

CHERRY HILL TUITION EDEXCEL (B) BIOLOGY A2 PAPER 27 MARK SCHEME

Question Number	Answer	Mark
1 (a) (i)	B ;	(1)

Question Number	Answer	Mark
1 (a) (ii)	D ;	(1)

Question Number	Answer	Mark
1 (a) (iii)	A ;	(1)

Question Number	Answer	Mark
1 (a) (iv)	D ;	(1)

Question Number	Answer	Mark
1 (a) (v)	A ;	(1)

Question Number	Answer	Additional guidance	Mark
1 (b)	1. Ideas of (muscles) work antagonistically ; 2. circular muscle relaxes ; 3. radial muscle contracts;	ACCEPT 2 stretched	(2)

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Question Number	Answer	Additional guidance	Mark
2(a)	<p>1. idea of comparative image clarity ;</p> <p>2. CT therefore can only identify {larger / main} structures / MRI can identify smaller structures / eq ;</p> <p>3. Reference to tissue identified / eq ;</p> <p>4. MRI uses {radio waves / magnetic field}, CT uses X-rays / eq ;</p> <p>5. Idea of both give {2D / 3D} images ;</p> <p>6. limitation of MRI or CT ;</p> <p>7. idea of images for both are at one point in time ;</p> <p>8. ref to comparative cost of use ;</p>	<p>ACCEPT 1 - image resolution {higher in MRI / lower in CT} / MRI offers more detail</p> <p>ACCEPT 6 – MRI-noisy, need to keep still, not so good for people with metal implants, pacemakers CT ref to safety aspects of X-rays</p> <p>ACCEPT 8 - MRI more expensive than CT</p>	<p>(3)</p>

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Question Number	Answer	Additional guidance	Mark
2(b)	<ol style="list-style-type: none"> 1. view brain activity directly / eq ; 2. idea of see brain activity over a period of time ; 3. safer as does not use X rays ; 4. no need to use special dyes ; 	<p>ACCEPT 1 – MRI identifies active areas by greater blood flow, greater oxygen uptake, presence of more oxyhaemoglobin in these areas</p> <p>ACCEPT 2 – see in real time, quotes figures such as fMRI takes up to 4 images a second or moving image, CT is still image</p>	(2)

Question Number	Answer	Additional guidance	Mark
2(c)(i)	<ol style="list-style-type: none"> 1. idea that tumour tissue differs from brain tissue ; 2. detail of effect on scan e.g. {energy source / magnetic field / radio waves / eq} {absorbed / blocked / eq} ; 3. Ref to difference in blood supply ; 	ACCEPT 1 - ref to relative densities, tumour growing / dividing / mutated cells	(2)

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Question Number	Answer	Additional guidance	Mark
2(c)(ii)	<ol style="list-style-type: none"> 1. Idea that (treatment) has been partially successful ; 2. tumour reduced / eq ; 3. reduction qualified e.g. in contact with less brain tissue or size reduction quoted ; 	<p>ACCEPT 3 - affecting less brain tissue Halved in size</p>	(2)

Question Number	Answer	Additional guidance	Mark
2(c)(iii)	<ol style="list-style-type: none"> 1&2. two appropriate functions given e.g. think, learn, show emotions, memory, personality, reasoning, eq ; ; 3. Because tumour is situated in the frontal lobe / cerebral hemispheres / cerebrum ; 	<p>ACCEPT 1&2 – decision making, problem solving, planning, intelligence, controls voluntary behaviour, forming associations (combining information from rest of cortex)</p> <p>ACCEPT 3 – frontal cortex</p>	(3)

Question 3 : N/A

Question Number	Answer	Additional guidance	Mark
4(a)(i)			

Question 4a : N/A

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Question Number	Answer	Additional guidance	Mark
4(b)	<ol style="list-style-type: none"> 1. the higher troponin T, the longer the stay / eq ; 2. reliability of prediction decreases as troponin T concentration increases ; 3. because {range / eq} increases ; 4. least reliable for 6.0+ as range is largest ; 5. one range stated e.g. for 6.0+ it is 7 to 11 days ; 6. reference to range overlapping between 4.0-5.9 and 6.0+ ; 7. idea that 6.0+ is too wide a category for conc. of troponin T ; 8. idea that the higher the troponin T, the greater the damage to the heart ; 	<p>ACCEPT 1 - converse</p> <p>ACCEPT 2 - converse, less reliable at high troponin T</p> <p>ACCEPT 3 - range of the length of stay, range of data</p> <p>ACCEPT 4 - converse for 1.0-3.9 / 4.0-5.9</p>	(3)

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Question Number	Answer	Additional guidance	Mark
5(a)	A - cell body ; B - axon ;		(2)

