Mark Scheme (Results)

October 2024

Pearson Edexcel International Advanced Level
In Biology (WBI15)
Paper 01 Respiration, Internal Environment, Coordination and Gene Techonology

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question number	Answer	Additional guidance	Mark
1(a)	Choose an item. • an arrow going to the right	Accept correct arrow anywhere on the diagram ACCEPT arrow going to the left reject arrows in 2 different directions	(1)

Question number	Answer	Additional guidance	Mark
1(b)(i)	Choose an item. B (-70 mV) is the correct answer A is not the correct answer as the resting potential is not -90 mV is where membrane is hyperpolarised C is not the correct answer as the resting potential is not +48 mV D is not the correct answer as the resting potential is not +70 mV		(1)

Question number	Answer	Additional guidance	Mark
1(b)(ii)	Choose an item. C (W) is the correct answer A is not the correct answer as the membrane is not hyperpolarized at U. B is not the correct answer as the membrane is not hypopolarised at V. D is not the correct answer as the membrane is not hyperpolarised at X.		(1)

Question number	Answer	Additional guidance	Mark
1(b)(iii)	Choose an item. D (140 mV) is the correct answer A is not the correct answer as the difference is not 40 mV. B is not the correct answer as the difference is not 50 mV. C is not the correct answer as the difference is not 90 mV.		(1)

Question number	Answer	Additional guidance	
1(c)	An answer that includes the following points: • one correct difference in function (1) • second correct difference in function (1)	ACCEPT spinal cord for CNS NOT spine ACCEPT action potentials for impulses ACCEPT piece together from different sentences. Mix and match Reject messages / information / signals sensory neurones: sensory neurones carry (electrical) impulse towards the {CNS / spinal cord / brain / relay neurone / synapse} whereas…. sensory neurones {receive stimulation from receptors / sense organ} / sensory neurones synapse with receptors / sensory carry impulses (away) from {receptors / sense organ} sensory neurones release neurotransmitters (into synapse)} whereas…. Motor motor neurone {carry (electrical) impulse away / receives impulse} from {CNS / brain / spinal cord / relay neurone / synapse} motor neurone {carry electrical impulse towards / stimulate a response in / synapse with} {effector / muscle / gland / neuromuscular junction} motor neurones are stimulated by (relay) neurotransmitters	(2)

Question number	Answer	Additional guidance	Mark
2(a)(i)	choose an item: • D (regulate the transcription of genes) is the correct answer A is not the correct answer as gibberellins do not hydrolyse starch to glucose B is not the correct answer as gibberellins do not inhibit elongation of cells C is not the correct answer as gibberellins do not regulate the translation of DNA		(1)

Question number	Answer	Additional guidance	Mark
2(a)(ii)	choose an item: • B (adrenaline) is the correct answer A is not the correct answer as adenine is not a hormone C is not the correct answer as amylopectin is not a hormone D is not the correct answer as antihypertensive is not a hormone		(1)

Question number	Answer	Additional guidance	Mark
2(b)(i)	An answer that includes the following points: • as TBT concentration increases testosterone concentration (in blood) decreases / converse (1) • as TBT concentration increases up to 50 mg kg^{-1} oestradiol concentration (in blood) increases and then decreases {above 50 mg kg^{-1} / at 100 mg kg^{-1}} (1) • concentration of testosterone is higher than concentration of oestradiol (with no TBT / in all concentrations) (1)	ignore concentration of corn oil with no ref to TBT ACCEPT oestrogen for oestradiol ACCEPT negative correlation between TBT and testosterone concentrations ACCEPT TBT decreases testosterone (concentration) ACCEPT as TBT concentration increases, oestradiol concentration increases and then decreases ACCEPT as TBT concentration increases up to 50 mg kg^{-1} oestradiol concentration (in blood) increases / positive correlation up to 50 mg kg^{-1}	(3)

Question number	Answer	Additional guidance	Mark
2(b)(ii)	A description that gives three of the following points • steroid hormone diffuses {across the cell membrane / into cell / into nucleus} (1) • (steroid hormones) bind to {receptors / proteins} (inside cell / nucleus) (1) • which {act as a / become / interact with} transcription factors (1) • causing {activation / repression} of gene (transcription) (1)	ACCEPT steroids for steroid hormone ACCEPT steroid hormone enters {cell / nucleus} ACCEPT pass through for diffuse reject binding to cell membrane receptors ACCEPT forms hormone-receptor complex ACCEPT bind to {promoter region / RNA polymerase} ignore binds to DNA ACCEPT {enable / inhibit} RNA polymerase binding ACCEPT switching genes {on / off} ACCEPT {allowing / preventing} {transcription / formation of mRNA}	(3)

