



Mark Scheme (Results)

Summer 2014

Pearson Edexcel GCSE  
in Biology (5BI2H) Paper 01

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Question Number	Answer	Acceptable answers	Mark
<b>1 (a) (i)</b>	nucleus (1)		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1 (a) (ii)</b>	<b>C</b> In DNA, the bases A - T are complementary		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1 (b)</b>	<p>A definition including two of the following:</p> <ul style="list-style-type: none"> <li>• a sperm fuses with egg / penetrates the egg (1)</li> <li>• nuclei/genetic information fuses /combines (1)</li> <li>• reference to haploid gametes /gametes have 23 chromosomes (1)</li> <li>• reference to cell made being diploid / has 23 pairs of chromosomes / zygote formed (1)</li> </ul>	Ignore sperm meets egg	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1 (c) (i)</b>	<p>A description that includes the following:</p> <ul style="list-style-type: none"> <li>• (aerobic) respiration / using glucose / using oxygen (1)</li> <li>• energy released (for movement / swimming / metabolism)(1)</li> </ul>		<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1 (c) (ii)</b>	An explanation including <b>two</b> of the following: <ul style="list-style-type: none"><li>• a change in a base/base sequence/order of bases / a change in mRNA (1)</li><li>• named change e.g. addition/deletion (1)</li><li>• reference to change in an amino acid / order of amino acids (1)</li></ul>	Accept codon, triplet, genetic code for base.  substitution/deletion/other named gene mutation.	<b>(2)</b>

**(Total for question 1 = 8 marks)**

Question Number	Answer	Acceptable answers	Mark
<b>2(a)</b>	<b>D</b> leaf palisade cell		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(b)</b>	<p>An explanation linking two of the following:</p> <ul style="list-style-type: none"> <li>• by osmosis</li> <li>• from an area of high <b>water</b> concentration to an area of low <b>water</b> concentration</li> <li>• through (partially permeable) membrane</li> </ul>	<p>Ignore references to diffusion reject active transport</p> <p>accept water moves down a concentration gradient</p>	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(c)(i)</b>	<ul style="list-style-type: none"> <li>• all four bars plotted correctly (+/- 1/2 small square) (1)</li> <li>• X axis correctly labelled for plotted bars , eg North A, North B, South A, South B (1)</li> </ul>		<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(c)(ii)</b>	<b>D</b> a quadrat		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2(c)(iii)</b>	<p>A suggestion including two of the following:</p> <ul style="list-style-type: none"> <li>• Species B <b>is able to</b> grow on both (North and South) sides (1)</li> <li>• (there are more) on the south side because of a specific difference in a named abiotic factor eg lighter /darker on South side , temperature, pH, water level, (1)</li> <li>• there are fewer on the north side because they are out competed by species A / idea of eaten more on North side (1)</li> </ul>	<p>Ignore species B is found / grows on both sides</p> <p>Ignore carbon dioxide concentration</p> <p>Accept less pollution / less sulphur dioxide on South side</p>	<b>(2)</b>

**(Total for question 2 = 8 marks)**

Question Number	Answer	Acceptable answers	Mark
<b>3(a)(i)</b>	<p>A comparison to include three of the following:</p> <p>For the unfit person:</p> <ul style="list-style-type: none"> <li>the unfit person's heart rate is higher / faster(1)</li> <li>idea that both react in the same way eg both peak at ten minutes, both increase when they start exercising (1)</li> <li>heart rate increases more quickly (to maximum) (1)</li> <li>heart rate decreases more slowly (back to resting rate) (1)</li> <li>credit correct manipulated values obtained for heart rates (1)</li> </ul>	ORA for fit person	<b>(3)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(a)(ii)</b>	<ul style="list-style-type: none"> <li>Correct substitution i.e. <math>0.20 \times 110</math> (1)</li> <li>22</li> </ul>	<p>Allow 2 marks for correct final bald answer</p> <p>ecf. Allow one mark if final value is correct for the substitution of a different heart rate from the graph, ie between 56 and 140 bpm.</p>	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(a)(iii)</b>	<p>An explanation that includes:</p> <ul style="list-style-type: none"> <li>the fit person recovers faster/ has a shorter recovery period (1)</li> </ul> <p>and two of the following: Fit Person has</p> <ul style="list-style-type: none"> <li>greater {vital capacity / blood flow / stroke volume / cardiac output} (1)</li> <li>correct reference to less / no anaerobic respiration less /no lactic acid build up (1)</li> <li>lactic acid removed faster EPOC less / lower oxygen debt less oxygen to replace(1)</li> </ul>	<p>ORA unfit person</p> <p>Accept Heart pumps more blood / more red blood cells / haemoglobin</p> <p>Accept fit person only respire aerobically / unfit person does anaerobic respiration.</p> <p>Accept unfit person has an oxygen debt /fit person has no oxygen debt</p>	<b>(3)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(b)</b>	<b>D</b> pulmonary vein → atrium → ventricle → aorta		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>3(c)</b>	plasma (1)		<b>(1)</b>

