

CHERRY HILL TUITION EDEXCEL (B) BIOLOGY A2 PAPER 29 MARK SCHEME

Question Number	Correct Answer	Mark
1(a)	<ol style="list-style-type: none"> <li>1. nature of abnormality e.g. bleeding, ref. to density ;</li> <li>2. {location / eq} of abnormality ;</li> <li>3. {extent / size/ eq} of abnormality ;</li> <li>4. likely problems e.g. accessibility for surgery ;</li> </ol>	max (2)

Question Number	Correct Answer	Mark
1(b)	<ol style="list-style-type: none"> <li>1. (found in) different {regions / eq} of brain / eq ;</li> <li>2. the right hand brain has {more / two/ eq} abnormalities ;</li> <li>3. different areas of brain have different functions / eq ;</li> <li>4. {symptoms / eq} depend on region of brain affected / eq ;</li> <li>5. idea of different types of abnormality can cause different symptoms ;</li> </ol>	max (2)

Question Number	Correct Answer	Mark
1(c)	<ol style="list-style-type: none"> <li>1. detects level of oxygenation of the blood /measures changes in blood flow within brain / eq ;</li> <li>2. {increased flow / more oxygen / eq} suggests increased activity / eq ;</li> <li>3. study brain activity related to {stimuli / tasks / eq} ;</li> </ol>	max (2)

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1(d)	<table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th style="text-align: center;">W</th> <th style="text-align: center;">X</th> <th style="text-align: center;">Y</th> <th style="text-align: center;">Z</th> <th></th> </tr> </thead> <tbody> <tr> <td style="text-align: right;">Regulating core temperature</td> <td></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td></td> <td></td> <td style="text-align: right;">;</td> </tr> <tr> <td style="text-align: right;">Climbing stairs</td> <td></td> <td></td> <td></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: right;">;</td> </tr> <tr> <td style="text-align: right;">Regulating carbon dioxide in the blood</td> <td></td> <td></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td></td> <td style="text-align: right;">;</td> </tr> <tr> <td style="text-align: right;">Choosing a gift</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td></td> <td></td> <td></td> <td style="text-align: right;">;</td> </tr> </tbody> </table>		W	X	Y	Z		Regulating core temperature		<input checked="" type="checkbox"/>			;	Climbing stairs				<input checked="" type="checkbox"/>	;	Regulating carbon dioxide in the blood			<input checked="" type="checkbox"/>		;	Choosing a gift	<input checked="" type="checkbox"/>				;	<b>(4)</b>
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2(a)	<ol style="list-style-type: none"> <li>1. depolarisation of adjacent {membrane / eq} / eq ;</li> <li>2. changes PD across membrane / eq ;</li> <li>3. opens sodium {gates / eq} ;</li> <li>4. sodium ions move into (the neurone) ;</li> </ol>	max (2)

Question Number	Correct Answer	Mark												
2(b)	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 30%;">Position on diagram</th> <th style="width: 30%;">Permeable to sodium ions</th> <th style="width: 30%;">Permeable to potassium ions</th> <th style="width: 10%;"></th> </tr> </thead> <tbody> <tr> <td style="text-align: center;">A</td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td></td> <td style="text-align: right;">;</td> </tr> <tr> <td style="text-align: center;">D</td> <td></td> <td style="text-align: center;"><input checked="" type="checkbox"/></td> <td style="text-align: right;">;</td> </tr> </tbody> </table>	Position on diagram	Permeable to sodium ions	Permeable to potassium ions		A	<input checked="" type="checkbox"/>		;	D		<input checked="" type="checkbox"/>	;	(2)
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Question Number	Correct Answer	Mark
2(c)	<ol style="list-style-type: none"> <li>1. correct {reference to / description of} diffusion gradient (of potassium ions) ;</li> <li>2. correct {reference to / description of} electrochemical gradient ;</li> <li>3. increased permeability (of membrane) to potassium ions / eq ;</li> <li>4. reference to potassium {gates / eq} open / eq ;</li> <li>5. reference to sodium {gates / eq} closed / eq ;</li> </ol>	max (3)

