

Mark Scheme (Results)

Summer 2014

Pearson Edexcel GCSE
in Biology (5BI2H) Paper 01

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Question Number	Answer	Acceptable answers	Mark
1(a)(i)	nucleus (1)		(1)

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

Question Number	Answer	Acceptable answers	Mark
1(b)	A definition including two of the following: • a sperm fuses with egg / penetrates the egg (1) • nuclei/genetic information fuses /combines (1) • reference to haploid gametes /gametes have 23 chromosomes (1) • reference to cell made being diploid / has 23 pairs of chromosomes / zygote formed (1)	Ignore sperm meets egg	(2)

Question Number	Answer	Acceptable answers	Mark
1(c)(i)	A description that includes the following: • (aerobic) respiration / using glucose / using oxygen (1) • energy released (for movement / swimming / metabolism)(1)		(2)

Question Number	Answer	Acceptable answers	Mark
1(c)(ii)	An explanation including two of the following: • a change in a base/base sequence/order of bases / a change in mRNA (1) • named change e.g. addition/deletion (1) • reference to change in an amino acid / order of amino acids (1)	Accept codon, triplet, genetic code for base. substitution/deletion/other named gene mutation.	(2)

(Total for question 1 = 8 marks)

Question Number	Answer	Acceptable answers	Mark
2(a)	D leaf palisade cell		(1)

Question Number	Answer	Acceptable answers	Mark
2(b)	An explanation linking two of the following: • by osmosis • from an area of high water concentration to an area of low water concentration • through (partially permeable) membrane	Ignore references to diffusion reject active transport accept water moves down a concentration gradient	(2)

Question Number	Answer	Acceptable answers	Mark
2(c)(i)	• all four bars plotted correctly (+/- 1/2 small square) (1) • X axis correctly labelled for plotted bars , eg North A, North B, South A, South B (1)		(2)

Question Number	Answer	Acceptable answers	Mark
2(c)(ii)	D a quadrat		(1)

Question Number	Answer	Acceptable answers	Mark
2(c)(iii)	A suggestion including two of the following: - Species B is able to grow on both (North and South) sides (1) (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) - there are fewer on the north side because they are out competed by species A / idea of eaten more on North side (1)	Ignore species B is found / grows on both sides Ignore carbon dioxide concentration Accept less pollution / less sulphur dioxide on South side	(2)

(Total for question 2 = 8 marks)

Question Number	Answer	Acceptable answers	Mark
3(a)(i)	A comparison to include three of the following: For the unfit person: - the unfit person's heart rate is higher / faster(1) - idea that both react in the same way eg both peak at ten minutes, both increase when they start exercising (1) - heart rate increases more quickly (to maximum) (1) - heart rate decreases more slowly (back to resting rate) (1) - credit correct manipulated values obtained for heart rates (1)	ORA for fit person	(3)

Question Number	Answer	Acceptable answers	Mark
3(a)(ii)	- Correct substitution i.e. 0.20×110 (1) 22	Allow 2 marks for correct final bald answer 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.	(2)

Question Number	Answer	Acceptable answers	Mark
3(a)(iii)	An explanation that includes: - the fit person recovers faster/ has a shorter recovery period (1) and two of the following: Fit Person has - greater {vital capacity / blood flow / stroke volume / cardiac output} (1) - correct reference to less / no anaerobic respiration less /no lactic acid build up (1) - lactic acid removed faster EPOC less / lower oxygen debt less oxygen to replace(1)	ORA unfit person Accept Heart pumps more blood / more red blood cells / haemoglobin Accept fit person only respire aerobically / unfit person does anaerobic respiration. Accept unfit person has an oxygen debt /fit person has no oxygen debt	(3)

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

Question Number	Answer	Acceptable answers	Mark
3(c)	plasma (1)		(1)

(Total for question 3 = 10 marks)

Question Number	Answer	Acceptable answers	Mark
4(a)	A description including two of the following: - teeth chop / cut / grind food into smaller pieces (1) - amylase / enzymes added (1) - digests starch into (simple) sugars / maltose / glucose (1) (saliva / mucus added) to soften / moisten / lubricate (food) (1) - bolus formed / tongue rolls food into ball / (1)	Accept increase in surface area Reject into smaller molecules Accept to make food easier to swallow.	(2)

