

Question	Answer	Marks	Guidance
1 (a) (i)	<p>A dendrite(s) ;</p> <p>B dendron (membrane) ;</p> <p>C cell body (of neurone) ;</p> <p>D axon (membrane) ;</p>	4	<p>Mark the first answer on each prompt line. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>A DO NOT CREDIT sensory receptor</p> <p>B DO NOT CREDIT dendrion (as inclusion of the 'i' means that it can be confused with dendrite)</p>
1 (a) (ii)	direction of (conduction / travel / transmission), impulse / action potential ;	1	<p>DO NOT CREDIT signal / message</p> <p>DO NOT CREDIT 'action potential' alone</p>

Question	Answer	Marks	Guidance
1 (b)	<p><i>pumping / active</i></p> <p>1 sodium-potassium pump, uses ATP / uses energy / by active transport / (pumps) actively ;</p> <p>2 pumps / actively moves, sodium ions / Na⁺, out of, cell / axon / neurone, <u>and</u>, potassium ions / K⁺, in ;</p> <p><i>passive / diffusing</i></p> <p>3 K⁺, diffuse / move / flow / leak, (freely) back out (of cell) ;</p> <p>4 membrane less permeable to Na⁺ / fewer Na⁺ channels open, so fewer Na⁺, diffuse / move / flow / leak, back in ; ora</p> <p>5 voltage-gated (Na⁺), channels closed ;</p> <p>6 AVP ;</p> <p>QWC – technical terms used appropriately and spelled correctly ;</p>	3 max	<p>If symbol for ion not used, must refer to ion IGNORE ref to value of resting potential</p> <p>1 DO NOT CREDIT if referring to 2 separate pumps</p> <p>2 IGNORE numbers / ratio for this mark DO NOT CREDIT in context of (diffusion) channels</p> <p>4 Looking for a comparative statement referring to permeability and its consequence ACCEPT 'K⁺ move out (20x) faster than Na⁺ move in' for idea of more K⁺ moving out IGNORE ref to impermeable to Na⁺ / all Na⁺ channels closed</p> <p>5 IGNORE ref. ligand-gated channels</p> <p>6 e.g. <ul style="list-style-type: none"> • 3 Na⁺ out and 2 K⁺ in • build up of +ve ions outside • large (numbers of), anions / -ve ions, inside • ref to negatively charged proteins </p> <p>Note 'pumps 3 Na⁺ out and 2 K⁺ into cell' = 2 marks (mp 2 and mp 6) 'the Na/K pump actively moves 3 Na⁺ out of and 2 K⁺ into axon' = 3 marks (mps 1, 2 and 6)</p> <p>Use of three terms from: sodium-potassium pump, ion(s), diffuse (or derived term), permeable, voltage-gated</p> <p>Please insert a QWC symbol next to the pencil icon, followed by a tick (✓) if QWC has been awarded or a cross (x) if QWC has not been awarded. You should use the green dot to identify the QWC terms that you are crediting.</p>

Question		Answer	Marks	Guidance
1	(c) (i)	<p>X depolarisation ;</p> <p>Y repolarisation ;</p> <p>Z hyperpolarisation ;</p>	3	<p>Mark the first answer on each prompt line. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>As the term is asked for, IGNORE descriptions</p> <p>X ACCEPT depolarise(d) / depolarising</p> <p>Y ACCEPT repolarise(d) / repolarising</p> <p>Z ACCEPT hyperpolarise(d) / hyperpolarising</p> <p>IGNORE refractory period</p>
1	(c) (ii)	<p><u>threshold</u> (potential / value / voltage) ;</p>	1	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>DO NOT CREDIT threshold frequency</p>
1	(c) (iii)	<p>1 idea that only stimuli , that reach / are greater than , threshold value / -50mV , produce an action potential ; ora</p> <p>2 (when stimulated) action potential either occurs or does not / all-or-nothing (law) ;</p> <p>3 idea that the action potential is the same (magnitude / size) , no matter how strong the stimulus / even if strength of stimulus increases ;</p> <p>4 idea that a strong stimulus produces many action potentials (in rapid succession) ;</p>	2 max	<p>IGNORE ref to refractory period as Figs do not indicate this</p> <p>Note 'strong stimulus increases frequency but not magnitude of action potential' = 2 marks (mps 3 & 4)</p>
Total			15	

