

## CHERRY HILL TUITION EDEXCEL (B) BIOLOGY A2 PAPER 26 MARK SCHEME

Question Number	Answer	Mark
<b>1(a)(i)</b>	B ;	<b>(1)</b>

Question Number	Answer	Mark
<b>1(a)(ii)</b>	C ;	<b>(1)</b>

Question Number	Answer	Mark
<b>1(b)</b>	D ;	<b>(1)</b>

Question Number	Answer	Mark
<b>1(c)</b>	A ;	<b>(1)</b>

Question Number	Answer	Mark
<b>1(d)</b>	C ;	<b>(1)</b>

Question Number	Answer	Mark
<b>1(e)</b>	D ;	<b>(1)</b>

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Question Number	Answer	Mark
<b>2 (a) (i)</b>	all the {DNA / genes / eq} of (the human species) ;	<b>(1)</b>

Question Number	Answer	Mark
<b>2 (a) (ii)</b>	Any <b>one</b> from:  1. idea of discrimination e.g. insurers might have access to a person's DNA /  2. idea of who decides whether a person is tested /  3. idea of need for confidentiality /  4. expensive medical treatments might be restricted / eq ;	<b>(1)</b>

Question Number	Answer	Mark
<b>2 (b) (i)</b>	1. idea that (Human Genome Project) identifies allele related to melanoma e.g. mutant allele, aberrant allele ;  2. idea that drug targets this allele ;  3. (mutant) allele can no longer express itself / eq ;  4. idea of drug preventing translation ;  5. idea that such a drug is more effective ;	<b>(3)</b>

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Question Number	Answer	Mark
<b>2 (b) (ii)</b>	<ol style="list-style-type: none"> <li>1. idea that drug affects expression of the allele ;</li> <li>2. idea that protein not produced ;</li> <li>3. idea that (melanoma) cells killed ;</li> <li>4. idea that (melanoma) cells do not divide ;</li> <li>5. idea that they are replaced with normal body cells ;</li> <li>6. through mitosis / eq ;</li> <li>7. description of specific part of mitosis affected e.g. no spindle fibres ;</li> </ol>	<b>(4)</b>

Question Number	Answer	Mark
<b>2 (b) (iii)</b>	<ol style="list-style-type: none"> <li>1. randomised trial / eq ;</li> <li>2. {large number / eq} of patients ;</li> <li>3. double blind / eq ;</li> <li>4. idea of {use of placebo / use of current treatment} ;</li> <li>5. testing how effective the drug is on patients / eq ;</li> </ol>	<b>(2)</b>

Question Number	Answer	Mark
<b>2 (c)</b>	<ol style="list-style-type: none"> <li>1. yeast cells have human collagen {gene / allele / DNA / eq} ;</li> <li>2. idea that new collagen is recognised as 'self' e.g. has no non-self antigens ;</li> <li>3. does not trigger immune response / eq ;</li> </ol>	<b>(2)</b>

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Question Number	Answer	Mark
<b>3 (a) (i)</b>	1. cage with no enrichment / eq ; 2. idea of same regime e.g. starvation time, feeding time, time in cage ;	<b>(2)</b>

Question Number	Answer	Mark
<b>3 (a) (ii)</b>	idea of motivation e.g. to encourage them to look for food ;	<b>(1)</b>

Question Number	Answer	Mark
<b>3 (b)</b>	1. overall trend increases / eq ; 2. idea of rapid increase in visiting over first { 2 / 3 / 5 } days / eq ; 3. after this the increase in visiting slows down / eq ; 4. comment on lower percentage on day 4 ; 5. comment on levels off from day { 5 / 9 } ; 6. idea that the rats did not visit all the floors (on each day) e.g. 100% of the floors never achieved ; 7. manipulation of figures / eq ;	<b>(3)</b>

Question Number	Answer	Mark
<b>3 (c)</b>	1. idea that exploration encouraged in group P ; 2. due to { enrichment / hidden food / eq } ; 3. idea that they are more intrepid e.g. they visit more of the maze ; 4. { better / more adept / eq } at looking for food / learnt to look for food ;	<b>(2)</b>

