

Question	Answer	Marks	Guidance				
4 (a)	any two from: involuntary/automatic/without thinking; rapid/fast/quick/immediate; short-lived/doesn't last long;	1	two answers required for one mark				
(b) (i)	A – receptor; B – sensory neuron; C – relay/intermediate neuron; D – motor neuron; E – effector/muscle;	3	5 correct responses = 3 marks 3 or 4 correct responses = 2 mark 2 correct responses = 1 marks 0 or 1 correct responses = 0 marks if 'neuron' is missing throughout, deduct one mark allow nerve/nerve cell for neuron throughout ignore CNS allow effector neuron				
(ii)	... no processing of information is required. <table border="1" data-bbox="863 1122 1007 1895"> <tr><td>✓</td></tr> <tr><td></td></tr> <tr><td></td></tr> <tr><td></td></tr> </table>	✓				1	if more than one box is ticked = 0 marks
✓							
(c)	max 2 for identifying: reflex/response = crying / fear (1) primary stimulus = (loud) noise (1) secondary stimulus = rat (1) the (reflex) response becomes associated with secondary stimulus/rat (regardless of presence of primary stimulus) (1)	3					
	Total	8					

Question Answ	er	Marks	Guidance
6 (a)	<p>effector – produces/creates the response</p> <p>processing centre – receive information/coordinate responses</p> <p>receptor – to detect stimuli</p>	2	<p>3 correct responses = 2 marks 1 or 2 correct responses = 1 mark</p> <p>accept named example – muscle contraction/ gland secretion/ creates action reject reference to stimulus ignore causes a change</p> <p>ignore spinal cord/ CNS but reject brain/ decides accept 'tells effector what to do' ignore processing</p> <p>accept reacts to stimulus</p>
(b)	<p>(i)</p> <p>neuron B has highest (mean) value/neuron B has two highest values (104 & 91)/neuron C has lowest result and so it is not C ;</p> <p>idea of outlier/value 104/ 4th result in data for neuron B ;</p> <p>outlier increased mean for neuron B/correct recalculation of the mean for neuron B (79) ;</p> <p>range of B is large/much more variation in data for B (compared to A) ;</p> <p>the value of B is only slightly above A/the two ranges overlap/idea of no real difference ;</p>	3	<p>if arguments only in support of neuron A = 2 marks</p>
(ii)	<p>a number of values in A are greater than some in B prevents impulses leaving the neuron (1) prevent impulses entering from an adjacent neuron (1)</p>	2	<p>accept reverse argument reject messages/ electricity/ signals ignore mixed up/speeding up accept 'interfering' with other neuron = 1 max.</p>

Question Answer	er	Marks	Guidance
6 (d)	<p>Level 3 (5–6 marks) Good suggested explanation of why impulse is one-directional AND linked to description of events at the synapse. Quality of written communication does not impede communication of the science at this level.</p> <p>Level 2 (3–4 marks) Good detailed description of events at the synapse. Quality of written communication partly impedes communication of the science at this level.</p> <p>Level 1 (1–2 marks) Good basic description of events at the synapse. Quality of written communication impedes communication of the science at this level.</p> <p>Level 0 (0 marks) Insufficient or irrelevant science. Answer not worthy of credit.</p>	6	<p>This question is targeted at grades up to A*</p> <p>Indicative scientific points may include:</p> <p>Explanation of one-way transmission</p> <ul style="list-style-type: none"> • only the sensory neuron (not the relay neuron) can produce/release the chemicals/transmitter substances • only the relay neuron (not the sensory neuron) membrane contains the receptor molecules needed to trigger an impulse. • only the sensory/first neuron has reuptake channels/sites for (breakdown products of) chemicals/transmitter substances <p>Description of events at synapse</p> <p>Detailed</p> <ul style="list-style-type: none"> • impulse causes release of chemicals/transmitter substances • chemicals/transmitter substances diffuse across the gap • chemicals/transmitter substances bind to receptor molecules on the membrane of the relay neuron • only specific chemicals can bind to the receptor molecules • when bound to the receptor molecules the chemicals trigger/initiate a nerve impulse at the membrane of the relay neuron • chemicals/transmitter substances broken down/reabsorbed (into sensory/first neuron) <p>Basic</p> <ul style="list-style-type: none"> • synapse is a gap between adjacent neurons/between the sensory and relay neuron • sensory/first neuron releases chemicals into gap • impulse carried across the synapse/gap • chemicals cause an impulse at relay/second neuron <p>Use the L1, L2, L3 annotations in Scorris; do not use ticks.</p>
	Total	13	