Question	Answer	Mark	Guidance
5 (a)	<p>both have</p> <ol style="list-style-type: none"> 1 dendrite(s) ; 2 an axon ; 3 a cell body with a , nucleus / named organelle ; 4 myelin sheath / myelinated / (covered with) Schwann cell / nodes of Ranvier ; 5 <u>voltage-gated</u> channels / sodium-potassium (ion) pump ; <p>3 max</p> <p>QWC ;</p>	1	<p>1 DO NOT CREDIT if states that motor neurone has dendrites and a dendron</p> <p>3 e.g. mitochondria / Golgi / SER / RER</p> <p>4 CREDIT may have / can have</p> <p>Award if 3 of the following terms have been used in a correct context with correct spelling: dendrite(s) axon(s) cell body(ies) myelin (or derived term) schwann</p> <p><i>Please insert a QWC symbol next to the pencil icon, followed by a tick (✓) if QWC has been awarded or a cross (✗) if QWC has not been awarded. You should use the green dot to identify the QWC terms that you are crediting.</i></p>
5 (b)	<p>M ;</p> <p>B ;</p> <p>M ;</p>	3	<p>Mark the first answer in each box. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p>

Question	Answer	Mark	Guidance
5 (c)	(i) 1 evaporation will , have a cooling effect / reduce (body) temperature ; 2 heat , taken from / supplied by , the body / blood / skin , is , needed / used for , evaporation ; 3 <i>idea that</i> water has a high latent heat of , vaporisation / evaporation ;	2 max	2 ACCEPT evaporation uses latent heat Look for a clear statement that body heat is being used for evaporation 3 e.g. evaporation of water needs a lot of , energy / heat
5 (c)	(ii) <i>idea that</i> to increase body temperature as it is lower than the 'new' set-point (even though body is hot) ;	1	e.g. as the new 'normal' body temperature is higher, the body is using shivering to raise the temperature of the internal environment.
5 (d)	1 vasodilation results in more blood nearer to the skin surface ; 2 <i>idea that</i> will lose (even) more heat / further heat loss (from body) / body temperature decreases further ; 3 (named) organ(s) will not be able to maintain , function / metabolism ;	2 max	1 Vasodilation must be in correct context (arterioles). DO NOT CREDIT (large) arteries / capillaries / veins , relaxing / dilating / expanding DO NOT CREDIT blood vessels moving closer to the surface 2 just 'the body loses heat' is not enough 3 ACCEPT ref to lack of kinetic energy for enzymes ACCEPT ref to lack of enzyme activity
	Total	12	

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2 (a) (i)	it converts energy (mechanical) into , another / different , form of energy (electrical) ;	1	If type of energy is specified, it must be as indicated in the brackets ACCEPT 'converts one form of energy into another' IGNORE pressure
2 (a) (ii)	<i>idea that deformation of membrane will allow more Na⁺ through because</i> 1 (the increased pressure) causes sodium (ion) channels to open ; 2 (temporary) gaps / holes / spaces , appear , between the <u>phospholipids</u> / in the <u>bilayer</u> ;	1 max	 1 CREDIT Na ⁺ channels DO NOT CREDIT Na channels DO NOT CREDIT ref to voltage(-gated) channels 2 IGNORE weakened DO NOT CREDIT 'breaks in the bilayer' DO NOT CREDIT 'pores' for 'gaps' DO NOT CREDIT idea of additional , channels / carriers , inserted
2 (a) (iii)	if the , stimulus is not strong enough / threshold (value) is not reached / depolarisation (of membrane) is insufficient , then , it / an action potential , is not , generated / AW ; ora	1	ACCEPT 'impulses' for 'action potentials' DO NOT CREDIT ref to 'strength' of an action potential IGNORE ref to numerical value for threshold potential IGNORE ref to 'it' or 'action potential' reaching threshold DO NOT CREDIT ref to action potentials of different sizes/values

