



MARKING GUIDANCE

Question	Answer	Additional Guidance	Marks
01a	Any one from: <ul style="list-style-type: none">• Voluntary is striated/bands of myosin and actin but involuntary is unstriated/non striated• Voluntary has cylindrical cells but involuntary has spindle-shaped cells• Voluntary cells are multinucleate and involuntary cells are uninucleate	Must have clear comparison for the mark Accept many nuclei vs one nucleus	1
01b	Method – Any five from: <ul style="list-style-type: none">• Attach two electrodes to the arm muscle being measured e.g. bicep• Attach a third electrode on an inactive point (e.g. wrist) to act as a control.• Switch off other electrical equipment not needed to reduce interference (e.g. phones)• Connect the electrodes to an amplifier and a computer.• Record readings from the relaxed muscle and when the weight is lifted• Control measure mentioned e.g. same mass of weight used, same movement to lift weight used		6



	<ul style="list-style-type: none">Repeat the weight lift and hold it for increasing lengths of time e.g. 5, 10, 15, 20 seconds Reliability – Any one from: <ul style="list-style-type: none">Take repeats from same participant after they have been allowed to rest/using different armsRepeat with different participants		
01ci	Any two from: <ul style="list-style-type: none">Primary mRNA contains introns and exonsintrons must be removed/do not code for proteins/endonuclease enzyme removes intronsExons must be joined togetherExons code for proteins so must be together to allow for correct code/protein synthesis		2
01cii	<ol style="list-style-type: none">after muscle contraction calcium ions are not pumped back into sarcoplasmic reticulumcalcium ions still bound to troponin/actin binding sites are still exposed	must demonstrate understanding of ions not being transported	2
TOTAL			11



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02a	A species that has a disproportionate effect on their environment relative to their abundance		1
02b	Any two from: <ul style="list-style-type: none">• Increasing seed dispersal• Improving habitat conditions/increasing number of <u>different</u> habitats e.g. more nesting sites for birds• Increasing the growth of <u>different</u> plant species• Deflecting succession/preventing succession• <u>More food sources</u> for other species	Must not just be idea of more plants/habitats/food but idea of more different species/habitats/food sources therefore increasing biodiversity	2
02c	How humans caused decline: <ul style="list-style-type: none">• Habitat/ecosystem disturbance and destruction• Land use for building/roads• Land use for agriculture/farming /deforestation• Hunting from humans for food• Competition from introduced species – goats• Overgrazing caused by introduced species - goats• Predation from introduced species – pigs and rats eating eggs• Nest / egg, trampling by introduced species	Must include points from both sections	6



	Conservation efforts: <ul style="list-style-type: none">• Culling goats• Breeding programme – described (preventing eggs/small tortoises being eaten)• Reducing tourist/visitor numbers• Strict rules for tourists/visitors• Preventing any non-native species coming in on boats e.g. checking• Education of locals and tourists• National Park management/ protection/ to enforce rules		
TOTAL			9



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03a	(As a control) to show that the indicator (alone/on its own) does not change colour in the light OR Shows that any colour change is caused by the pondweed		1
03b	<ol style="list-style-type: none">1. So that the light intensity and temperature remained constant2. As light (and temperature) can affect the rate of photosynthesis and respiration	Allow if only temp mentioned in point 1	2
03c	<ol style="list-style-type: none">1. More carbon dioxide produced decreases pH/makes the solution more acidic/ yellow2. In tube A the rate of photosynthesis is greater than the rate of respiration (as more CO₂ used up so less acidic)3. In tube B only respiration is occurring as no light is available for photosynthesis so CO₂ highest as it is being produced but not used making solution more acidic4. The rate of photosynthesis and respiration must be equal in tube C keeping the pH neutral.	accept converse for decreasing/removing carbon dioxide and anywhere in answer but no marks given if it is implied that O ₂ is alkaline	4



03d	<ol style="list-style-type: none">1. Aerobic respiration uses oxygen2. Oxygen is terminal /final electron acceptor3. (oxygen combines with) protons / H^+ and electrons / e^- to form water / H_2O		3
03e	<ol style="list-style-type: none">1. Count the number of bubbles of gas produced by the cut end or measure the volume of gas produced2. In a set amount of time		2
TOTAL			12