Question number	Answer	Additional guidance	Mark
3(a)(i)	An explanation that includes three of the following points: • less calcium ions would bind to troponin (1) • troponin doesn't change shape (1) • (therefore) tropomyosin remain in position / less tropomyosin moves (1) • myosin head cannot bind to {actin / binding site} / {no / less} formation of (actin-myosin) cross bridges} (1) • (therefore) muscles stay relaxed	ACCEPT tropomyosin blocks binding sites / binding sites not exposed ACCEPT {less / no} {contraction of muscle / shortening of sarcomere} ignore disrupt contraction	(3)

Question number	Answer	Additional guidance	Mark
3(b)(i)	An answer that includes the following point: • homeostasis / osmoregulation / negative feedback (1)	ACCEPT phonetic spelling	(1)

Question number	Answer	Additional guidance	Mark
3(b)(ii)	A calculation showing the following steps: • calculation of (upper and /or lower) range of serum calcium (1) • correct calculation of difference (1)	(91 - 6%) = 85.54 OR (91 + 6%) = 96.46 accept 12% / 5.46 / 5.5 (mg dm^{-3}) for 1 mark (96.46– 85.54) =10.92 / 10.9 (mg dm^{-3}) Accept 11(mg dm^{-3}) Accept answers in standard form 1.09×10^1 / 1.1×10^1 correct answer gains both marks	(2)

Question number	Answer	Additional guidance	Mark
3(c)(i)	An explanation that includes two of the following points: • (small) increase in lactate concentration (between 15 to 60 minutes / during exercise) / little change in lactate concentration (between 15 to 60 minutes) (1) • because {lactate / lactic acid} is produced by anaerobic respiration (1) • lactate produced is being converted into pyruvate (1)	ACCEPT increases, then decreases then increases again / fluctuates ignore if refer to change between 0 – 60 mins lactate concentration in blood stays high as equilibrium between {lactate going to the liver / being converted to pyruvate} and continued anaerobic respiration during exercise	(2)

Question number	Answer	Additional guidance	Mark
3(c)(ii)	An answer that includes one of the following points: • to provide {base line data / starting point / for comparison} (1)	to provide lactate concentration when {anaerobic respiration is not occurring /at rest} identify if exercise affects blood lactate concentration ignore control	(1)

Question number	Answer	Additional guidance	Mark
3(c)(iii)	An answer that includes the following point: • a named controlled variable with a suitable description on how it could be controlled (1)	e.g. same age - select any age range eg 18 – 35 yrs / same age Same (resting) blood pressure Same VO_2 max Same cycling intensity by doing same course on exercise bike Same exercise bike Same BMI Same {food / fluid} intake (24hours) prior to exercise – standardized meals same {caffeine / drug} intake same {temperature / humidity / oxygen concentration} of room etc ignore similar	(1)

Question number	Answer	Additional guidance	Mark
4(a)	An explanation that includes four of the following points: • with (increasing) age the number of dopamine producing cells decreases (1) • after {44/45} years the number of dopamine producing cells fall below {normal / people without Parkinson's / 350 000} (1) • {less / fewer} {neurotransmitters / dopamine} {released / produced} (1) • therefore {fewer / no} {(electrical) impulses / action potential / nerve impulses} (1) • causing {reduced / no / disruption to} {muscle contraction / responses} (1)	ACCEPT negative correlation ACCEPT identification of age where number of dopamine producing cells is below {normal / people without Parkinson's / 350 000} ignore {no / lack of} {dopamine / neurotransmitter} ignore L-Dopa is hard to convert into dopmine ACCEPT less depolarisation ACCEPT threshold value not met ACCEPT causes paralysis ACCEPT loss of control of muscles / loss of motor {control / function} ignore increase in symptoms	(4)

Question number	Answer	Additional guidance	Mark
4(b)	An answer that includes two of the following points • (carbidopa) prevents L-DOPA being broken down (in digestive system / before blood-brain barrier) (1) • (because) L-Dopa can pass blood-brain barrier / dopamine can't pass blood-brain barrier (1) • allowing a lower dose of L-DOPA to be given (1)	ACCEPT less L-DOPA {converted / broken down} to dopamine (in digestive system / before blood-brain barrier) ACCEPT (more) L-DOPA {converted / broken down} to dopamine {in the brain / after the blood-brain barrier} ACCEPT more L-DOPA {absorbed into blood / transported by blood (to brain)} ignore dopamine should only be in brain and not digestive system ignore enter brain unqualified L-Dopa shouldn't be converted to dopamine until after it has crossed the blood brain barrier = 2 marks	(2)

