

Mark Scheme (Results)

Summer 2019

Pearson GCE In Biology (8BN0) Paper 01
Lifestyle, Transport, Genes and Health

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General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.
- In questions marked with an **asterisk** (*), marks will be awarded for the ability to structure answers logically showing how the points are related or follow on from each other where appropriate.

Question Number	Answer	Mark
1(a)(i)	***The only correct answer is C*** **polysaccharide** ***A*** *is incorrect because amylose is not a disaccharide* ***B*** *is incorrect because amylose is not a monosaccharide* ***D*** *is incorrect because amylose is not a trisaccharide*	**(1)**

Question Number	Answer	Mark
1(a)(ii)	***The only correct answer is D*** **hydrolysis reaction involving glycosidic bonds** ***A*** *is incorrect because starch does not contain ester bonds* ***B*** *is incorrect because starch does not contain ester bonds* ***C*** *is incorrect because condensation reactions join molecules together*	**(1)**

Question Number	Answer	Additional Guidance	Mark
1 (a)(iii)	An answer that makes reference to the following: • amylose is {unbranched / has only 1,4 glycosidic bonds} OR amylopectin {is branched / has (1,4 and) 1,6 glycosidic bonds}	IGNORE coiled	**(1)**

Question Number	Answer	Additional Guidance	Mark
1(b)	An explanation that makes reference to three of the following: • branched therefore can be rapidly hydrolysed (to release glucose) (1) • compact so more (energy / glucose) can be stored (1) • insoluble therefore does not affect osmosis (1) • molecules too large to diffuse across cell surface membrane (1)	ALLOW branched therefore can be broken down quicker ignore easily ALLOW 'does not take up much space' ALLOW insoluble therefore does not affect water potential of cell ALLOW large molecules therefore remain in cells	**(3)**

Question Number	Answer	Additional Guidance	Mark
1(b)	An explanation that makes reference to three of the following: • branched therefore can be rapidly hydrolysed (to release glucose) (1) • compact so more (energy / glucose) can be stored (1) • insoluble therefore does not affect osmosis (1)	ALLOW branched therefore can be broken down quicker. IGNORE easily ALLOW 'does not take up much space' ALLOW insoluble therefore does not affect water potential of cell	**(3)**

	• molecules too large to diffuse across cell surface membrane (1)	ALLOW large molecules therefore remain in cells	

uestion Number	Answer	Additional Guidance	Mark
2(a)(i)	• numbers inserted into equation correctly (1) • correct ratio shown (1)	<u>Example of calculation</u> 1÷0.16 = 6.25:1 ALLOW 25:4 or 12.5:2 1:6.25 gains one mark Correct answer with no working gains full marks	**(2)**

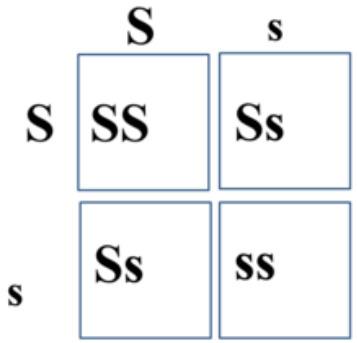
Question Number	Answer	Mark
2(a)(ii)	**The only correct answer is A disaccharide** ***B*** *is incorrect because lactose is not a modified disaccharide* ***C*** *is incorrect because lactose is not a monosaccharide* ***D*** *is incorrect because lactose is not a protein*	**(1)**

Question Number	Answer	Additional Guidance	Mark
2(b)	An explanation that makes reference to three of the following: • energy intake higher than energy output (1) • (excess) {energy / sugars} can be {stored as / converted to} fat (1) • leading to weight gain (greater than overweight) (1) • obesity as indicated by a {BMI above 30 / waist-hip ratio greater than 0.85 in women or 1.0 for men} (1)	ALLOW correct description of energy imbalance ALLOW increase in body mass	**(3)**

Question Number	Answer	Additional Guidance	Mark
2(c)	An explanation that makes reference to two of the following: • sucralose contains chlorine (1) • therefore the shape of the molecule has been changed (1) • sucralose is not complementary to active site of sucrase / enzyme-substrate complex does not form (1)	ALLOW Cl / chloride	**(2)**

Question Number	Answer	Mark
3(a)	**The only correct answer is C 861** ***A*** *is incorrect because this is the total number of amino acids from one of each type of chain* ***B*** *is incorrect because this is the total number of amino acids in the four polypeptide chains.* ***D*** *is incorrect because it is (141*146)/3.*	**(1)**

Question Number	Answer	Additional Guidance	Mark
3(b)(i)	An answer which makes reference to the following: • sequence of {bases / nucleotides} in DNA coding for a {sequence of amino acids / polypeptide / protein}	ALLOW section of DNA coding for a {sequence of amino acids / polypeptide / protein}	**(1)**