Question Number	Correct Answer	Mark
2(d)	<ol style="list-style-type: none"><li>1. PD less negative / eq</li><li>2. idea that the membrane remains permeable to potassium ions ;</li><li>3. potassium ions {move because of charge difference / eq} ;</li><li>4. into {nerve cell / neurone / axon / eq} ;</li><li>5. idea that potassium ion is removing a positive charge (from the outside) ;</li><li>6. idea that equilibrium is established e.g. diffusion gradient balanced by potential difference ;</li></ol>	max (3)

Question 3: N/A

Question Number	Correct Answer	Mark
4(a)	<ol style="list-style-type: none"><li>1. {initiates / eq} heartbeat / eq ;</li><li>2. (starts) wave of excitation / depolarisation ;</li><li>3. {determines / eq} heart rate ;</li></ol>	max (2)

Question Number	Correct Answer	Mark
4(b)	<ol style="list-style-type: none"><li>1. {increased / eq} impulses to SAN / eq ;</li><li>2. (via) sympathetic {nervous system / eq } ;</li><li>3. stimulates more frequent depolarisation in SAN / eq ;</li><li>4. increases {heart rate / cardiac output} /eq ;</li></ol>	max (2)

Question Number	Correct Answer	Mark
*4(c)	<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"> <li>1. changes {electrical activity / <i>depolarisation</i>} of heart / eq ;</li> <li>2. peak is reversed / eq ;</li> <li>3. idea that peak is earlier than expected ;</li> <li>4. no change in pressure in <i>pulmonary artery</i> ;</li> <li>5. (because) little blood in <i>ventricles</i> ;</li> <li>6. missed normal wave after E / longer gap before next wave / eq ;</li> <li>7. missed (effective) <i>contraction</i> after E ;</li> <li>8. early <i>depolarisation</i> leaves <i>ventricle</i> insensitive ;</li> <li>9. idea that the wave of <i>depolarisation</i> is prevented ;</li> <li>10. reference to <i>refractory period</i> / eq ;</li> </ol>	max (5)

Question Number	Correct Answer	Mark
4(d)	<ol style="list-style-type: none"><li>1. idea that (absolutists) say drugs should not be used at any time ;</li><li>2. should not allow athletes to be pressured into using drugs ;</li><li>3. risk to health / eq ;</li><li>4. gain unfair advantage / eq ;</li><li>5. other harmful substances banned / eq ;</li><li>6. burden on care services / eq ;</li><li>7. idea that (relativists) say that drugs could be used under some circumstances ;</li><li>8. idea that they could be used for medication ;</li><li>9. drugs (in the body) can be difficult to legislate for / eq ;</li></ol>	max (2)

Question 5 & 6: N/A

Question Number	Correct Answer	Mark
7(a)	<ol style="list-style-type: none"> <li>1. idea that enzymes are proteins ;</li> <li>2. reference to transcription ;</li> <li>3. gene / eq ;</li> <li>4. reference to mRNA ;</li> <li>5. reference to translation (of mRNA) ;</li> <li>6. reference to genetic code / eq ;</li> <li>7. reference to {ribosome / polysomes} ;</li> <li>8. reference to tRNA ;</li> <li>9. idea that amino acids bonded / polypeptide produced ;</li> </ol>	max (4)

Question Number	Correct Answer	Mark
7(b)	<ol style="list-style-type: none"> <li>1. adrenoceptors are {proteins / glycoproteins} ;</li> <li>2. phospholipids can move in the membrane / eq ;</li> <li>3. can be {added to / removed from / move around in} {phospholipid bilayer / membrane} ;</li> <li>4. adrenoceptors can interact with phospholipids e.g. {hydrophobic / hydrophilic} interactions ;</li> </ol>	max (2)