Question number	Answer	Additional guidance	Mark
4(c)	An answer that includes the following points: • as dopamine concentration increases the (mean) heart rate increases and then decreases (1) • correct comment on mean heart rate increasing up to {3 / 4} / decreasing after 4 or at 5} (1) • correct comment on error bars and {significant difference / no significant difference / significant effect} (1) • accept relevant comment on methodology (1)	ACCEPT mean heart rate doesn't change between 0-1 e.g. between log {0-1 / 0-2 / 1-2 / 3-4} error bars overlap therefore there is no significant {difference / effect} e.g. between log {2 /3} error bars do not overlap therefore there is a significant difference e.g. error bars at 5 don't overlap with any others so results are significantly different ignore error bars overlapping without being specific as to which e.g. only 10 flies used/ no indication of age / sex / environmental conditions / only tested on one species / small sample size	(4)

Question number	Answer	Additional guidance	Mark
5(a)(i)	Choose an item • B (increased number of slow twitch muscle fibres) is the correct answer A is not the correct answer as a decreased glomerular filtration rate is not an adaptation to run for long distances C is not the correct answer as narrower airways are not an adaptation to run for long distances D is not the correct answer as smaller cardiac output is not an adaptation to run for long distances		(1)

Question number	Answer	Additional guidance	Mark
5(a)(ii)	An explanation that includes four of the following points: • increase in (blood) carbon dioxide / decrease in (blood) pH} (1) • detected by chemoreceptors which send (more) impulses to {medulla (oblongata) / CVC} (1) • which send impulses to {SAN / intercostal / diaphragm / breathing} muscles (1) • SAN causes more {electrical impulses / depolarization / waves of excitation} (to spread over walls of atria) (1) • **{**cardiac muscle contraction **/** heart muscle	ACCEPT impulses via sympathetic NS ignore {signal / message}	(4)

	contraction / systole} occurs more frequently (1) • more frequent contraction of {intercostal muscles / diaphragm} (1)	ignore force of contraction ACCEPT {faster / more**}** contraction of {intercostal / diaphragm / breathing muscles} ignore force of contraction	

Question number	Answer	Additional guidance	Mark
5(b)(i)	A description that includes the following points: • as mass increases the resting metabolic rate increases (1) • as mass increases pulse rate decreases (1) • as resting metabolic rate increases pulse rate decreases (1)	ACCEPT positive correlation ACCEPT negative correlation ACCEPT negative correlation	(3)

Question number	Answer	Additional guidance	Mark
5(b)(ii)	A description that includes three of the following points: • thermoreceptors detect {increase/ change} in temperature / temperature above 37°C} (1) • impulses to {thermoregulatory centre / hypothalamus / heat loss centre} (1) • (thermoregulatory centre) sends impulses {via motor neurones / via sympathetic neurons / to correctly named effector} (1) • correct response (by effectors) to {increase heat loss / decrease heat energy gain} from the body (1)	ignore control centre unqualified e.g. sweat glands, hair erector muscles, liver, smooth muscles in skin blood vessels ignore signals / messages / information e.g. vasodilation, sweat production, decreased metabolic rate	(3)

Question number	Answer	Additional guidance	
6(a)(i)	A calculation showing the following steps: • correct measurement of Bowman's capsule (1) • calculation of magnification and answer given in standard form (1) OR • conversion of 52 mm to nm (52 x 1000000) = 5.2 x 10^7 • calculation of magnification (5.2 x 10^7) ÷70 =	52(mm) (+/-1mm) accept 5.2(cm) (+/- 0.1cm) (52 ÷0.00007) = 7.43 x 10^5 IF THEY USE UNITS eg nm **NO MP2** ACCEPT RANGE 7.29 x 10^5 -7.57 x 10^5 7.3 x 10^5 -7.6 x 10^5	(2)