Question	Answer	Mark	Guidance
2 (a) (iv)	<p>1 <i>idea that it is represented by the frequency of the action potentials ;</i></p> <p>2 high , frequency / rate (of generation) , of action potentials shows , a strong / an intense , stimulus ; ora</p>	2	<p>Note: max 1 if term 'frequent' or derived term NOT used in answer</p> <p>ACCEPT 'impulses' for 'action potentials'</p> <p>1 CREDIT represented by how , frequently / often, the action potentials are , transmitted / generated.</p> <p>2 DO NOT CREDIT ref to speed of , action potentials / impulses</p> <p>Note: e.g. 'a higher frequency of impulses represents a strong stimulus' = 2 marks</p>
2 (b)	<p><i>action potentials not generated because</i></p> <p>1 sodium (ion) channels (remain) open / resting potential not re-established ;</p> <p>2 <i>idea of ions being in the wrong place for correct ion movement (across membrane) ;</i></p>	1 max	<p>IGNORE lack of (named) neurotransmitter as the Q refers to generation of the action potential in the receptor and not its onward transmission</p> <p>1 CREDIT Na⁺ channels IGNORE 'voltage-gated' DO NOT CREDIT Na channels</p>

Question	Answer	Mark	Guidance
2 (c)	<p>1 allows , neurones to communicate / cell signalling ;</p> <p>2 ensure transmission (between neurones) in one direction (only) ;</p> <p>3 allows , convergence / impulses from more than one neurone to be passed to a single neurone ;</p> <p>4 allows , divergence / impulses from a single neurone to be passed to more than one neurone ;</p> <p>5 idea that filters (out) , 'background' / low level , <u>stimuli</u> or ensures that only <u>stimulation</u> that is strong enough will be passed on ;</p> <p>6 prevents fatigue / prevents over-stimulation ;</p> <p>7 allows many low level <u>stimuli</u> to be amplified ;</p> <p>8 <i>idea that</i> presence of inhibitory and stimulatory synapses allows impulses to follow specific path ;</p> <p>9 permits , memory / learning / decision making ;</p>	3 max	<p>ACCEPT 'action potentials' for 'impulses' IGNORE 'messages' and 'signals' throughout</p> <p>1 e.g. ● passes impulse on to next neurone ● passes neurotransmitter on to next neurone</p> <p>2 Must be transmission <i>between</i> neurones IGNORE description unless for clarification</p> <p>3 IGNORE 'summation' ACCEPT 'neurotransmitter' instead of 'impulse'</p> <p>4 ACCEPT 'neurotransmitter' instead of 'impulse'</p> <p>7 IGNORE 'summation'</p> <p>Note: 'impulses from more than one neurone can pass to a single neurone' = 2 marks (mps 1 & 3) Note: 'impulses from a single neurone can pass to many neurones' = 2 marks (mps 1 & 4)</p>
	Total	9	

Question	Answer	Marks	Guidance
1 (a) (i)	<p>A cytoplasm ;</p> <p>B cell surface (plasma) membrane / neurone / neurilemma / axon / dendron ;</p> <p>C nucleus (of Schwann cell) ;</p>	3	<p>Mark the first answer on each prompt line. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>A ACCEPT cytosol IGNORE myelin</p> <p>B IGNORE nerve DO NOT CREDIT cell body</p>
1 (a) (ii)	<p>node(s) of Ranvier ;</p>	1	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p>
1 (b)	<p><i>in myelinated neurones</i></p> <p>1 conduction <u>faster</u> in myelinated neurone ; ora</p> <p>2 depolarisation / action potential, can only occur where (voltage-gated / Na⁽⁺⁾) <u>channels</u> present ;</p> <p>3 <i>idea that</i> myelinated neurones have long(er) sections with no, (voltage-gated / Na⁽⁺⁾) channels present ;</p> <p>4 ion , movement / transfer , can only take place at the gaps / nodes ; ora</p> <p>5 longer local circuits / fewer local circuits ;</p> <p>6 saltatory conduction / action potential jumps from node to node ; ora</p>	4	<p>1 must be a comparative statement and not from figs alone</p> <p>2 IGNORE ref to nodes of Ranvier (as they should be using information in Q)</p> <p>3 e.g. (only) 0.2% of the myelinated neurone has voltage-gated Na channels ACCEPT channels are further apart in myelinated</p> <p>4 This is a general mark for Na⁺ or K⁺ movement, regardless of direction</p> <p>5 ACCEPT 'currents' for 'circuits'</p> <p>6 ACCEPT 'gap' for 'node' ACCEPT jumping between nodes</p>

