

QUESTION 1: N/A

Question	Marking Guidance	Mark	Comments
2(a)	<ol style="list-style-type: none"> 1. (Taxis is) movement towards/away from a stimulus / a directional response/movement (to a stimulus); 2. (Move towards) temperature they were used to/cultured in; 	2 max	Movement towards temperature they were used to = 2 marks
2(b)	<ol style="list-style-type: none"> 1. Hungry, so seeking food / in absence of food respond to temperature; 2. Move towards temperature they were used to/cultured in; 3. Associate (this temperature) with food; 4. (Then) stay in this temperature; 	3 max	Ignore references to temperature and enzymes 1. Must be stated not inferred from other statements 3. Accept they think food is here 3. Stated not inferred
2(c)	<ol style="list-style-type: none"> 1. (Dim) worms live in soil/dark/ affected by bright light / dim light is like normal environment/what they are used to; 2. (Even) because worms might move towards/away from bright light / to avoid creating light gradient / prevent worms showing phototaxis/ all parts of surface exposed to same light; 3. (Dim light) ensures heat from light not a variable/ heat from lamp could kill/dry out worms; 	2 max	2. Accept to avoid kinesis due to light 3. not just to control variables/factors

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3(a)	<ol style="list-style-type: none"> 1. (In myelinated) action potential/depolarisation only at node(s); 2. (In myelinated, nerve impulse) jumps from node to node/saltatory; 3. (In myelinated) action potential/impulse does not travel along whole length; 	3	<p>The question is about speed of transmission, not repolarisation or related matters</p> <p>3. Accept converse for non-myelinated</p>
3(b)	<ol style="list-style-type: none"> 1. Probability of obtaining this difference by chance; 2. Is less than 5%/less than 0.05/less than one in twenty; 3. Difference is significant; 	2 max	<p>1. and 3. Reject 'results' once only</p> <p>1. This statement often split round 2.</p> <p>2. Accept is 4.7%/0.047 but reject less than 4.7%/0.047</p> <p>2. Accept correct greater than 95%/greater than 0.95 arguments</p>
3(c)	<ol style="list-style-type: none"> 1. (All) dementia results lower (than control group)/non-dementia result higher; 2. Error bars do not overlap so differences are (possibly) significant; 3. Dementia may be due to other factors / not only due to a lack of myelin; 4. (Because) big/significant differences in myelin in different dementia; 5. Only small sample sizes/only one study/ more data required; 	4 max	<p>2. Neutral results</p> <p>2. Accept not due to chance/statistically significant</p> <p>2. In this context, accept references to standard deviation</p> <p>3. Accept suitable named factor e.g. genetic</p> <p>4. Not just 'different'</p>

QUESTION 4: N/A

Question	Marking Guidance	Mark	Comments
5(a)	<ol style="list-style-type: none"> 1. No/less oestrogen produced (by follicles/ovaries); 2. No/less negative feedback (by oestrogen); 3. On pituitary (gland); 	2 max	<ol style="list-style-type: none"> 1. Ignore references to corpus luteum and progesterone 2. Ignore oestrogen inhibits FSH but accept oestrogen inhibits release/production of FSH
5(b)(i)	<ol style="list-style-type: none"> 1. (Less FSH so) fewer/no follicles develop; 2. (So) fewer follicles (will be) destroyed (by chemotherapy); 3. (So) more follicles left for later in life/after treatment; 4. (So) more eggs; 	3 max	<ol style="list-style-type: none"> 1. Neutral fewer eggs develop <p>Accept converse statements</p> <p>Ignore references to LH and ovulation</p> <p>Accept for one mark statement of set/limited number of follicles present (at birth)</p>
5(b)(ii)	<p>(Artificial hormone,)</p> <ol style="list-style-type: none"> 1. Similar shape/structure/binding site to normal hormone; 2. So binds to (same) receptor and stops normal hormone binding; 	2	<ol style="list-style-type: none"> 1. Reject same shape 1. Accept part of shape same as hormone/similar tertiary structure <p>Reject references to active sites, <u>enzyme</u> inhibitors and substrates.</p> <p>Accept references to binding sites and competitive inhibition of hormone binding sites</p>