Question Number	Answer	Additional guidance	Mark
5(b)(i)	<ol style="list-style-type: none"> 1. increasing Eugenol concentration increases percentage inhibition / positive correlation ; 2. description of non linear correlation ; 3. credit correct manipulation of the data e.g. between 0.1 and 1.0 mmol dm³ percentage inhibition to increase by 55% ; 	ACCEPT 2 – e.g. greatest increase in inhibition is between eugenol concentration of 0.2 and 0.4 mmol dm ⁻³	(2)

Question Number	Answer	Additional guidance	Mark
*5(b)(ii)	<p>QWC – Spelling of technical terms (<i>shown in italics</i>) must be correct and the answer must be organised in a logical sequence)</p> <ol style="list-style-type: none"> 1. {reduced / eq} Ca^{2+} enters { <i>presynaptic membrane</i> / into <i>sensory neurone</i> } ; 2. due to Ca^{2+} channel not opening / decreased sensitivity of <i>membrane</i> to Ca^{2+} ; 3. fewer <i>vesicles</i> {move towards / fuse} with <i>presynaptic membrane</i> ; 4. less <i>neurotransmitter</i> {released into / less diffuses across} { <i>synaptic gap</i> / eq } ; 5. less <i>neurotransmitter</i> binds to receptors on { <i>post-synaptic membrane</i> / adjacent neurone } ; 6. idea of reduced depolarisation / less Na^+ or cation channels open ; 7. idea of { threshold intensity / <i>action potential</i> / <i>impulse</i> } less likely to occur ; 8. idea of pain not being sensed as impulse { stopped before entering CNS / leaving the <i>sensory neurone</i> } ; 	<p>ACCEPT 1 – into <i>synaptic</i> knob / pre-synaptic neurone</p> <p>ACCEPT 4 (& 5) - named neurotransmitter example</p> <p>ACCEPT 7 - not reached as alternative to less likely to be reached</p>	(6)

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Question Number	Answer	Additional guidance	Mark
6(a) (i)	(cut shoot) without IAA present / without agar blocks ;	ACCEPT - agar block with no IAA, empty agar block, agar block with water ACCEPT - auxin(s) as alternative to IAA	(1)

Question Number	Answer	Additional guidance	Mark
6(a) (ii)	<ol style="list-style-type: none"> 1. (both sides of) shoot taller / eq ; 2. than the control / eq ; 3. both IAA's diffuse { down / out of agar / to zone of elongation } / eq ; 4. reference to cell elongation / eq ; 5. details of cell elongation / eq ; 6. shoot bends to the right / eq ; 7. (due to) more growth on {left side of shoot / side with artificial IAA} / eq ; 	<p>ACCEPT - auxin as alternative to IAA throughout</p> <p>ACCEPT 1 – grow { taller/higher/up/ towards the light }</p> <p>ACCEPT 3 – away from the light/agar block</p> <p>ACCEPT 6 - bends away from side with artificial IAA</p>	(5)

Question Number	Answer	Additional guidance	Mark
6(b)	<ol style="list-style-type: none"> 1. idea that IAA enters the cell ; 2. reference to movement within cell / IAA in cytoplasm to nucleus ; 3. effect when binds to transcription factor e.g. forms a transcription initiation complex or countering an inhibitor ; 4. reference to switching on gene ; 5. activity at promoter region / eq ; 6. allows formation of (m)RNA / eq ; 7. idea of translation produces protein ; 	<p>ACCEPT - auxin as alternative to IAA throughout</p> <p>ACCEPT 3 - joins to promoter region or activates transcription factor</p> <p>ACCEPT 5 – ref to RNA polymerase activity</p>	(4)

Question Number	Answer	Additional guidance	Mark
7(a)	<ol style="list-style-type: none"> 1. alpha glucose in starch and beta glucose in cellulose; 2. only {starch / amylopectin} can be branched / cellulose only a linear molecule ; 3. starch contains two types of molecule, cellulose only one ; 4. alternate monomers rotated through 180° in cellulose only ; 5. only {amylopectin / starch} can have 1-6 glycosidic bonds / cellulose has 1-4 glycosidic bonds only ; 	<p>ACCEPT 3 - the two named molecules of starch – amylose and amylopectin</p> <p>ACCEPT 5 – starch can have 1-6 & 1-4 glycosidic bonds but cellulose only 1-4</p>	(2)

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Question Number	Answer	Additional guidance	Mark
7(b)(i)	<ol style="list-style-type: none"> 1. thermoreceptors in hypothalamus / eq ; 2. detect the increase in (core) blood temperature / eq ; 3. reference to heat loss centre activated ; 4. reference to autonomic nervous system ; 5. reference to impulses down motor neurones ; 6. to {effectors / named effector} / eq ; 7. detail of method of heat loss / eq ; 	<p>ACCEPT 5 - effector neurone for motor neurone</p> <p>ACCEPT 7 – vasodilation of blood vessels, sweat released, heat loss from blood through radiation</p>	(4)