Question Number	Answer	Mark
<b>3 (d)</b>	1. more synapses /eq ; 2. idea that more {connections between neurones / neurones connected together} ; 3. idea of better learning capacity ;	<b>(2)</b>

Question Number	Answer	Mark
<b>*4 (a)</b>	<p><b>Take into account quality of written communication when awarding the following points.</b></p> <ol style="list-style-type: none"> <li>1. idea of calibration for volume ;</li> <li>2. idea of calibration for time ;</li> <li>3. description of how to calculate tidal volume (from trace) / eq ;</li> <li>4. idea that one peak = one breath ;</li> <li>5. reference to breathing rate is number of peaks per minute ;</li> <li>6. idea of standardised group of males and females e.g. same age, non-smokers ;</li> <li>7. idea that traces taken at rest ;</li> <li>8. reference to replicates ;</li> <li>9. description of how to calculate the mean from the trace ;</li> </ol>	<b>(6)</b>

Question Number	Answer	Mark
<b>4 (b) (i)</b>	<ol style="list-style-type: none"> <li>1. PEF increases (from 15) to when they are in their 30s and then decreases ;</li> <li>2. reaches a peak at age { 30 to 34 } for women / eq ;</li> <li>3. reaches a peak at age { 36 to 39 } for men / eq ;</li> <li>4. idea that PEF falls below value at 15 (later on in life) ;</li> <li>5. manipulation of figures to illustrate the points above ;</li> </ol>	<b>(4)</b>

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Question Number	Answer	Mark
<b>4 (b) (ii)</b>	weakening of muscles / loss of elasticity of lungs ;	<b>(1)</b>

Question Number	Answer	Mark
<b>4 (b) (iii)</b>	1. he is more than 30% below / must be less than $400 \text{ dm}^3 \text{ min}^{-1}$ / he is { 37 to 39 % } below / eq ; 2. therefore his asthma is not under control ;	<b>(2)</b>

Question Number	Answer	Mark
<b>4 (b) (iv)</b>	height ;	<b>(1)</b>

Question Number	Answer	Mark
<b>5 (a) (i)</b>	{pigment / eq} at back of eye absorbs light / no light is reflected out (from the choroid) ;	<b>(1)</b>

Question Number	Answer	Mark
<b>5 (a) (ii)</b>	<ol style="list-style-type: none"> <li>1. circular muscles contract (and radial muscles relax) to {constrict / eq} pupil ;</li> <li>2. radial muscles contract (and circular muscles relax) to {dilate / eq} pupil ;</li> <li>3. need for fine control of aperture to allow pupil to be reset to a different size / allow changing to take account of varying light intensity ;</li> <li>4. (these) muscles can only shorten / eq ;</li> <li>5. antagonistic muscles have opposite effects / eq ;</li> <li>6. idea that contraction of one muscle set stretches the other ;</li> </ol>	<b>(3)</b>

Question Number	Answer	Mark
<b>5 (a) (iii)</b>	<ol style="list-style-type: none"> <li>1. details of impulse e.g. depolarisation / eq ;</li> <li>2. reference to bipolar {neurone / cell / eq} ;</li> <li>3. reference to sensory neurone / eq ;</li> <li>4. reference to optic nerve ;</li> <li>5. reference to {motor / eq} neurone connected to (radial) muscles ;</li> <li>6. reference to contraction of radial muscle ;</li> </ol>	<b>(3)</b>

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Question Number	Answer	Mark
<b>5 (b)</b>	<ol style="list-style-type: none"><li>1. has an effect on nervous system of iris / eq ;</li><li>2. radial muscles contract / eq ;</li><li>3. idea of prevention of pupil constriction ;</li><li>4. larger aperture / pupil dilates / eq ;</li><li>5. letting more light in / eq ;</li><li>6. (so) can see { more / all / eq } retina ;</li></ol>	<b>(3)</b>

Question Number	Answer	Mark
<b>5 (c)</b>	<ol style="list-style-type: none"><li>1. retinol and retinal are very similar in structure / eq ;</li><li>2. idea of retinol is needed to make retinal / eq ;</li><li>3. idea that shortage of retinol in diet leads to less retinal ;</li><li>4. in rods ;</li><li>5. idea that this leads to reduced vision in { low light / at night / eq } ;</li></ol>	<b>(3)</b>