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1 (c) (i)	exocytosis ;	1	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>IGNORE secretion</p>
1 (c) (ii)	synaptic knob / synaptic bulb / presynaptic membrane ;	1	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>ACCEPT bouton ACCEPT presynaptic knob IGNORE vesicle DO NOT CREDIT synapse</p>
1 (c) (iii)	<p>1 vesicle cannot fuse with cell membrane and acetylcholine not secreted ;</p> <p>2 protease / enzyme / toxin / it , hydrolyses , VAMP / SNARE / protein / peptide bonds ;</p> <p>3 (because of hydrolysis) VAMP (protein) cannot bind to SNARE (complex) ;</p> <p>4 microtubules broken down so vesicle cannot move towards membrane ;</p>	2 max	<p>1 ACCEPT bind / attach , for fuse (see diagram)</p> <p>2 ACCEPT acts on / digests / breaks down , for 'hydrolyses'</p> <p>3 ACCEPT attach / join / lock , for 'bind' IGNORE fuse DO NOT CREDIT in context of , inhibition / denaturation</p>
	Total	12	

Question	Expected Answers	Marks	Additional Guidance
2 (a)	<p>(i) structure A / Schwann cell / it, produces myelin ;</p> <p>(electrical) <u>insulation</u> / <u>insulates</u> ;</p> <p>prevents movement of ions, into / out of, neurone / axon <i>or</i> prevents depolarisation ;</p> <p>speeds up, conduction / transmission / passage, of, impulse / action potential ;</p> <p>action potentials / local circuits / depolarisation / only occur at, gaps / nodes (of Ranvier) ;</p> <p>saltatory conduction / described ;</p> <p>QWC – technical terms used appropriately with correct spelling ;</p>	<p>1</p> <p>2</p> <p>3</p> <p>4</p> <p>5</p> <p>6</p> <p>3 max</p> <p>1</p>	<p>Needs the idea of production rather than simply stating 'it is a myelin sheath'</p> <p>CREDIT insulate or derived term. IGNORE impermeable DO NOT CREDIT <i>idea of thermal insulation</i></p> <p>CREDIT 'across membrane' instead of, in / out, of axon IGNORE ion exchange IGNORE impermeable DO NOT CREDIT ions moving, into / out of, membrane DO NOT CREDIT movement of ions without qualification</p> <p>Statement must be comparative eg <u>faster</u> DO NOT CREDIT message / signal / wave of depolarisation</p> <p>ACCEPT longer local circuits ACCEPT 'local currents' instead of local circuits</p> <p>eg • impulse jumps from, node to node / gap to gap Note: 'saltatory conduction' = 2 QWC terms</p> <p>Correct use and spelling of 3 terms from: myelin, depolarisation (or other derived term), impulse, conduct (or other derived term), action potential, local circuit, node, saltatory You should use the GREEN DOT to identify the QWC terms that you are crediting. Please insert a QWC symbol next to the PENCIL ICON, followed by a tick (✓) if QWC has been awarded or a cross (x) if QWC has not been awarded</p>

Question	Expected Answers	Marks	Additional Guidance
2 (a) (ii)	<u>exocytosis</u> ;	1	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>IGNORE bulk transport</p>
2 (a) (iii)	<u>diffusion</u> ;	1	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>DO NOT CREDIT facilitated diffusion</p>
2 (a) (iv)	<p>1 <i>idea that only the <u>presynaptic</u> neurone , produces / releases / contains , acetylcholine / ACh / (neuro)transmitter ;</i></p> <p>2 <i>only the <u>presynaptic</u> membrane has , Ca⁽²⁺⁾ / calcium (ion) , channels ;</i></p> <p>3 <i>idea that only the <u>postsynaptic</u> , membrane / neurone , has (ACh) receptors ;</i></p> <p>4 <i>ACh broken down at <u>postsynaptic</u> membrane ;</i></p>	1 max	<p>IGNORE ref to refractory period (as not a feature of synapse)</p> <p>ACCEPT ACh / ach throughout</p> <p>1 CREDIT knob / terminal bouton / bulb (instead of neurone)</p> <p>2</p> <p>3 DO NOT CREDIT ref to bouton / bulb / etc</p> <p>4 IGNORE ref to (acetyl)cholinesterase without ref to action at postsynaptic membrane</p>