Question	Expected Answer	Marks	Additional Guidance
5	<p>a</p> <p>Level 3 (5-6 marks) Good description of synaptic transmission AND An explanation of how antidepressants may work</p> <p>Quality of written communication does not impede communication of the science at this level</p> <p>Level 2 (3-4 marks) A description of transmission at a synapse AND ref. to how antidepressants might work OR A good description of transmission at a synapse</p> <p>Quality of written communication partly impedes communication of the science at this level</p> <p>Level 1 (1-2marks) A description of transmission at a synapse. OR Ref. to how antidepressants might work</p> <p>Quality of written communication impedes communication of the science at this level</p> <p>Level 0 (0 marks) Insufficient or irrelevant science. Answer not worthy of credit</p>	6	<p>This question is targeted at grades up to A*</p> <p>Indicative scientific points may include</p> <p>Synaptic transmission</p> <ul style="list-style-type: none"> • electrical impulse arrives at the first neuron • chemicals / (named) neurotransmitters are released into the gap / cleft • chemicals diffuse across gap • receptors (on the second neurone) (chemicals) bind to receptors • on the second neuron • electrical impulse is generated • chemical is reabsorbed back in to first neuron via the re uptake channels <p>How antidepressants work</p> <ul style="list-style-type: none"> • drug blocks the re-uptake channels • stops reabsorption (of serotonin) • the concentration of serotonin increases / serotonin remains (in the synaptic cleft) • so more serotonin to bind to receptors • drug may bind to receptors • so more impulses generated

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6 (a)	(helps the animal) find food/find shelter/avoid a predator	1	accept movement away from stimulus e.g. light ignore new born reflexes e.g. suckling/grasping										
(b)	<table border="1" style="width: 100%;"> <tr> <td>...is given along with a primary stimulus.</td> <td style="text-align: center;">✓</td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> </tr> <tr> <td>...has no direct link to the final response.</td> <td style="text-align: center;">✓</td> </tr> <tr> <td> </td> <td> </td> </tr> </table>	...is given along with a primary stimulus.	✓					...has no direct link to the final response.	✓			2	1 mark for each correct tick
...is given along with a primary stimulus.	✓												
...has no direct link to the final response.	✓												
Total		3											

Question	Answer	Marks	Guidance
7 (a)	sensory motor sensory transmitter substance	1	3 or 4 correct responses = 1
(b)	A C D B	1	
Total		2	

Question	Expected Answers	Marks	Additional Guidance
7 a	Any two from: A / flashing lights OR C /hearing music, is <u>sensory</u> ; B / movement / muscle / effector is <u>motor</u> ; C is not lower back / B is not upper front ora ; Not enough information to be certain / AW ;	2	
b	SSRIs break down serotonin molecules. SSRIs stop serotonin from being produced. SSRIs block sites where serotonin is removed from the synapse. ✓ SSRIs stimulate the serotonin receptor sites on the second neuron. ✓ SSRIs slow down the production of serotonin. SSRIs have a similar effect to serotonin. ✓ SSRIs are rapidly broken down in the synapse. SSRIs effects are due to an increased serotonin concentration in the synapse. ✓	3	4 correct = 3 marks 3 correct = 2 marks 2 correct = 1 mark Each extra tick negates one correct tick
c	Any two from: Idea that patient may not benefit directly; Patient may be harmed ; Idea of informed consent / patient cannot give consent ;	2	
	Total	[7]	