Question Number	Answer	Mark										
<b>6</b>	<table border="1"><thead><tr><th><b>Statement</b></th><th><b>Tick (✓) or cross (x)</b></th></tr></thead><tbody><tr><td>Cause cell depolarisation</td><td>x</td></tr><tr><td>Affected by all wavelengths of light</td><td>x</td></tr><tr><td>Involved in plant growth and development</td><td>✓</td></tr><tr><td>Affected by darkness</td><td>✓</td></tr></tbody></table> <p>1 for each correct row.</p>	<b>Statement</b>	<b>Tick (✓) or cross (x)</b>	Cause cell depolarisation	x	Affected by all wavelengths of light	x	Involved in plant growth and development	✓	Affected by darkness	✓	<b>(4)</b>
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Question Number	Answer	Mark
<b>7 (a)</b>	<ol style="list-style-type: none"> <li>1. high numbers of obese people / eq ;</li> <li>2. this is linked to increased risk of diseases such as {diabetes / CVD / eq} ;</li> <li>3. idea that this puts an economic burden on society ;</li> </ol>	<b>(2)</b>

Question Number	Answer	Mark
<b>7 (b)</b>	<ol style="list-style-type: none"> <li>1. three fatty acids ;</li> <li>2. contains a glycerol (molecule) / ref. to ester bonds ;</li> </ol>	<b>(2)</b>

Question Number	Answer	Mark
<b>7 (c)</b>	<ol style="list-style-type: none"> <li>1. <math>80\% \times \{10 / 15 / 20\} \%</math> OR <math>0.8 \times 0.1</math> OR <math>0.8 \times 0.15</math> OR <math>0.8 \times 0.2</math> OR idea that percentage mortality has not changed ;</li> <li>2. <math>0\% / 8\% / 12\% / 16\% /</math> (range) 8 to 16% ;</li> </ol>	<b>(2)</b>

Question Number	Answer	Mark
<b>7 (d)</b>	<p>1. (serious) self reflection is associated with increased activity in the mPFC (in both) / eq ;</p> <p>Body image:</p> <p>2. there is a link between overweight body image in females and activation of mPFC / eq ;</p> <p>3. there is no (significant) mPFC activation in men when presented with equivalent male images /eq ;</p> <p>Words:</p> <p>4. { words / eq} associated with increased activation in the amygdala in females / eq ;</p> <p>5. (and) deactivation of the left mPFC in females / eq ;</p> <p>6. in men this response was reversed / eq ;</p>	<b>(4)</b>

Question Number	Answer	Mark
<b>7 (e)</b>	<p>1. idea that cortisol levels need to be high for a long time ;</p> <p>2. this leads to {high blood pressure / suppressed thyroid function / impaired immunity / increased intra-abdominal fat / CVD / diabetes / cancer} ;</p>	<b>(2)</b>

Question Number	Answer	Mark
<b>7 (f)</b>	<p>1. greater surface area / eq ;</p> <p>2. idea of more quickly hydrolysed (by enzymes) / eq ;</p> <p>3. to release energy / for use in respiration / eq ;</p>	<b>(2)</b>

Question Number	Answer	Mark
<b>7 (g)</b>	<ol style="list-style-type: none"> <li>1. UCP-1 is in the mitochondria / eq ;</li> <li>2. idea that electron transport chain is disrupted ;</li> <li>3. (therefore) less ATP is produced by the electron transport chain / eq ;</li> <li>4. UCP-1 might inhibit {ATP synthase / ATPase / eq } OR alter the proton gradient / eq ;</li> <li>5. more energy as heat / eq ;</li> </ol>	<b>(3)</b>

Question Number	Answer	Mark
<b>7 (h)</b>	<ol style="list-style-type: none"> <li>1. it only undergoes the first stage of metabolism / eq ;</li> <li>2. glucose is completely metabolised / eq ;</li> <li>3. idea that products of 18F-FDG breakdown cannot be metabolised ;</li> <li>4. idea that this is due to wrong shape for next enzyme ;</li> <li>5. (so) cannot bind to active site / binds permanently / eq ;</li> <li>6. idea that (altered shape means) cannot exit through the same glucose / eq channels they entered by ;</li> </ol>	<b>(3)</b>