Question	Expected Answers	Marks	Additional Guidance
2 (b) (i)	<p>1 <i>idea that atropine, binds to / occupies / competes for, (ACh) <u>receptor</u> on postsynaptic, membrane / neurone ;</i></p> <p>2 <i>idea that prevents ACh binding / blocks binding site / blocks receptor ;</i></p> <p>3 <i>ion gates / ion channels / sodium channels / protein channels, do not open / remain closed ;</i></p> <p>4 <i>Na⁺ cannot enter / K⁺ cannot leave, neurone / (nerve) cell ;</i></p> <p>5 <i>no / insufficient, depolarisation / postsynaptic potential / excitatory postsynaptic potential / epsp / generator potential ;</i></p> <p>6 <i>(so) does not reach threshold (value / potential) ;</i></p>	3 max	<p>IGNORE ref to atropine and ACh having similar shapes (as given in Q)</p> <p>ACCEPT ACH / ach throughout</p> <p>Only credit ORA for the mark points if candidate clearly states that these events do <u>NOT</u> take place with atropine.</p> <p>1 IGNORE ref inhibition DO NOT CREDIT active site DO NOT CREDIT ref to bouton / bulb / etc</p> <p>2 CREDIT fewer ion channels open</p> <p>4 CREDIT sodium ions / potassium ions DO NOT CREDIT Na / K DO NOT CREDIT ions entering the membrane</p> <p>5 IGNORE action potential (as given in Q)</p> <p>6</p>

Question	Expected Answers	Marks	Additional Guidance
2 (b)	<p>(ii)</p> <p>1 idea that will, bind to / occupy / compete for / block, (some of ACh) receptors ;</p> <p>2 so acetylcholine / ACh, cannot bind / less likely to bind (to receptor / to postsynaptic membrane) ;</p> <p>3 prevents / reduces, constant stimulation / overstimulation / constant depolarisation, of postsynaptic neurone or prevents / reduces, constant firing of action potentials / tetanus / (muscle) spasm ;</p> <p>4 AVP ;</p>	<p>2 max</p>	<p>ACCEPT ACh / ach throughout</p> <p>1 DO NOT CREDIT ref to active site</p> <p>2 ACCEPT idea that ACh remains in synaptic cleft</p> <p>3</p> <p>4 eg • effective if administered soon after exposure • cannot counteract inhibition of acetylcholinesterase</p>
TOTAL		12	

Question	Answer	Marks	Guidance
6. (a)	<p>1 receptors ;</p> <p>2 intensity ;</p> <p>3 chemical ;</p> <p>4 potential / value ;</p> <p>5 impulse ;</p>	5	<p>Mark the first answer on each prompt line. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>1 ACCEPT receptor cells DO NOT CREDIT neurones / organs</p> <p>2 IGNORE brightness DO NOT CREDIT frequency</p> <p>3 IGNORE volatile / soluble</p> <p>4 ACCEPT 'level' / '(needed) for depolarisation' IGNORE numerical value quoted / 'receptor' DO NOT CREDIT action potential</p> <p>5 ACCEPT action potential DO NOT CREDIT message / signal / information / stimulus</p>

Question	Answer	Marks	Guidance
6. (b) (i)	<p>the <i>motor neurone - structure</i> the cell body is at (one) end of the , neurone / cell or the cell body is in , brain / spinal cord / CNS or dendrites connected (directly) to cell body or long(er) axon or no dendron or axon , connects to / ends at , effector / motor end plate ;</p>	1	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>IGNORE ref to cell size / myelin(ation)</p> <p>DO NOT CREDIT at end of axon / nerve</p> <p>IGNORE reference to dendrite length</p> <p>CREDIT ora for sensory i.e. cell body is at centre of cell or cell body is in PNS or dendrites at the end(s) of , axon / dendron or short(er) axon or dendron present or connects to / starts at , receptor</p>