Question	Answer	Additional Guidance	Marks
04a	<ol style="list-style-type: none">Schwann cellInsulates the axon/action potential/depolarisation only occurs at node(s)/gaps/jumps from node to node/saltatory conduction.Allows faster transmission of impulse along axon/increases speed of impulse		3
04b	<p>Any three from:</p> <ul style="list-style-type: none">Sodium-potassium pump uses ATP/actively pumps/uses energySodium ions (Na^+) out of neurone/axon and potassium ions (K^+) in3 Na^+ out for 2K^+ inVoltage-gated Na^+ channels are closedMembrane less permeable to Na^+/fewer Na^+ channels open so less Na^+ can diffuse back in (AW but do not accept idea ALL Na^+ channels closed or impermeable)K^+ ions can diffuse/move back out of cell/axonCreates buildup of positive ions outside/more negative ions inside		3
04ci	<ol style="list-style-type: none">(Voltage-gated) Sodium ion (Na^+) channels openSodium ions enter/diffuse in down their concentration gradient	Accept membrane more permeable to sodium ions	2
04cii	Refractory period		1



04d	$32 \text{ nm} = 32/10^9 = 3.2 \times 10^{-8}$ $3.2 \times 10^{-8} / 1.6 \times 10^{-7} \text{ s}$ $= 0.2 \text{ m/s}$	1 mark for conversion 1 mark for correct answer	2
04e	<ol style="list-style-type: none">1. More/increase in dopamine produced in <u>presynaptic</u> neurone/bulb/knob2. More dopamine diffuses across synaptic cleft3. So faster speed of transmission as more dopamine binds to receptors on postsynaptic membrane OR <ol style="list-style-type: none">2. Increased dopamine concentration gradient3. So faster speed of transmission as faster diffusion across cleft to postsynaptic receptors		3
TOTAL			14



Question	Answer	Additional Guidance	Marks
05a	Any one from: <ul style="list-style-type: none">• Embryonic/embryos/blastocyst• Foetus/Fetal• Umbilical cord (blood)• Induced pluripotent stem cells (iPS), convert somatic cells into pluripotent	Ignore adult stem cells/bone marrow as not pluripotent	1
05bi	100x1500 = 150,000 cells 3 days = 72 hours $N = 150,000 \times 2^{(72/18)}$ $N = 2.4 \text{ million}/2,400,000$	Ecf if start number of cells incorrect but correct substitution	2
05bii	1. Might divide out of control/uncontrollable cell division 2. Leading to tumour / cancer		2
05c	Any three from: <ul style="list-style-type: none">• Greater blood supply (to damaged areas)• Bringing more oxygen / glucose for respiration• Brings more amino acids for protein synthesis.• For cell mitosis / division		3



05d	Any two from: <ul style="list-style-type: none">• Test effectiveness of new drugs• Test side effects/toxicity of new drugs• Developmental research to show how cells differentiate/become different cell types.• Identify changes in cell function responsible for certain (named) diseases e.g. cancer		2
TOTAL			10



Question	Answer	Additional Guidance	Marks
06a	<ol style="list-style-type: none">1. It can pass through the phospholipid bilayer, enter the nucleus and bind to DNA directly2. So must be a fat soluble/lipid/steroid based/not a protein hormone		2
06b	<ol style="list-style-type: none">1. Not all cells have cortisol receptors on DNA2. Cortisol will only be able to bind/have complementary shape for cortisol receptor		2
06c	Binds to DNA and causes changes in gene expression	must have both parts for the mark	1
06d	Give 1% ethanol but no cortisol in water	idea of exactly the same but no cortisol	1
06e	<ol style="list-style-type: none">1. Each antibody will have a <u>specific tertiary structure/shape</u> in the <u>variable region</u>2. That is <u>complementary</u> to antigens on the surface of each cell type		2



06f	Any three from: <ul style="list-style-type: none">• Cortisol significantly reduces the number of T and B cells but significantly increases the number of phagocytes• Error bars do not overlap (credit once)• Fewer T cells in blood means less likely they will be activated by an antigen presenting cell/APC or a pathogen• Fewer T cells so fewer B cells activated.• Fewer <u>plasma cells</u> produced by <u>mitosis</u> so fewer antibodies produced	accept references to memory T and B cells	3
06g	Any three from: <ul style="list-style-type: none">• Binding of the cortisol prevents/blocks/represses transcription of genes• Fewer proteins produced which regulate the cell cycle• DNA not checked/repared during interphase/S phase• Cell undergoes apoptosis due to DNA damage• Cells not dividing so fewer B and T cells		3
TOTAL			14