<table>
<tr><th>Question</th><th>Marking Guidance</th><th>Mark</th><th>Comments</th></tr>
<tr><td>1(a)</td><td>
<table>
<tr><th>Function</th><th>Name</th></tr>
<tr><td>Attaches to Z line at the end of the sarcomere</td><td>1. Actin;</td></tr>
<tr><td>Breaks down ATP</td><td>2. ATPase / myosin (head);</td></tr>
<tr><td>Covers binding site on actin in relaxed myofibril</td><td>3. Tropomyosin;</td></tr>
</table>
</td><td>3</td><td>2. Accept water

3. Accept troponin</td></tr>
<tr><td>1(b)</td><td>1. Can’t form myosin/thick filaments;
2. Can’t pull/can’t move actin/slide actin past / (myosin) have to be joined/fixed to pull actin;
3. Myosin moves /if attached doesn’t move;
4. Can’t move actin towards each other/middle of sarcomere/between myosin/
can’t shorten sarcomere/can’t pull Z lines together;</td><td>3</td><td>Neutral: prevents actin and myosin sliding filament action
2. Accept: myosin can’t pull on each other

4. Accept: contract for shorten</td></tr>
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Question	Marking Guidance	Mark	Comments
2(a)	1. Stimulates/causes ovulation/ /(secondary) oocyte(s); 2. Stimulates/causes formation of corpus luteum; 3. Stimulates/leads to production/release of oestrogen/progesterone;	2	1. Accept release of egg/ovum 1. Ignore references to follicle 3. Ignore: references to testosterone
2(b)	1. Inhibition of hypothalamus **so** less GnRH; 2. Inhibition of pituitary/less GnRH **so** less LH and FSH; 3. So no stimulation of testes to make testosterone;	3	Ignore references to negative feedback 1 and 2 must include all the statement 1 and 2 Accept none = less
2(c)	1. Keeps/makes/causes high testosterone; 2. So (keeps) inhibition of GnRH/LH/FSH;	2	1. Must have idea of high or higher 2. Accept: inhibits hypothalamus/pituitary gland 2. Accept less/no GnRH/LH/FSH

QUESTION 3: N/A

QUESTION 4: N/A

Question	Marking Guidance	Mark	Comments
5(a)	1. (Increased pressure) deforms/changes stretch-mediated sodium (ion) channel; 2. (Sodium channels open and) sodium ions flow in; 3. Depolarisation (leading to generator potential);	3	2. Accept Na^+ 3. Accept correct description of depolarisation
5(b)	Value between 2.17:1 and 2.29:1;; Values between 117 to 119 and between 52 to 54 found but ratio wrong way round = 1 mark	2	Accept rounding up to 2.2 or 2.3 Accept: number without : 1 Correct working showing answer but incorrect rounding in answer line = 1 Wrong way round gives answer between 0.35:1 and 0.46:1
5(c)	1. Parasympathetic greater effect than sympathetic; 2. Parasympathetic keeps heart rate down/lower/decreases heart rate (as blood pressure increases); 3. Sympathetic keeps heart rate up/higher/increases heart rate (as blood pressure increases); 4. Parasympathetic greatest/greater effect at high blood pressure/sympathetic greatest effect at low blood pressure;	3 max	Ignore: descriptions of graph 2. and 3. Accept converse for blood pressure decreases

Question	Marking Guidance	Mark	Comments
6(a)	One suitable suggestion; explained; Eg 1. Action potentials travel more slowly/don't travel; 2. So delay in muscle contraction/muscles don't contract/muscles contract slow(er); ***OR*** 3. Action potentials/depolarisation 'leaks' to adjacent neurones; 4. So wrong muscle (fibres) contract;	2 max	1. Accept: fewer/no saltatory movement of potentials 3. Accept: neurones not insulated
6(b)	Lipid-soluble / pass through phospholipid bilayer;	1	Not just 'pass through membranes'
6(c)	1. Prevents influx of calcium <u>ions</u> (into pre-synaptic membrane); 2. (Synaptic) vesicles don't fuse with membrane / vesicles don't release neurotransmitter; 3. Neurotransmitter does not diffuse across synapse/does not bind to receptors (on post-synaptic membrane); 4. No action potential/depolarisation (of post-synaptic membrane)/ sodium (ion) channels do not open / prevents influx of sodium <u>ions</u>;	4	1. Need idea of <u>moving into</u> pre-synaptic membrane/synaptic knob 1. Accept Ca^{++}/Ca^{2+} 2. Accept vesicles don't release acetylcholine 3. Accept: sarcolemma/muscle membrane for post-synaptic membrane 4. Accept Na^{+} 4. Accept prevents depolarisation of muscle cell Ignore: descriptions of events at post-synaptic membrane involving calcium ions and muscle contraction
6(d)	1. They won't affect synapses in brain; 2. They won't cause problems with the brain's function/won't damage brain; 3. (So only the) muscle/neuromuscular junctions treated/affected;	2 max	2. Accept: suitable named problem e.g. hallucination 2. Ignore: unqualified references to 'side effects' 2. Accept: reference to addiction/harm of smoking (cannabis)

Question	Marking Guidance	Mark	Comments
7(a)	1. Similarity – directional response (to a stimulus)/movement towards/away from a stimulus; 2. Difference – taxis (whole) organism moves and tropism a growth (response);	2	2. Must be clear which one, taxis or tropism, they are referring to 2. Taxis occurs in animals/motile organisms and tropism occurs in plants
7(b)	1. Grow in direction of/towards (pull of) gravity; 2. Grow away from salt; 3. Salt has more effect (than gravity);	3	Accept: tropism for growth Ignore: pulled by gravity 1. Accept: positively geotropic/gravitropic 2. Accept: negatively chemotropic/halotropic 1 and 2. Ignore: references to bends/moves 3. Accept: converse statement for gravity Note: all three points may appear in one sentence
7(c)	1. More carriers in (cell) **L**/lower in **R**; 2. (So) less IAA in (cell) **L**/more IAA in (cell) **R**; 3. (So) more (elongation) growth in **L**/less (elongation) growth in **R**;	3	Accept: left for **L** and right for **R**/side nearer salt for **L** 2. Accept: more IAA moves out of **L**/less IAA moves out of **R** 3. Accept: less inhibition of growth in **L**/more inhibition of growth in **R**;

Question	Marking Guidance	Mark	Comments
8(a)	1. Release of glucagon; 2. Leads to formation of glucose in liver (cells); 3. From non-carbohydrates/amino acids/fatty acids;	3	2. Reject: glucagon breaks down glycogen, or any other biological molecule 3. Accept: gluconeogenesis/references to glycogen as source of glucose
8(b)	1. Mutant mice (mRNA suggests) make a lot of (the) enzyme; 2. Mutant mice use kidney/intestine (cells) to make glucose; 3. Normal mice do this much less/normal mice use liver cells;	3	1. Accept: PCK1 made (for enzyme made) 2. Accept: use other organ (than liver)
8(c)	1. Differences significant; 2. Probability of difference being due to chance <u>less than</u> 0.01/1%/1 in 100 / probability of difference not being due to chance <u>more than</u> 0.99/99%/99 in 100;	2	Reject: references to results being significant once 2. Ignore: references to 0.05/5%/5 in 100