Question Number	Answer	Mark
<b>7 (i)</b>	<ol style="list-style-type: none"> <li>1. fucoxanthin increases the production of UCP-1 / eq ;</li> <li>2. UCP-1 {uncouples / disrupts / eq} the electron transport chain / oxidative phosphorylation / eq ;</li> <li>3. less ATP available for use / eq ;</li> <li>4. more energy lost as heat / eq ;</li> <li>5. extra fat is used in {respiration / eq} ;</li> </ol>	<b>(3)</b>

Question Number	Answer	Mark
<b>*7 (j)</b>	<p><b>Take into account quality of written communication when awarding the following points.</b></p> <ol style="list-style-type: none"> <li>1. PRDM16 levels higher in BAT than WAT / eq ;</li> <li>2. loss of PRDM16 causes a loss in heat production / eq ;</li> <li>3. more energy stored as fat in WAT / eq ;</li> <li>4. (artificial) excess of PRDM16 causes white fat cells to become brown fat cells / eq ;</li> <li>5. this influences UCP-1 levels / eq ;</li> <li>6. genetically engineered mice had high levels of UCP-1 during BAT formation / eq ;</li> <li>7. increasing PRDM16 in muscle cells causes them to differentiate into brown fat cells / eq ;</li> <li>8. increased BAT as a result associated with increased {heat production / weight loss / fat loss / eq} / eq ;</li> </ol>	<b>(5)</b>

Question Number	Answer	Mark
<b>7 (k)</b>	<ol style="list-style-type: none"> <li>1. anorexia associated with a reduction in {CD68 expression / mRNA coding for fat synthesis / certain proteins / eq} / eq ;</li> <li>2. anorexia associated with an increase in resistin mRNA expression / eq ;</li> <li>3. {psychological distress / eq} leads to changes in DNA structure / methylation of DNA / eq ;</li> </ol>	<b>(2)</b>



Question Number	Answer	Mark
8(a)	ref to biotic factors involve {organisms / living} abiotic are {physical / chemical / non-living} (factors) / eq ;	(1)

Question Number	Answer	Mark
8(b)(i)	B ;	(1)

Question Number	Answer	Mark
8 * (b)(ii) QWC	<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. ref to {several / many / more than 2} readings ;</li> <li>2. ref to use of random quadrat positions ;</li> <li>3. description of suitable process to give random positions / eq ;</li> <li>4. ref to {known / stated} area of quadrat ;</li> <li>5. number of individuals in each quadrat {counted/ recorded} / eq ;</li> <li>6. description of how mean density calculated using total count e.g. total number (of each species) divided by total area sampled ;</li> </ol>	<p>maximum (3)</p>

Question Number	Answer	Mark
8(b)(iii)	<p><b>(Abiotic)</b> light intensity / light duration / availability of oxygen(in rock pools) / length of exposure (to air) / length of submersion / temperature / presence of toxic chemicals / height above sea level / slope/ aspect / wave action / pH / any other suitable e.g. ;</p> <p><b>(Biotic)</b> predators / availability of food organisms / disease / parasites / competition for a named resource / any other suitable e.g. ;</p>	(2)

Question Number	Answer	Mark
8(b)(iv)	B ;	(1)

Question Number	Answer	Mark
8(b)(v)	<p><b>Statement A</b> 1. data on two species only / eq ;</p> <p><b>Statement B</b> Accept any 3 of the following</p> <p>2. idea of density of both species changes as height changes ;</p> <p>3. as height increases <i>L. littorea</i> tends to increase, <i>L. obtusata</i> tends to decrease / eq ;</p> <p>4. no <i>L. obtusata</i> above 2 m, {very few / almost no} <i>L. littorea</i> below 0.5 m ;</p> <p>5. competition not a (significant) factor as both species can be found at same height ;</p> <p>6. ref to both are {plentiful / high density} between 0.5 and 1.5 m ;</p> <p><b>Statement C</b> 7. idea of density of species changes as height changes ;</p> <p>8. ref to no {information / data} for other factors ;</p>	<p>sub-max (3)</p> <p>maximum (4)</p>