	
4	sympathetic system controls radial muscle (pupil opens);	
5	parasympathetic system controls circular muscle (closes pupil);	
6	amount of light detected by retina;	
7	nerve impulses pass from retina to brain;	
8	too much light hitting retina;	
9	reflex action occurs and impulses sent to iris;	
10	circular muscle contracts due to impulses down parasympathetic nerve fibres, radial relaxes pupil constricts;	
11	with low light intensity, reverse;	
12	reflex occurs and radial muscle contracts due to impulses down sympathetic nerve fibres, circular relaxes, pupil dilates;	max 7
	<b>Q – clear, well organised answer, using specialist terms;</b>	1
		max 8
		<b>[Total: 18]</b>

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<b>Question</b>	<b>Expected Answers</b>	<b>Marks</b>
<b>5 (a)</b>	hinge joint; <b>A</b> 'lever' joint	<b>1</b>
<b>(b)</b>	correct drawing in and labeling of the hyaline cartilage; at two articular surfaces;	<b>2</b>
<b>(c)</b>	inflammation; loss of cartilage; calcification of the joint capsule; reduced joint flexibility / movement becomes difficult; friction causes bone erosion;	<b>3 max</b>
<b>(d)</b>	hyaline cartilage reduces friction; absorbs shock; synovial membrane secretes synovial fluid; oily fluid to lubricate joint / AW; biceps, is a flexor muscle / contracts to 'bend' arm; triceps, extensor muscle / contracts to extend / 'straighten' arm; humerus acts as, anchor / origin, of biceps / triceps muscles / AW; radius for insertion of biceps tendon; ulna for insertion of triceps tendon;  tendons, connect muscles to bones, inelastic; (capsular) ligaments connect bones to bones; <b>R</b> 'hold things in place' prevent dislocation;	<b>8 max</b>
		<b>[Total: 14]</b>



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<b>Question</b>	<b>Expected Answers</b>	<b>Marks</b>
6 (a)	many boxes which do not need observing; untrained persons can supervise; results, recorded / displayed, on 'ticker tape';	2 max
(b)	less frequent rewards; speeded up learning / lever pressing;	2
(c)	<i>stimulus</i> light bulb shines; <i>response</i> press lever / appearance of food reward;	2
(d)	learned / operant conditioning / positive reinforcement;	1
(e)	a study of how behaviour changes not, actual / natural, behaviour; situation very artificial / all work in laboratory; innate animal behaviour not observed; a very mechanistic approach;	2 max
(f)	<i>idea that</i> Kohler an ethologist, looking for different things; studied more natural behaviour of the animals; not 'changed' / 'experimental', behaviour; not in artificial lab. situation; studied larger number of species; Skinner only studied (small number of) lab. animals; <b>A</b> ref to subjective v objective approach; AVP;	3 max
		<b>[Total: 12]</b>