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Mark Scheme (Results)

Summer 2014

Pearson Edexcel GCSE in Biology (5BI2H) Paper 01

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Summer 2014
Publications Code UG039976

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 x 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 respires 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 ÷ 10.3) x 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	Answer	Acceptable answers	Mark
6(a)	**D** mRNA mRNA		**(1)**

Question Number	Answer	Acceptable answers	Mark
6(b)	A description linking two of the following: • leaves the nucleus / moves to the cytoplasm • through the nuclear membrane • attaches to ribosome	Accept through a nuclear pore	**(2)**

Question Number	Answer	Acceptable answers	Mark
6(c)	A explanation linking three of the following: • (enzyme and substrate have) complementary shapes • substrate fits into enzyme / enzyme substrate complex formed • reference to <u>active site</u> • enzymes break (chemical) bonds / form chemical bonds / (causes) reaction to occur / make products • Idea of products leaving enzyme (so that enzyme can be used again)	this may be awarded if clearly shown in an unlabelled diagram reject if active site is part of substrate	**(3)**

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^{o}C • over 37^{o}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)

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