Question	Expected Answer	Marks	Additional Guidance
6	Cerebral cortex	1	Accept cerebrum / cerebral hemispheres /pre – frontal cortex
a	i	1	Ignore memory Accept up to 10 years
	ii		
	<p>any one from</p> <p>idea of some children (are found when they) are too old to learn language skills / Idea that language develops at an early age :</p> <p>idea of neurone pathways (for language)form earlier in life / neurone pathways (for language)less likely to form later in life / neurone pathways (for language)not formed</p>		
b	<p>any two from</p> <p>electrical stimulation is invasive / MRI scans are not invasive;</p> <p>electrical stimulation has risk / MRI has less risk ;</p> <p>electrical stimulation could harm / damage (named) parts of the brain / cause infection /death / pain OR MRI causes less or no damage etc ;</p>	2	<p>ignore references to ethics / religion</p> <p>accept description of invasive, such as need to cut the skull/inserts electrodes into the brain</p> <p>Accept dangerous Ignore not safe / no risk</p> <p>Ignore side effects</p>
	Total	4	

Question	Answer	Marks	Guidance
8 (a)	<p>Level 3 (5–6 marks) Identification of some features and detailed description of mechanisms to include neurons. Quality of written communication does not impede communication of the science at this level.</p> <p>Level 2 (3–4 marks) Identification of a feature and an incomplete description of a mechanism Quality of written communication partially impedes communication of the science at this level.</p> <p>Level 1 (1–2 marks) Identifies a feature OR a statement about the mechanism. Quality of written communication impedes communication of the science at this level.</p> <p>Level 0 (0 marks) Insufficient or irrelevant science. Answer not worthy of credit.</p>	6	<p>The question is targeted at grades up to A*</p> <p>Relevant points include:</p> <p>Mechanisms:</p> <ul style="list-style-type: none"> • learning involves new neuron pathways forming • repetition will strengthen new pathways • repetition means new pathways are more likely to transmit • damaged area bypassed • brain neurons do not regenerate <p>Features:</p> <ul style="list-style-type: none"> • cerebral cortex identified as part of the brain affected by stroke • cerebral cortex is part of brain concerned with language/communication/speech neurons in brain • billions of neurons in brain • large number of neurons gives capacity to learn <p>ignore reference to the damaged site repairing</p>

Question	Answer	Marks	Guidance
(e)	<p>(Level 3) Answer includes a detailed description of the model with well-described links to the way it relates to the investigation. Quality of written communication does not impede communication of the science at this level. (5 – 6 marks)</p> <p>(Level 2) Answer includes a detailed description of model. Quality of written communication partly impedes communication of the science at this level. (3 – 4 marks)</p> <p>(Level 1) Answer includes a basic description of the model with some features of the model missing. Quality of written communication impedes communication of the science at this level. (1 – 2 marks)</p> <p>(Level 0) Insufficient or irrelevant science. Answer not worthy of credit. (0 marks)</p>	6	<p>This question is targeted at grades up to A*</p> <p>Indicative scientific points include:</p> <p>features of model:</p> <ul style="list-style-type: none"> • memory is the storage and retrieval of information • information held in short term memory • information can be moved to long term memory/stored by repetition / reinforcement • recalling the information is called retrieval • lack of reinforcement means information can be forgotten • this represents as an 'exit route' within models for memory <p>allow any clear reference to the points above shown in a labelled diagram</p> <p>link to investigation:</p> <ul style="list-style-type: none"> • the sequence of numbers represented the information • models are limited in explaining how memory works • more likely to remember the sequence if there is a pattern, e.g. 5, 10, 15 at the start • credit any valid link between noise and results in the experiment, e.g. in quiet room it is easier to repeat sequence so more likely to remember, in loud room more distractions/stimuli
	Total	14	
	Paper total	60	