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

Question Number	Answer	Acceptable answers	Mark
4(b)(ii)	An explanation linking three of the following: - surface area decreased - by 20 times - so less glucose / fatty acid / glycerol / absorbed - which are used for energy	Accept (surface area reduced) by 570. Accept sugar / amino acids	(3)

Question Number	Answer	Acceptable answers	Mark
4(c)	A suggestion linking two of the following: • (food is moved by) peristalsis • (waves of) muscular contraction • if no bulk to push against – food will not move. • intestine muscles weaker / idea of not enough fibre means that less exercising of intestinal muscle	Accept idea that it is the fibre that is pushed along / (muscle push against fibre) which pushes food along Accept may become constipated.	(2)

Question Number	Answer	Acceptable answers	Mark
4(d)	An description linking two of the following: • probiotics are (claimed to be) beneficial bacteria / natural gut flora • (Reproduce so) outcompete / replace harmful bacteria • Any health benefit eg: reduce diarrhoea / IBS/ inflammation of intestinal wall / increase in vitamin uptake /	Accept useful / helpful for beneficial Ignore friendly Accept improves the immune system / reduce allergies	(2)

(Total for question 4 = 10 marks)

Question Number	Answer	Acceptable answers	Mark
5(a)(i)	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	(2)

Question Number	Answer	Acceptable answers	Mark
5(a)(ii)	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	(1)

Question Number	Answer	Acceptable answers	Mark
5(b)	A description including the following: • Produce two (daughter) cells • which are genetically identical • and diploid	Accept DNA for chromosomes throughout Also credit details of the process of mitosis chromosomes replicates (1) spindle fibres form / chromosomes attached to spindle (1) Chromosomes arranged on equator / middle of cell / chromosomes pulled apart /pulled to poles /separation of sets of chromosomes (1) Idea of nucleus reforming / New cell wall formed (to divide cell) / cytokinesis / description of cytokinesis (1)	(3)

Question Number		Indicative Content	Mark
QWC	*5(c)	A explanation to include some of the following points • active transport requires energy • (active transport moves mineral ions) from the soil into root (hair cells) • reference to pumps (in the cell membranes) • from a low concentration to a high concentration/against their concentration gradient • reference to mineral ions / mineral salts accept named minerals eg nitrates • diffusion is a passive process • gases diffuse from high to low concentration/down their concentration gradient • gas exchange in the leaf occurs by diffusion • carbon dioxide diffuses in • to air spaces in leaves / into cells • for photosynthesis / produces glucose • oxygen diffuses in • for respiration	(6)
Level	0	No rewardable content	
1	1 - 2	• a limited explanation that gives information about active transport OR diffusion in the correct context e.g. minerals ions are transported into root (hair cells) • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	3 - 4	• a simple explanation that gives details of active transport or diffusion transporting materials e.g. carbon dioxide diffuses into leaves down their concentration gradient OR a limited explanation of both active transport and diffusion • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	5 - 6	• a detailed explanation that describes both processes e.g. active transport requires energy to transport mineral ions into the root hair cell AND carbon dioxide diffuses into the leaf for photosynthesis • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

(Total for question 5 = 12 marks)

Question Number		Indicative Content	Mark
QWC	*6(d)	A description to include some of the following points Temperature • (temperature) too low – not enough energy to make reactions occur (fast enough) • reference to optimum temperature • optimum for most (humans) - 37°C • over 37°C changes enzyme shape / changes active site shape of enzyme • therefore rate of reaction decreases / stops • enzymes denatured (if temperature too high) pH • optimum pH – around 7.3 / 6 to 8 for most enzymes • specific optimum quoted eg pepsin – pH 2 to 3 • pH either side of optimum – changes the shape of the enzyme / shape of the active site • therefore rate of reaction decreases / stops • enzymes denatured (if pH too high / too low) substrate / enzyme concentration • higher concentrations faster reactions • due to more collisions • until maximum rate reached / all enzymes being used	(6)
Level	0	No rewardable content	
1	1 – 2	• a limited description of how temperature OR pH OR substrate concentration affects the rate of enzyme action • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	3 – 4	• a simple description of two or more factors OR a detailed description of one factor • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	5 – 6	• a detailed description of at least two factors • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

(Total for question 6 = 12 marks)