Question Number	Correct Answer	Mark
7(c)	<ol style="list-style-type: none"> <li>1. {incomplete / insufficient} data / eq ;</li> <li>2. different interpretations of data / eq ;</li> <li>3. &amp; 4. credit any two examples from the text e.g. evidence from noradrenaline, electrical stimulation, multifactorial problem, antidepressant drugs, pain killers, gender ; ;</li> </ol>	max (3)



Question Number	Correct Answer	Mark
*7(d)(i)	<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> <p><b>Drug therapy</b></p> <ol style="list-style-type: none"> <li>1. idea that it affects the whole brain ;</li> <li>2. idea that it is difficult to get dose right ;</li> </ol> <p><b>DBS (Deep Brain Stimulation)</b></p> <ol style="list-style-type: none"> <li>3. targets specific area of the brain / eq ;</li> <li>4. relieves tremors /eq ;</li> <li>5. has effects on {other areas of the brain / other cell types} ;</li> <li>6. has short term side effects e.g. laughing, crying ;</li> <li>7. has long term side effects e.g. depression, mood swings, suicidal tendencies ;</li> <li>8. invasive procedure has risk / eq ;</li> </ol> <p><b>Gene therapy</b></p> <ol style="list-style-type: none"> <li>9. corrects chemical imbalance / eq ;</li> <li>10. precise group of cells affected / eq ;</li> </ol> <p><b>Light therapy</b></p> <ol style="list-style-type: none"> <li>11. very precise effects / eq ;</li> <li>12. requires genetic modification / eq ;</li> <li>13. genes from different species / eq ;</li> </ol> <p><b>General (Gene or light therapy)</b></p> <ol style="list-style-type: none"> <li>14. dangers of using virus as vector / eq ;</li> <li>15. ethical issues of genetic modification / eq ;</li> </ol>	max (7)

Question Number	Correct Answer	Mark
7(d)(ii)	<ol style="list-style-type: none"> <li>1. both caused by {lack / eq} of neurotransmitter ;</li> <li>2. Parkinson's {lack / eq} of dopamine ;</li> <li>3. depression {lack / eq} of serotonin ;</li> </ol>	max (2)

Question Number	Correct Answer	Mark
7(e)	<ol style="list-style-type: none"> <li>1. light affects pigments / eq ;</li> <li>2. rhodopsin / iodopsin (in mammals) ;</li> <li>3. (changes in pigment) result in action potentials /nerve impulses / eq ;</li> <li>4. pigments (in cones) respond to {specific / eq} wavelength / eq ;</li> </ol>	max (3)

Question Number	Correct Answer	Mark
7(f)	<ol style="list-style-type: none"> <li>1. virus acts as a vector ;</li> <li>2. reference to human cold virus ;</li> <li>3. virus has specific surface proteins / eq ;</li> <li>4. match surface{proteins / receptors / eq} of target cell ;</li> <li>5. binding to surface protein promotes entry to cell / eq ;</li> <li>6. idea that genes can be incorporated into {host DNA / eq}</li> </ol>	max (3)

Question Number	Correct Answer	Mark
7(g)	<ol style="list-style-type: none"><li>1. {causes / involved in / eq} inflammation / eq ;</li><li>2. vasodilation / eq ;</li><li>3. increased blood flow / eq ;</li><li>4. increased {permeability / leakage} of blood vessels ;</li><li>5. Oedema / swelling / eq ;</li><li>6. reference to temperature increase ;</li><li>7. reference to histamine / mast cells ;</li><li>8. idea that phagocytes / macrophages move to site ;</li></ol>	max (2)