Question Number	Answer	Additional guidance	Mark
7(b)(ii)	<ol style="list-style-type: none"> 1. (shivering) is muscle contraction ; 2. which uses {respiration / ATP / eq} ; 3. which release heat (to warm body) / eq ; 	<p>ACCEPT 2 - oxidative phosphorylation, ATP being converted to ADP and Pi</p>	(2)

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Question Number	Answer	Additional guidance	Mark
7(c)	<ol style="list-style-type: none"> 1. (cancer causing) gene identified / eq ; 2. gene {cut / isolated / eq} from DNA / eq ; 3. using a {restriction / eq} enzyme / eq ; 4. gene in {vector / named vector} ; 5. mechanism for getting {gene / vector} into host cells (of naked mole rats) / eq ; 	<p>ACCEPT 4 – named examples including retrovirus, virus, liposome</p> <p>ACCEPT 5 - reference to (micro)injection, microprojectiles, electroporation, gene gun, inhaler</p>	(3)

Question Number	Answer	Additional guidance	Mark
*7(d)	<p>QWC – Spelling of technical terms (<i>shown in italics</i>) must be correct and the answer must be organised in a logical sequence)</p> <ol style="list-style-type: none"> 1. idea that this air has higher CO₂ content ; 2. { CO₂ level in blood increases / pH of blood falls / eq } ; 3. change detected by chemoreceptors in { carotid body / carotid artery / aortic body / aorta / medulla } ; 4. reference to { ventilation centre / eq } (in medulla) ; 5. sends more impulses along neurones / eq ; 6. to intercostal muscles / diaphragm / eq ; 7. causing an increased { ventilation rate / rate of breathing / depth of breathing } / eq ; 	<p>ACCEPT 2 - high, higher (for CO₂)</p> <p>ACCEPT 4 – respiratory centre, inspiratory centre for ventilation centre</p> <p>ACCEPT 5 – impulses sent more often</p>	<p>(5)</p>

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Question Number	Answer	Additional guidance	Mark
7(e)	<ol style="list-style-type: none"> 1. naked mole rat's {incisors / eq} grow through {skin / lip} without {damage / eq} ; 2. lead to new {coatings / permanent seal /eq} at {skin / bone / metal} interface ; 3. so soft tissue is {not damaged / eq } (by the prosthetic) / eq ; 		(2)
Question Number	Answer	Additional guidance	Mark
7(f)	gonadotrophin-releasing (hormone) and anterior pituitary / gonadotrophins and {ovaries / testes} ;	ACCEPT - testosterone and testes ACCEPT - gonads for testes or ovaries	(1)
Question Number	Answer	Additional guidance	Mark
7(g)	<ol style="list-style-type: none"> 1. idea of irregularity of flagellum ; 2. Idea of irregularity associated with mid-region ; 	ACCEPT 1 – no or more than one flagellum ACCEPT 2 – not enough mitochondria	(2)

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Question Number	Answer	Additional guidance	Mark
7(h)	<ol style="list-style-type: none"> 1. idea of high levels of inbreeding ; 2. low level of genetic diversity / eq ; 3. idea that there is some variation because more than one male is involved in ; 4. unfamiliar males used as mates (by queen) / eq ; 5. fusion of colonies / eq ; 6. arrival of a dispersal phenotype (from a different colony) ; 7. mutations / eq ; 	<p>ACCEPT 1 – accept idea in context of only one queen/female breeds</p> <p>ACCEPT 2 – restricted gene pool, low genetic variation</p>	(3)

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Question Number	Answer	Additional guidance	Mark
7(i)	<ol style="list-style-type: none"> 1. reduces inbreeding (depression) / eq ; 2. increases outbreeding / outbreeding qualified ; 3. (leading to) increase in genetic diversity ; 4. idea of colony size regulation ; 5. idea of increase in fecundity ; 6. idea of increased chance of survival ; 	<p>ACCEPT 1 - less genetic drift</p> <p>ACCEPT 2 – disperser/new comer more likely to breed</p> <p>ACCEPT 3 – increased genetic variation, increase in variety of alleles</p> <p>ACCEPT 6 – appropriate ref to natural selection, due to environmental changes</p>	(2)