Question number	Answer	Additional guidance	
6(a)(ii)	A calculation showing the following steps: • calculation of volume (1) • and answer given to 2 significant figures (1)	(4/3 x 3.14 x 35 x 35 x 35) =179503 (nm^3) Accept number within range (179500 – 179600) =180000 (nm^3) / 1.8 X 10^5	(2)

		correct answer gains both marks	

Question number	Answer	Additional guidance	
6(b)(i)	Choose an item. • C (osmoreceptor) is the correct answer A is not the correct answer as baroreceptors do not respond to changes in water potential of the blood. B is not the correct answer as chemoreceptors do not respond to changes in water potential of the blood. D is not the correct answer as thermoreceptors do not respond to changes in water potential of the blood.		(1)

Question number	Answer	Additional guidance	Mark
6(b)(ii)	An answer that includes one of the following points: • {osmoregulation / to maintain osmotic balance of cells} (1) • {to maintain water content of cells / prevent dehydration of cells / prevent {crenated / shrinking} of cells / prevent cell lysis} (1) • allow correct functioning of kidney (1)	ACCEPT to prevent water {entering / leaving} by osmosis ACCEPT keep {plasma / blood} isotonic / maintain water potential of blood ACCEPT maintain osmotic pressure ignore cells destroyed ACCEPT prevent cells being hypertonic or hypotonic ignore ultrafiltration	(1)

Question number	Answer	Additional guidance	Mark
6(c)	A description that includes four of the following points: • (plasma concentration) detected by osmoreceptors (1) • blood {volume / pressure} (increase) would be detected by {baroreceptors / pressure receptors} in {carotid artery / aortic arch} (1) • (resulting in**)** pituitary gland to release less ADH (1) • causing reduction in aquaporins in kidney tubule / decreases permeability of {DCT / collecting duct} (1) • leading to less water being reabsorbed by {kidney / DCT / collecting duct} / (more) {dilute / less concentrated} urine production (1)	ignore permeability of tubules decreases unqualified (must say a correct named tubule) ACCEPT less water reabsorbed into blood (but ignore body) ACCEPT more water excreted in urine} ignore more urine produced	(4)

Question number	Answer	Additional guidance	Mark
6(d)(i)	Choose an item • A (co-transport with sodium ions) is the correct answer B is not the correct answer as glucose is not reabsorbed by endocytosis. C is not the correct answer as glucose is not reabsorbed by exocytosis. D is not the correct answer as glucose is not reabsorbed by osmosis.		(1)

Question number	Answer	Additional guidance	Mark
6(d)(ii)	A calculation showing the following steps: • conversion of 7.5 g to mg (1) • calculation of rate per second (1)	(7.5 x 1000) / 7500 7.5 x 10^3 7500÷(60x60) = 2.08 / 2.083 / 2.1 ecf applied for mp2 for division by 3600 (60 x 60) correct answer gains both marks	(2)

Question number	Answer	Additional guidance	Mark
7(a)	Choose an item • B (an organism containing genetic material from another species) is the correct answer A is not the correct answer as primers are not amplified sequences of nucleic acid C is not the correct answer as primers are not viruses containing DNA. D is not the correct answer as primers are not DNA that contains a mutation		(1)

Question number	Answer	Additional guidance	Mark
7(b)(i)	An answer that includes three of the following points: • all {have antigen binding activity / produce BVZ} (1) • {animal culture and GM rice / all other / GM rice} have higher (antigen) binding activity than non-transformed rice (1) • animal culture has highest (antigen) binding activity (than all others) (1) • strain B has highest (antigen) binding activity of the GM rice / strain D has lowest (antigen) binding activity of the GM rice (1)	do not piece together ACCEPT {control / non-transformed} rice {has lowest / some} binding activity ACCEPT GM increases antigen binding activity ACCEPT animal culture has higher (antigen) binding activity than GM / converse ACCEPT (strain) B is most effective GM at producing BVZ	(3)

Question number	Answer	Additional guidance	Mark
7(b)(ii)	A description that includes two of the following points: • (BVZ antibodies are) complementary to {antigens / receptors / (specific) membrane protein} on cancer cell (1) • (BVZ / antibody) binds to {antigens / receptors / (specific) membrane protein} (of cancer cells) (1) • resulting in {(enhanced) phagocytosis / engulfing by phagocytes / destruction by phagocytes} (1)	ACCEPT opsonisation occurs ignore antibody binds to cancer cells unqualified ACCEPT agglutination / causes cancer cells to {clump / stick} together ACCEPT macrophages for phagocytes ACCEPT stimulate lysis / marker for T cells / destruction by killer T cell	(2)