Question Number	Correct Answer	Mark
7(h)	<ol style="list-style-type: none"> <li>1. representative sample / eq ;</li> <li>2. (sufficiently) large sample / eq ;</li> <li>3. double blind testing ;</li> <li>4. reference to placebo ;</li> <li>5. objective measurement of effects / eq ;</li> <li>6. (collecting / analysing) separate data sets for males and female / eq ;</li> <li>7. other factors need to be {controlled / measured} e.g. hormone levels in females, socioeconomic, nutrition ;</li> <li>8. reference to other models e.g. animals, tissue culture ;</li> <li>9. appropriate comment on safety issues e.g. toxicity ;</li> <li>10. consideration of time e.g. between dose and observation, long term data ;</li> </ol>	max (4)

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

Question Number	Answer	Mark
8(b)	<ol style="list-style-type: none"> <li>1. {no / little / eq} change in pre-monsoon temperature, post-monsoon has risen / eq ;</li> <li>2. idea that both {fluctuate / eq} ;</li> <li>3. idea that {fluctuations / eq} match each other ;</li> <li>4. reference to {fluctuations / changes} {within / less than / eq} 1°C ;</li> <li>5. reference to a particular change in both e.g. both decreased between 1800 to 1850 ;</li> <li>6. Credit correct manipulation of figures to compare pre-monsoon and post-monsoon changes units needed ;</li> <li>7. idea that the range of (mean) temperatures is greater OR greater fluctuations, in post-monsoon period ;</li> </ol>	(3)

Question Number	Answer	Mark
8(c)(i)	<ol style="list-style-type: none"> <li>1. idea of {extrapolating / eq} data ;</li> <li>2. idea of use for {modelling / investigation of correlations} ;</li> <li>3. idea of providing evidence for global warming ;</li> <li>4. idea of using this data along with data from other sources ;</li> </ol>	(3)

Question Number	Answer	Mark
8(c)(ii)	<ol style="list-style-type: none"> <li>1. Idea that there is not enough data ;</li> <li>2. idea that data has only been collected from Nepal ;</li> <li>3. reference to {no way of confirming data / no proof / not reliable} ;</li> <li>4. idea of { fluctuations too great / no real trend} ;</li> <li>5. idea that means are a poor representation of raw data ;</li> <li>6. reference to {scatter / spread / eq} (of raw data) is indicator of reliability ;</li> <li>7. idea that method of estimated temperature from growth rings is questionable / eq ;</li> <li>8. other environmental changes (affecting trees)not taken into account / eq ;</li> </ol>	(3)

Question Number	Answer	Mark
8(d)	<p>Any one from:</p> <ol style="list-style-type: none"> <li>1. (estimates of) carbon dioxide levels (in air)</li> <li>2. (pollen) from peat</li> <li>3. temperature records ;</li> </ol>	(1)

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

Question Number	Answer	Mark
*9(b) QWC	<p>(QWC - Spelling of technical terms must be correct and the answer must be organised in a logical sequence)</p> <ol style="list-style-type: none"> <li>1. idea of <i>geographical isolation</i> e.g. <i>physical barrier</i> between Corsican and mainland birds / <i>allopatric speciation</i> ;</li> <li>2. idea that there are different <i>selection pressures</i> (between Corsica and the mainland) ;</li> <li>3. an example of selection pressure e.g. food source, different habitats ;</li> <li>4. idea that <i>mutations</i> occurred ;</li> <li>5. Idea that this results in <i>adaptation</i> to the conditions ;</li> <li>6. these {<i>alleles /genes</i>} passed on (to <i>offspring</i>);</li> <li>7. idea of change in <i>gene pool</i> e.g. increasing <i>frequency</i> of (these) <i>alleles</i>, changes in <i>gene pool</i> ;</li> <li>8. reference to <i>reproductive isolation</i> (of Corsican nuthatches from mainland nuthatches) ;</li> <li>9. idea that birds on mainland could live in all regions as there is no restriction on <i>gene flow</i> ;</li> </ol>	(5)