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Question Number	Answer	Additional guidance	Mark
7(j)	<p>Paired responses:</p> <ol style="list-style-type: none"> 1. reduced sensitivity to chemical pain / disconnection of 'pain nerves' ; 2. high CO₂ in air (of tunnels) ; 3. haemoglobin has higher affinity for oxygen / brain can tolerate eq ; 4. low O₂ levels (in tunnels) / eq ; 5. increased number of oxytocin receptors in brain ; 6. overcrowding / eq ; 7. non-pigmented ; 8. lack of UV light ; 9. outbreeding mechanisms such as disperser; 10. low genetic diversity ; 11. hairless/ naked/ reduction of sweat gland / loose skin / no insulating layer / poikilothermic ; 12. due to nature of its temperature environment / eq ; 13. teeth arrangement / eq ; 14. for digging underground ; 15. keen sense of smell/reduce eyesight / ref to circadian rhythms ; 16. dark conditions ; 17. division of labour ; 18. for the survival of the eusocial colony ; 	<p>ACCEPT1 - lack or receptor for chemical pain</p> <p>ACCEPT 3 – ref to brain's hypoxia response, neurones or brain resistance to hypoxia</p> <p>ACCEPT13 - forward of lips or long</p>	<p>(4)</p>

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Question Number	Answer	Additional guidance	Mark
8(a)	<ol style="list-style-type: none"> 1. reference to increase in {metabolic rate / enzyme activity / eq} as temperature rises ; 2. reference to increase in {kinetic / eq} energy of molecules (as temperature rises) / eq ; 3. reference to increase in {enzyme-substrate complexes / energy of collisions / eq} (as temperature rises) ; 4. idea of {inactivation at lower temperatures/ denaturation at higher temperatures} of enzymes ; 5. idea that temperature affects {differentiation / growth /division / eq} ; 	<p>1. Accept converse argument for mp 1 – 3</p> <p>2. Accept movement</p> <p>4.Accept the idea that enzyme-substrate complexes cannot be made if denaturing</p>	(3)

Question Number	Answer	Additional guidance	Mark
8(b)	<ol style="list-style-type: none"> 1. idea that temperature affects {survival / development / growth / metabolism / cell division / eq} ; 2. idea that enzymes affect {development / growth / metabolism / cell division/ eq} ; 3. idea that temperature affects enzymes ; 4. idea that different frogs have different enzymes ; 		(2)

Question Number	Answer	Additional guidance	Mark
8(c)	<i>sylvatica,</i> <i>pipiens,</i> <i>palustris,</i> <i>clamitans</i> ; ;	if order correct but reversed = 1 mark	(2)

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Question Number	Answer	Additional guidance	Mark
8(d)	<ol style="list-style-type: none"> 1. idea that different species are reproductively isolated ; 2. idea of different breeding {times / seasons / eq} ; 3. idea of different {breeding / courtship / eq} {behaviour / rituals / displays / colour / songs / croaks / eq} ; 4. idea that population at {northerly / southerly} limit of range may not develop (to adulthood) ; 5. idea that breeding between different species results in infertile offspring ; 	3. Accept idea of incompatible {genitalia / gametes}	(3)

Question Number	Answer	Additional guidance	Mark
8(e)	<ol style="list-style-type: none"> 1. idea that global warming will increase the temperature (at the latitudes) ; 2. idea that temperatures (at these latitudes) may become too high for any of the species ; 3. idea that new temperature may be above the maximum to complete development or above the upper lethal limit ; 4. idea that species move {north / to cooler regions / eq} ; 5. ref to change in {food source / predators / competition / eq} ; 	2.Accept become extinct	(3)

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Question Number	Answer	Additional guidance	Mark
9(a)(i)	1. idea of (a sequence of) changes in {a community / organisms / species / plants} ; 2. over a period of time / eq ;	1. Accept the idea of species replacing or succeeding each other 2. Accept gradually	(2)

Question Number	Answer	Additional guidance	Mark
9(a)(ii)	1. idea of final {stage / sere / community} ; 2. feature of community described e.g. self-sustaining , stable, one dominant species, a few codominant species ;	1. Accept at the end of succession 2. Ignore named example	(2)

Question Number	Answer	Additional guidance	Mark
9(b)(i)	1. idea of conservation of {genetic diversity / genetic variation / biodiversity} ; 2. idea of extinction ; 3. idea of aesthetic reasons ; 4. idea that these plants may be useful e.g. as medicines ; 5. idea that other animals depend on these plants as a {source of food / habitat} ;	1. Accept gene pool 5. Accept part of a food chain Ignore survival	(2)

Question Number	Answer	Additional guidance	Mark
9(b)(ii)	grazing / remove saplings / mowing / eq ;	Accept burning	(1)

Question Number	Answer	Mark
9(c)(i)	C systematic ;	(1)

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Question Number	Answer	Additional guidance	Mark
9(c)(ii)	<ol style="list-style-type: none"> 1. comparison (of the value) to the critical value indicates no significance / stronger correlation the nearer the value is to 1.0 / 0.565 is too low / eq ; 2. idea that sample size too small ; 3. idea that { there is no correlation between height and width / other factors affect height / other factors affect width / eq} ; 	<p>1. Ignore plus and minus numbers</p> <p>2. Accept not enough data</p>	(2)