Question	Marking Guidance	Mark	Comments
6(a)	<ol style="list-style-type: none"> 1. (Phosphocreatine) provides phosphate/phosphorylates; 2. To make ATP; 	2	<ol style="list-style-type: none"> 1. Accept P_i or P in circle 1. Reject phosphorus 2. Accept: ADP + CP → ATP + C Neutral – provides ATP
6(b)	<p>One suitable suggestion; eg</p> <ol style="list-style-type: none"> 1. Genetic differences; 2. Level of fitness/amount of regular exercise done/mass of muscle; 3. Sex; 4. Ethnicity 5. Metabolic rate; 6. Number of fast/slow muscle fibres 	1 max	Neutral lifestyle/diet/illness
6(c)	<ol style="list-style-type: none"> 1. (From graph, phosphocreatine) takes longer to remake as people get older; 2. Fast muscle fibres used for rapid/brief/powerful/strong contractions; 3. Phosphocreatine used up rapidly during contraction/to make ATP; 4. Anaerobic respiration involved; 5. (As people get older) slower metabolic rate/slower ATP production/slower respiration; 6. ATP used to reform phosphocreatine; 7. Lots of phosphocreatine in fast fibres; 	4 max	1. Accept positive correlation between age and time to reform phosphocreatine

Question	Marking Guidance	Mark	Comments
7(a)(i)	<ol style="list-style-type: none"> 1. Amino acid/protein/enzyme/urea/nucleic acid/chlorophyll/DNA/RNA//ATP/ADP/AMP/ NAD/NADP; 2. DNA/RNA/nucleic acid/ATP/ADP/AMP/ NADP/TP /GP/ RuBP /phospholipids; 	2	<p>1. and 2. Accept any named equivalent examples e.g. nucleotides.</p> <p>Neutral: ammonia/nitrite /nitrate/ phosphate.</p>
7(a)(ii)	<ol style="list-style-type: none"> 1. Saprobiotic (microorganisms/bacteria) break down remains/dead material/protein/DNA into ammonia/ammonium; 2. Ammonia/ammonium ions into nitrite and then into nitrate; 3. (By) Nitrifying bacteria / nitrification; 	3	<p>1. Accept: saprobionts /saprophytes/saprotrophs</p> <p>1. Neutral: decomposer</p> <p>2. Allow correct chemical symbols.</p> <p>2. Accept: correct answers which use incorrect bacteria e.g. nitrogen-fixing but then reject m.p. 3.</p>
7(b)	<ol style="list-style-type: none"> 1. Nitrate/phosphate/named ion/nutrients for growth of/absorbed/used by plants/algae/producers; 2. More producers/consumers/food so more fish / fish reproduce more / fish grow more / fish move to area; 	2	<p>2. Must have idea of more plants related to some increase in fish.</p>

Question	Marking Guidance	Mark	Comments
8(a)	Succession;	1	Ignore any word in front of succession e.g. secondary/ecological succession. Neutral 'forestation'
8(b)	<ol style="list-style-type: none"> 1. Greater variety/diversity of plants/insects / more plant/insect species; 2. More food sources / more varieties of food; 3. Greater variety/more habitats/niches; 	3	<ol style="list-style-type: none"> 1. Neutral: more plants 2. Neutral: more food / more/greater food source (singular) 3. Accept: more nesting sites 3. Q Neutral: more homes/shelters.
8(c)(i)	Temperature and carbon dioxide;	1	Neutral: water, chlorophyll
8(c)(ii)	Shows (gross) photosynthesis/productivity minus respiration / more carbon dioxide used in photosynthesis than produced in respiration;	1	1. Correct answers are often shown as: net productivity = (gross) photosynthesis – (minus) respiration.
8(c)(iii)	<ol style="list-style-type: none"> 1. (Shade plant) has lower (rate of) respiration/ respiratory losses; 2. (Shade plant) less CO₂ released at 0 light intensity/in dark; 3. Greater (net) productivity / less sugars/glucose used / more sugars/glucose available; 	2	<ol style="list-style-type: none"> 1. Accept use of figures. 1. Accept: lower compensation point. Neutral: any references to rate of photosynthesis.