Question Number	Answer	Mark
9(c)(i)	<p>ACCEPT the converse in the context of <i>S. europaea</i>, if clearly expressed</p> <ol style="list-style-type: none"> <li>reference to <i>S. whiteheadi</i> adapted to {colder / mountainous} regions ;</li> <li>(if climate warms) {food supply / pine seeds / invertebrates} less available ;</li> <li>idea of {small population / only 2500 pairs} (of <i>S. whiteheadi</i>) ;</li> <li>idea of limited {gene pool / genetic diversity / variety of alleles} ;</li> <li>idea that all the <i>S. whiteheadi</i> will be adversely affected ;</li> <li>idea that the <i>S. whiteheadi</i> cannot fly to other regions ;</li> </ol>	(3)

Question Number	Answer	Mark
9(c)(ii)	<ol style="list-style-type: none"> <li>idea that <i>S. whiteheadi</i> have a variety of food sources e.g. can change their feeding habits, eat seeds and invertebrates} ;</li> <li>idea that {more / different} {invertebrates /seeds / food / eq} might become available ;</li> <li>idea that they have another allele that gives a survival advantage ;</li> <li>idea that they could migrate (NOT south, somewhere warmer) ;</li> </ol>	(2)

Question Number	Answer	Mark
9(d)	<ol style="list-style-type: none"> <li>idea of captive-breeding programmes ;</li> <li>reference to {conserve / preserve / eq} {alleles /genes / gene pools} ;</li> <li>reference to {re-introduction / releasing of <i>S. whiteheadi</i> into suitable habitats} ;</li> </ol>	(2)



Question Number	Answer	Mark
10 (a)(i)	<ol style="list-style-type: none"> <li>(rate of) {production of / energy incorporated into / eq} {biomass / organic material / organic molecules / tissue} ;</li> <li>reference to {losses in respiration / GPP- R } ;</li> <li>in {producers / plants / eq } ;</li> </ol>	(2)

Question Number	Answer	Mark
10 (a)(ii)	<ol style="list-style-type: none"> <li>correct readings from graph indicated e.g. (11 and 1) ;</li> <li>correct subtraction e.g. (11-1 / 10) ;</li> <li>correct division (by 1) x 100/1 to give 1000% ;</li> </ol> <p>[correct answer = 3 marks]</p>	(3)

Question Number	Answer	Mark
10 (b)	<ol style="list-style-type: none"> <li>idea that the rate of {(bio)chemical / metabolic / photosynthetic / named} reactions increases ;</li> <li>idea of increase in {movement / kinetic energy} of {enzyme / substrate / molecules / particles} / eq ;</li> <li>idea of (increase in reaction rate) because of more enzyme substrate interaction ;</li> </ol>	(2)

Question Number	Answer	Mark
10(c)	<ol style="list-style-type: none"> <li>1. (between January and April) NPP increases as light increases ;</li> <li>2. idea of a correlation between NPP and light ;</li> <li>3. idea that the changes in NPP are occurring after the changes in light / peak light is April and peak NPP is May ;</li> <li>4. reference to increase in light increases {(rate of) photosynthesis / (ATP) energy available for Calvin Cycle / eq} ;</li> <li>5. credit correct details of photosynthesis e.g. light results in excitation of electrons ;</li> <li>6. idea that there is no real correlation between temperature and NPP / reference to temperature fluctuating ;</li> <li>7. idea that the temperature affects how quickly enzymes work ;</li> <li>8. reference to NPP falling (from May) but temperature remaining high ;</li> <li>9. reference to (light / temperature) limiting factor ;</li> </ol>	(4)

Question Number	Answer	Mark
10(d)	<p>Any two biotic factors e.g.</p> <ol style="list-style-type: none"> <li>1. grazing / {consumers / herbivores / named herbivore} / eq ;</li> <li>2. trampling / eq ;</li> <li>3. shading by {plants / named plant} / eq ;</li> <li>4. competition from other plants / eq ;</li> <li>5. disease / eq ;</li> </ol>	(2)