**(Total for question 3 = 10 marks)**



Question Number	Answer	Acceptable answers	Mark
<b>4(a)</b>	<p>A description including two of the following:</p> <ul style="list-style-type: none"> <li>teeth chop / cut / grind food into smaller pieces (1)</li> <li>amylase / enzymes added (1)</li> <li>digests starch into (simple) sugars / maltose / glucose (1)</li> <li>(saliva / mucus added) to soften / moisten / lubricate (food) (1)</li> <li>bolus formed / tongue rolls food into ball / (1)</li> </ul>	<p>Accept increase in surface area Reject into smaller molecules</p> <p>Accept to make food easier to swallow.</p>	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(b)(i)</b>	<b>C</b> the capillary network in the villi have a large surface area		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(b)(ii)</b>	<p>An explanation linking three of the following:</p> <ul style="list-style-type: none"> <li>surface area decreased</li> <li>by 20 times</li> <li>so less glucose / fatty acid / glycerol / absorbed</li> <li>which are used for energy</li> </ul>	<p>Accept (surface area reduced) by 570.</p> <p>Accept sugar / amino acids</p>	<b>(3)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(c)</b>	<p>A suggestion linking two of the following:</p> <ul style="list-style-type: none"> <li>• ( food is moved by) peristalsis</li> <li>• (waves of) muscular contraction</li> <li>• if no bulk to push against – food will not move.</li> <li>• intestine <b>muscles</b> weaker / idea of not enough fibre means that less exercising of intestinal muscle</li> </ul>	<p>Accept idea that it is the fibre that is pushed along / (muscle push against fibre) which pushes food along</p> <p>Accept may become constipated.</p>	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>4(d)</b>	<p>An description linking two of the following:</p> <ul style="list-style-type: none"> <li>• probiotics are (claimed to be) beneficial bacteria / natural gut flora</li> <li>• (Reproduce so) outcompete / replace harmful bacteria</li> <li>• Any health benefit eg: reduce diarrhoea / IBS/ inflammation of intestinal wall / increase in vitamin uptake /</li> </ul>	<p>Accept useful / helpful for beneficial Ignore friendly</p> <p>Accept improves the immune system / reduce allergies</p>	<b>(2)</b>

**(Total for question 4 = 10 marks)**

Question Number	Answer	Acceptable answers	Mark
<b>5(a)(i)</b>	Correct substitution i.e. $(-0.5 \div 10.3) \times 100$ (1)  - 4.85 / - 4.9	Accept data correctly put into other acceptable methods.  Accept answer with more decimal places eg: - 4.8543 / - 4.854368932  Full marks for correct bald answer award max of one mark if negative is not written eg 4.85 / 4.9	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>5(a)(ii)</b>	better / easier / more valid comparison can be made between values /can make more valid conclusion / because the original / starting masses of potato were not the same / Idea of easier to visualise the size of the change	Ignore makes the results / test reliable / accurate	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>5(b)</b>	<p>A description including the following:</p> <ul style="list-style-type: none"> <li>• Produce two (daughter) cells</li> <li>• which are <b>genetically</b> identical</li> <li>• and diploid</li> </ul>	<p>Accept DNA for chromosomes throughout</p> <p>Also credit details of the process of mitosis</p> <p>chromosomes replicates (1)</p> <p>spindle fibres form / chromosomes attached to spindle (1)</p> <p>Chromosomes arranged on equator / middle of cell / chromosomes pulled apart /pulled to poles /separation of sets of chromosomes (1)</p> <p>Idea of nucleus reforming / New cell wall formed (to divide cell) / cytokinesis / description of cytokinesis (1)</p>	<b>(3)</b>