Question	Marking Guidance	Mark	Comments
9(a)	Prevents <u>oxygen</u> being taken up/entering/being absorbed;	1	Accept: any idea of no contact with oxygen. Neutral: for anaerobic respiration / anaerobic conditions. Neutral: prevents entry of air. Reject: prevents entry of oxygen and another named gas.
9(b)(i)	0.0155 / 0.016 = 2 marks;; 0.0775 / 0.077 / 0.078 / 0.08 = 1 mark / 0.62 = 1 mark	2	
9(b)(ii)	Glucose decreases/is a limiting factor / increase in ethanol / yeast/cells die / toxins build up;	1	Accept: glucose is used up.
9(b)(iii)	1. (Stays the) same/level/(relatively) constant; 2. Same volume/amount of oxygen uptake and carbon dioxide release;	2	Note: if m.p.1 is awarded m.p 2 can be obtained without referring to 'same volume/amount'
9(c)	1. Oxygen is final/terminal (electron) acceptor / oxygen combines with electrons and protons; 2. Oxidative phosphorylation / electron transport chain provides ATP; 3. Only glycolysis occurs without oxygen / no Krebs / no link reaction;	2 max	

Question	Marking Guidance	Mark	Comments
10(a)	<ol style="list-style-type: none"> 1. Carbon dioxide combines with ribulose bisphosphate/RuBP; 2. Produces two glycerate (3-)phosphate/GP; 3. GP reduced to triose phosphate/TP; 4. Using reduced NADP; 5. Using <u>energy</u> from ATP; 6. Triose phosphate converted to glucose/hexose/RuBP/ ribulose bisphosphate/named organic substance; 	6 max	<ol style="list-style-type: none"> 2. Accept: any answer which indicates that 2 x as much GP produced from one RuBP. 3. Must have idea of reduction. This may be conveyed by stating m.p. 4. 4. Reject: Any reference to reduced NAD for m.p.4 but allow reference to reduction for m.p. 3. 5. Must be in context of GP to TP.
10(b)	<ol style="list-style-type: none"> 1. Carbon dioxide is a greenhouse gas; 2. Deforestation/trees removed so less carbon dioxide removed by photosynthesis; 3. Burning/combustion releases/produces carbon dioxide; 4. Methane is a greenhouse gas; 5. Any valid reference to source of methane, e.g. rice fields, landfills, cattle; 	4 max	<ol style="list-style-type: none"> 1. Accept: carbon dioxide contributes to greenhouse effect. 4. Accept: methane contributes to greenhouse effect. Neutral: any references to other gases.
10(c)	<ol style="list-style-type: none"> 1. Use a grid / split area into squares/sections; 2. Method of obtaining random coordinates / numbers, e.g. calculator/computer/random numbers table/random number generator; 3. Count number/frequency of plants in a quadrat; 4. Calculate mean/average number (per quadrat/section); 5. Valid method of calculating total number of bluebells/plants. e.g. mean number of plants per quadrat/section/m² multiplied by number of quadrats/sections/m² in wood; 	5	<ol style="list-style-type: none"> Neutral: any reference to using belt/line transects. 1. Accept: use of tape measures/map/area with coordinates. 3. Accept: determine percentage cover. 4. Accept: method of calculating mean. 5. Neutral: 'scale up' without further qualification.