Question	Answer	Marks	Guidance
6 (b) (ii)	<p><i>the motor neurone - function</i> carries , impulse(s) / action potential(s), from , brain / spinal cord / CNS / relay neurone</p> <p>or carries , impulse(s) / action potential(s), to , effector / muscle / gland ;</p>	1	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>IGNORE refs to 'connects ...'</p> <p>DO NOT CREDIT message / signal / information / stimulus</p> <p>DO NOT CREDIT message / signal / information / stimulus</p> <p>CREDIT ora for sensory i.e. carries , impulse(s) / action potential(s) , to , brain / spinal cord / CNS / relay neurone or carries , impulse(s) / action potential(s) , from receptor</p>
	Total	7	

Question	Answer	Marks	Guidance
1 (a)	cell signalling ;	1	Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks
1 (b) (i)	synaptic (cleft / space / gap) ;	1	Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks ALLOW synapse DO NOT CREDIT synoptic / synopsis / synopsis

Question	Answer	Marks	Guidance
1 (b) (ii)	<p>1 (named) neurotransmitter / acetylcholine , released from pre-synaptic / first , cell / membrane ;</p> <p>2 <u>diffuses</u> across , gap / cleft / synaptic cleft <u>or</u> reaches second , neurone / cell / membrane , by <u>diffusion</u> ;</p> <p>3 attaches to , <u>receptors</u> / binding sites of sodium channels , on <u>post-synaptic membrane</u> / <u>membrane</u> of second cell ;</p> <p>4 neurotransmitter / acetylcholine , broken down (in cleft) ;</p> <p>QWC – technical terms used appropriately and spelt correctly ;</p>	2 max	<p>DO NOT CREDIT a mark point if stated that complete <i>vesicles</i> (even if containing neurotransmitter) are involved</p> <p>1 <i>release of neurotransmitter</i> must be clearly stated</p> <p>2 IGNORE synapse</p> <p>3 DO NOT CREDIT post-synaptic knob / bulb</p> <p><i>Note that a statement reading: 'Diffuses across and attaches to receptors on the post-synaptic membrane' = 2 marks (mps 2 & 3)</i></p> <p>4 CREDIT ref to action of cholinesterase</p>
		1	<p>Use of three terms from: neurotransmitter, acetylcholine, pre-synaptic / presynaptic, diffuse / diffusion, synaptic cleft, receptor, post-synaptic / postsynaptic</p> <p>Please insert a QWC symbol next to the pencil icon, followed by a tick (✓) if QWC has been awarded or a cross (x) if QWC has not been awarded</p> <p>You should use the green dot to identify the QWC terms that you are crediting.</p>

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1 (b) (iii)	<p>1. ensures movement of, impulse / action potential, in one direction (only) ;</p> <p>2. integration or one neurone can, connect to / receive impulses from / transmit impulses to, many neurones ;</p> <p>3. allows summation ;</p> <p>4. idea that filters out, 'background' / low level, stimuli or ensures that only stimulation that is strong enough will be passed on;</p> <p>5. AVP ;</p>		<p>IGNORE ref to 'signals' / 'messages' / coordination</p> <p>1 ACCEPT description eg ACh only released from presynaptic and receptors only on postsynaptic</p> <p>3 ACCEPT description eg enough action potentials arrive to trigger depolarisation in next neurone</p> <p>5 eg</p> <ul style="list-style-type: none"> • permits, memory / learning • acclimatisation (or described) • prevents continuous stimulation of neurones • synapses are of two types – excitatory and inhibitory
1 (c) (i)	<p>endotherm(s) ;</p>	3 max	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>CREDIT homoiothermic</p>

Question		Answer	Marks	Guidance
1	(c) (ii)	(vaso)dilation ;	1	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>IGNORE 'arteriole' DO NOT CREDIT 'arterial dilation'</p>
1	(d) (i)	thyroxine / adrenaline;	1	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>ACCEPT adrenalin / thyroxin / epinephrin(e)</p>
1	(d) (ii)	hypothalamus ;	1	<p>Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p>
Total			12	