Question Number		Indicative Content	Mark
<b>QWC</b>	<b>*5(c)</b>	<p>A explanation to include some of the following points</p> <ul style="list-style-type: none"> <li>• active transport requires energy</li> <li>• (active transport moves mineral ions) from the soil into root (hair cells)</li> <li>• reference to pumps (in the cell membranes)</li> <li>• from a low concentration to a high concentration/against their concentration gradient</li> <li>• reference to mineral ions / mineral salts accept named minerals eg nitrates</li> <li>• diffusion is a passive process</li> <li>• gases diffuse from high to low concentration/down their concentration gradient</li> <li>• gas exchange in the leaf occurs by diffusion</li> <li>• carbon dioxide diffuses in</li> <li>• to air spaces in leaves / into cells</li> <li>• for photosynthesis / produces glucose</li> <li>• oxygen diffuses in</li> <li>• for respiration</li> </ul>	<b>(6)</b>
<b>Level</b>	<b>0</b>	No rewardable content	
<b>1</b>	<b>1 - 2</b>	<ul style="list-style-type: none"> <li>• a limited explanation that gives information about active transport <b>OR</b> diffusion in the correct context e.g. minerals ions are transported into root (hair cells)</li> <li>• the answer communicates ideas using simple language and uses limited scientific terminology</li> <li>• <u>spelling, punctuation and grammar are used with limited accuracy</u></li> </ul>	
<b>2</b>	<b>3 - 4</b>	<ul style="list-style-type: none"> <li>• a simple explanation that gives details of active transport or diffusion transporting materials e.g. carbon dioxide diffuses into leaves down their concentration gradient <b>OR</b> a limited explanation of both active transport and diffusion</li> <li>• the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately</li> <li>• <u>spelling, punctuation and grammar are used with some accuracy</u></li> </ul>	
<b>3</b>	<b>5 - 6</b>	<ul style="list-style-type: none"> <li>• a detailed explanation that describes <b>both</b> processes e.g. active transport requires energy to transport mineral ions into the root hair cell <b>AND</b> carbon dioxide diffuses into the leaf for photosynthesis</li> <li>• the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately</li> <li>• <u>spelling, punctuation and grammar are used with few errors</u></li> </ul>	

**(Total for question 5 = 12 marks)**

Question Number	Answer	Acceptable answers	Mark
<b>6(a)</b>	<b>D</b> mRNA mRNA		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>6(b)</b>	<p>A description linking two of the following:</p> <ul style="list-style-type: none"> <li>leaves the nucleus / moves to the cytoplasm</li> <li>through the nuclear membrane</li> <li>attaches to ribosome</li> </ul>	Accept through a nuclear pore	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>6(c)</b>	<p>A explanation linking three of the following:</p> <ul style="list-style-type: none"> <li>(enzyme and substrate have) complementary shapes</li> <li>substrate fits into enzyme / enzyme substrate complex formed</li> <li>reference to <u>active site</u></li> <li>enzymes break (chemical) bonds / form chemical bonds / (causes) reaction to occur / make products</li> <li>Idea of products leaving enzyme (so that enzyme can be used again)</li> </ul>	<p>this may be awarded if clearly shown in an unlabelled diagram</p> <p>reject if active site is part of substrate</p>	<b>(3)</b>

Question Number		Indicative Content	Mark
<b>QWC</b>	<b>*6(d)</b>	<p>A description to include some of the following points</p> <p>Temperature</p> <ul style="list-style-type: none"> <li>• (temperature) too low – not enough energy to make reactions occur (fast enough)</li> <li>• reference to optimum temperature</li> <li>• optimum for most (humans) - 37°C</li> <li>• over 37°C changes enzyme shape / changes active site shape of enzyme</li> <li>• therefore rate of reaction decreases / stops</li> <li>• enzymes denatured (if temperature too high)</li> </ul> <p>pH</p> <ul style="list-style-type: none"> <li>• optimum pH – around 7.3 / 6 to 8 for most enzymes</li> <li>• specific optimum quoted eg pepsin – pH 2 to 3</li> <li>• pH either side of optimum – changes the shape of the enzyme / shape of the active site</li> <li>• therefore rate of reaction decreases / stops</li> <li>• enzymes denatured (if pH too high / too low)</li> </ul> <p>substrate / enzyme concentration</p> <ul style="list-style-type: none"> <li>• higher concentrations faster reactions</li> <li>• due to more collisions</li> <li>• until maximum rate reached / all enzymes being used</li> </ul>	<b>(6)</b>
<b>Level I</b>	<b>0</b>	No rewardable content	
<b>1</b>	<b>1 – 2</b>	<ul style="list-style-type: none"> <li>• a limited description of how temperature OR pH OR substrate concentration affects the rate of enzyme action</li> <li>• the answer communicates ideas using simple language and uses limited scientific terminology</li> <li>• spelling, punctuation and grammar are used with limited accuracy</li> </ul>	
<b>2</b>	<b>3 – 4</b>	<ul style="list-style-type: none"> <li>• a simple description of two or more factors OR a detailed description of one factor</li> <li>• the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately</li> <li>• spelling, punctuation and grammar are used with some accuracy</li> </ul>	
<b>3</b>	<b>5 – 6</b>	<ul style="list-style-type: none"> <li>• a detailed description of at least two factors</li> <li>• the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately</li> <li>• spelling, punctuation and grammar are used with few errors</li> </ul>	

**(Total for question 6 = 12 marks)**