Question number	Answer	Mark
7(c) 1	**Discussion of Data:** • plant {height / growth} increased with GM fungus / accept converse • {number of grains per cob / yield} increased with GM fungus / accept converse • concentration of toxin decreased with GM fungus/ accept converse • in concentration of toxin SD do not overlap so difference is significant / {with number of cobs / plant height} SD do overlap so difference is not significant --	(6)
2	• as temp increases from current results in % of infection increased / shows positive correlation • a 2° (increase in temperature) give a (92% / 35%) increase in predicted maize infection • a 5° (increase in temperature) give {a (150% / 57%) increase in predicted maize infection / highest %} • the production of toxins by fungi is a natural defense mechanism, typically triggered under stressful conditions such as (drought / increased temperature) --	
3 and 4	**Benefits of GM fungus** • GM fungus introduced to plants to outcompete normal fungus / reduced growth of normal fungus • (so crops will have) {greater height /number of cobs / reduced conc of toxin}/ higher yield LINKED to general comment eg better food/ gm maize has higher nutritional value / more food (for people) to eat / more efficient use of land etc / Increased food security / more home-grown food / reducing imports/reducing carbon footprint /reducing food miles/Reduces malnutrition / reduces famine / • reduce deforestation to clear land for more crops • (so) increased farmer income / less need for {pesticides / insecticides} / processing costs • fewer {humans / animals} {poisoned / die} by toxin in infected maize / reduced health risks (as concentration of toxin in maize reduce) / lower toxin makes food safer to eat • ---	
5 and 6	**Risks** • Reduced biodiversity / monoculture produced • Gene/allele / toxin {enters / accumulates) food chains / Disrupts food chains • Fungus might crossbreed(?!) with other fungi and have unknown effects / gene transfer to other {species / food crop / fungus} / production of superweeds / superpests • GM can be seen as unethical / unnatural • Companies who own genetic modification tech could seek to profit further and limit the use of the tech that would otherwise prevent famine / financial cost to farmers / producing GM fungus is expensive / higher costs to consumers • The health risks posed by mycotoxins are significant / Unknown {health risks / effects} of {humans / animals / of} eating crops grown with GM fungus / more toxin (in increased temperature) may lead to more death.	

		Additional guidance
Level 0	0	No awardable content
Level 1	1-2	Demonstrates isolated elements of biological knowledge related to the given context with generalised comments made. Vague statements related to consequences are made with limited linkage to a range of scientific ideas, processes, techniques and procedures. The discussion will contain basic information with some attempt made to link knowledge and understanding to the given context.
Level 2	3-4	Demonstrates adequate knowledge and understanding by selecting and applying some relevant biological facts / concepts. Consequences are discussed which are occasionally supported through linkage to a range of scientific ideas, processes, techniques and procedures. The discussion shows some linkages and lines of scientific reasoning with some structure.
Level 3	5-6	Demonstrates comprehensive knowledge and understanding by selecting and applying relevant knowledge of biological facts / concepts. Consequences are discussed which are supported throughout by sustained linkage to a range of scientific ideas, processes, techniques and procedures. The discussion shows a well-developed and sustained line of scientific reasoning which is clear and logically structured.

Question number	Answer	Additional guidance	Mark
8(a)	A description that includes two of the following points: • {hypertension / high blood pressure} damages (brain) {capillaries / endothelium / blood vessels} (1) • leading to blood vessel {narrowing / blockage / bleeding} (1) • reducing oxygen(ated blood) to brain **(**cells) / causes inflammation in the brain (1)	ignore microstructural damage without reference to blood vessel ACCEPT formation of {atheroma / plaques} / deposition of amyloid ACCEPT damages areas of the brain responsible for thinking and memory ACCEPT smaller brain volume	(2)

Question number	Answer	Additional guidance	Mark
8(b)	An answer that includes the following points: • beta-amyloid is fat soluble (1) • {hydrophobic / hydrophilic / polar / non-polar / charged } (R groups of protein) (1) • (which cause) bonds to be formed between protein (molecules to clump them together) (1)	reject {hydrophobic / hydrophilic / polar / non-polar / charged} {tails / fatty acids} ACCEPT which affect the bonds made (with other proteins) ACCEPT named bonds but ignore incorrect bonds or bonds within a protein molecule ACCEPT hydrophobic regions (on different proteins) clump together (to move away from water) ACCEPT {hydrophobic / non-polar / hydrophilic / polar} interactions (with other proteins or water)	(3)