Question	Expected Answer	Mark	Additional Guidance																
1 (a)	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;"><i>motor neurone</i></th> <th style="width: 70%;"><i>sensory neurone</i></th> </tr> </thead> <tbody> <tr> <td>cell body in CNS</td> <td>cell body , not in CNS / in PNS ;</td> </tr> <tr> <td>cell body at end (of neurone)</td> <td>cell body , not at end / in middle (of neurone) ;</td> </tr> <tr> <td>dendrites connect directly to cell body</td> <td>dendrites do not connect directly to cell body or dendrites at the end(s) of , dendron / axon ;</td> </tr> <tr> <td>long(er) axon</td> <td>short(er) axon ;</td> </tr> <tr> <td>dendron absent / no dendron</td> <td>dendron present ;</td> </tr> <tr> <td>ends at motor end plate</td> <td>starts at / connects to , (sensory) receptor ;</td> </tr> </tbody> </table>	<i>motor neurone</i>	<i>sensory neurone</i>	cell body in CNS	cell body , not in CNS / in PNS ;	cell body at end (of neurone)	cell body , not at end / in middle (of neurone) ;	dendrites connect directly to cell body	dendrites do not connect directly to cell body or dendrites at the end(s) of , dendron / axon ;	long(er) axon	short(er) axon ;	dendron absent / no dendron	dendron present ;	ends at motor end plate	starts at / connects to , (sensory) receptor ;	3	<p>Award 1 mark for each correct side by side comparison. Comparative statements must be made on the same row.</p> <p>ALLOW two valid comparisons in the same pair of boxes, e.g</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="padding: 2px;">Cell body at end of neurone in the CNS</td> <td style="padding: 2px;">Cell body in middle and in the PNS</td> </tr> </table> <p style="text-align: center;">= 2 marks</p> <p>mps 2, 3 and 4 can be taken from a labelled diagram All mps can be taken from annotated diagrams</p>	Cell body at end of neurone in the CNS	Cell body in middle and in the PNS
<i>motor neurone</i>	<i>sensory neurone</i>																		
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Question	Expected Answer	Mark	Additional Guidance
1 (b)	<p>1 - 60 to -70 ;</p> <p>2 depolarisation ;</p> <p>3 <u>threshold potential</u> / <u>threshold value</u> ;</p> <p>4 all or nothing ;</p> <p>5 size / magnitude ;</p> <p>6 <u>frequency</u> ;</p>	6	<p>Mark the first answer on each prompt line. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks</p> <p>1 ACCEPT any single figure or range (within this range) Must be a negative number</p> <p>4 ALLOW all or none</p> <p>5 ALLOW amplitude DO NOT CREDIT intensity / strength / value / potential difference / voltage</p>
	Total	9	

Question	Expected Answer	Mark	Additional Guidance
5 (a) (i)	E ;	1	Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks
5 (a) (ii)	A <u>and</u> F ;	1	Mark the first two answers for one mark. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks
5 (a) (iii)	D ;	1	Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks
5 (a) (iv)	B ;	1	Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks
5 (b) (i)	B ;	1	Mark the first answer. If the answer is correct and an additional answer is given that is incorrect or contradicts the correct answer then = 0 marks
5 (b) (ii)	channel / receptor / ion , is different ; AVP ;	1 max	IGNORE has enzyme to break it down (as Q states that it is stored in body) DO NOT CREDIT ref to active site e.g. • <i>idea that toxin confined to ,</i> organelle / organ / part of the body • toxin not , in general circulation / (circulated) in blood • toxin stored in inactive form • contains a compound that neutralises toxin [S & C x 1]

Question		Expected Answer	Mark	Additional Guidance
5	(c) (i)	1	2 max	1 Named parts of the immune system are credited in mp 3 – not in this mp
		2		
		3		
5	(c) (ii)	1	2 max	1 IGNORE damaged neurone (as given in Q) IGNORE damaged axon
		2		
		3		
		4		
		Total	[10]	

[END]