Question number	Answer	Additional guidance	Mark
8(c)	An answer that includes the following points: • {2D / 3D / computer} image (1) • identify areas of brain activity / contrast between tissues / identify areas of {oxygen / glucose} uptake / identify plaques / identify amyloid build up (1) • provides detailed {structural / anatomical} (information) (1)	ignore high resolution image ACCEPT identify {biochemical changes / metabolic activity} in the brain	(2)

Question number	Answer	Additional guidance	Mark
8(d)	An answer that includes one of the following points: • Suitable reason stated (1)	e.g. risk isn't certain / findings are unclear / could be false positive / they may not develop it after all e.g. may affect {health / mental health / behaviour} in the short term E.g. may affect getting health insurance (1) e.g. may affect {relationships / work / career opportunities} (1) e.g. may cause {stress/ fear / worry / anxiety / distress / depression} e.g. they have right to decide if they want to know	(1)

Question number	Answer	Additional guidance	Mark
8(e)	An answer that includes three of the following points: • (low blood pressure) leads to reduced blood flow to the brain (1) • reduced {oxygen / glucose} (to the brain cells) (1) • leading to decrease in {aerobic respiration / ATP production} (1) • leading to reduced activity (in the brain) / {death of / damage to / loss of} brain cells (1)	ACCEPT reduced {amino acids / fatty acids / glycerol} to brain (cells) ignore nutrients / minerals ACCEPT reduced {protein / cell / myelin sheath} formation in brain ignore anaerobic respiration ACCEPT reduction in {neurotransmitter/ dopamine} secretion ignore reduction in brain volume ignore damage to endothelial cells	(3)

Question number	Answer	Additional guidance	Mark
8(f)	A description that includes the following points: • {sequence the genomes / / use DNA / mRNA} of people with and without dementia (1) • suitable method (1) • {identify / analyse} {alleles / genes} only found in people with dementia (1) • identify people with family history of dementia (1)	e.g. use of FISH / use of microarrays / specific probes/hybridization / use of UV fluorescence to identify gene Also accept use of PCR {identify / analyse} active genes (in dementia)	(3)

Question number	Answer	Additional guidance	Mark
8(g)	A description that includes two of the following points: • an antibody that {binds to / complementary to} a (specific) antigen (1) • produced by a {clone of B lymphocyte / plasma cell / cell line} (1) • causes {agglutination / phagocytosis} (1)	ignore identify antigen ACCEPT forms antibody-antigen complex ACCEPT antibody used for opsonization ACCEPT antibody that is specific to an antigen ACCEPT produced by hybridoma / (description of) formation of hybridoma ACCEPT appropriate genetic engineering methods ignore produced by immune cell	(2)

Question number	Answer	Additional guidance	Mark
8(h)	An explanation that includes one of the following points: • {to act as a control / as a method of control} (1) • to compare with the group which received {the drug / donanemab} (1) • remove {bias / psychological effect} (1) • without a placebo group to compare against, it is not possible to know whether the treatment itself had any effect (1)	ACCEPT make results statistically valid / comparable ACCEPT to compare the {results / effectiveness} / for comparison / provide contrast to drug ACCEPT to prove it was {the drug / donanemab} that had the effect ACCEPT show effect of {drug / donanemab}	(1)

Question number	Answer	Additional guidance	Mark
8(i)	An explanation that includes two of the following points: • (by causing) {immune/ inflammatory} response (1) • (due to) release of histamine (1) • by causing damage to {blood capillary endothelium blood vessel / blood brain barrier} (1) • leading to {leaking of fluid from the vessels / (brain) bleeding / increased oedema / increased tissue fluid formation} (1)	ACCEPT humoral response ignore inflammation / inflammation response ACCEPT increased permeability of capillary / weaker blood vessels ACCEPT vasodilation / dilating blood vessel ACCEPT increased {blood flow / fluid in region}	(2)

Question number	Answer	Additional guidance	Mark
8(j)	An answer that includes one of the following points: • {prevent / slow} the {development / progression} of the disease / prevent symptoms appearing / treat before symptoms appear (1) • reverse the effects of the plaques on the brain before they cause damage / prevent plaque formation / {prevent / reduce} amyloid build up (1)	Eg. people are being diagnosed earlier due to better detection techniques Eg. because there could be {plaques / amyloid} with no symptoms Eg. patient to lead a more normal life / work / family Eg. cognitive impairment happens before symptoms detected – Eg. {remove / clear} {plaques / amyloid} (earlier in disease) ignore responses such as better safe than sorry	(1)

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