Question Number	Answer	Additional Guidance	Mark
3(b)(ii)	• correct genetic diagram with reference to parental and offspring genotypes (1)	ALLOW correct gametes and offspring genotypes e.g. S and s for gametes, offspring SS, Ss and ss (or other letters)  	
	• correct probability (1)	0.25 / 25% / ¼ IGNORE ratios	**(2)**

Question Number	Answer	Additional Guidance	Mark
3(b)(iii)	An explanation that makes reference to the following: • different {sequence of amino acids / primary structure} (1) • (a different amino acid will have a) different R group (1) • (therefore) {secondary / tertiary / quaternary} structure will change (1) • (due to a) change in a named bond (holding molecule in its three-dimensional shape) (1) • (haemoglobin) may not bond to oxygen (1)	ALLOW different polypeptide chain i.e. hydrogen bonds, disulfide bridges, ionic bonds DO NOT ALLOW peptide bonds ALLOW may not bond to haem group ALLOW may not carry oxygen	**(4)**

Question Number	Answer	Additional Guidance	Mark
4(a)	• correct calculation of change in lipid content (1) • correct calculation of percentage change (1)	<u>Example of calculation</u> 7.5-1.8(=5.7) / 5.7 (5.7÷1.8 × 100)= 316.67 / 316.7 / 317 (%)	**(2)**

Question Number	Answer	Additional Guidance	Mark
4(b)	An answer that makes reference to four of the following: • five samples of breast milk tested from different points of feed (1) • description of titration of breast milk using DCPIP (1) • standardisation of titration technique (1) • use of a calibration curve to determine the vitamin C content in each breast milk sample (1) • repeat titration to achieve concordant results (for each time) (1)	e.g. volume of breast milk taken to decolourise the DCPIP ALLOW volume of DCPIP taken to produce a colour change in milk e.g. volume of DCPIP in flask / concentration of DCPIP / standardisation using known concentration of vitamin C ALLOW compare values with known vitamin C concentrations IGNORE to calculate an average	**(4)**

Question Number	Answer	Additional Guidance	Mark
4(c)(i)	A description that makes reference to two of the following: • increasing the number of months of breast feeding decreases the percentage of children with obesity (1) • large drop in obesity when children are breastfed for {3-5 months / more than 2 months} (1)	ALLOW the number of children with obesity decreases as the time they were breastfed increases	**(2)**

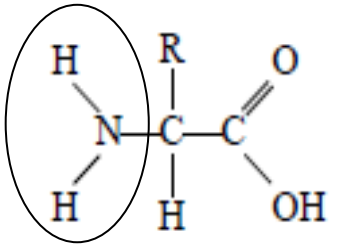
Question Number	Answer	Additional Guidance	Mark
4(c)(ii)	• values correctly substituted into rearranged equation (1) • correct answer with unit (1)	20×1.15^2 26.5 kg ALLOW 26.45 kg for one mark Correct answer with no working gains full marks	**(2)**

Question Number	Answer	Additional Guidance	Mark
5(a)(i)	An explanation that makes reference to the following: • same {age / type} of onion (1) • increases {repeatability / validity} (1) OR • smaller concentration intervals (1) • increasing {confidence in / validity of} conclusion (1) OR • same {temperature / surface area of onion} (1) • due to effect on osmosis (1)		**(2)**

Question Number	Answer	Additional Guidance	Mark
5(a)(ii)	• correct calculation of numerator (1) • correct calculation of standard deviation (1)	<u>Example of calculation</u> $\sum(x - \bar{x})^2 = 3.41$ $(3.2 - 4.6)^2 + (4.7 - 4.6)^2 + (5.8 - 4.6)^2$ $\sqrt{\frac{\mathbf{3.41}}{\mathbf{2}}} =$ 1.3 / 1.31 / 1.306 / 1.3057 Correct answer no working scores full marks ALLOW ECF if number other than 3.41 calculated	**(2)**

Question Number	Answer	Additional Guidance	Mark
5(a)(iii)	An answer which makes reference to three of the following: • 2.5% (sodium chloride solution) resulted in an increase in mass (1) • an increase (in sodium chloride solution) from 5% to {15% / 20%} resulted in a loss in mass (1) • because of the movement of water by osmosis (1) • (SD) values overlap for {5% and 10% / 10% and 15% / 10% and 20% / 15% and 20%} (sodium chloride solution) therefore no (significant) difference (1)		**(3)**

Question Number	Answer	Additional Guidance	Mark
5(b)	An explanation which includes the following: • increased permeability of (cell surface) membrane (1) plus two of the following • the low pH would {change the shape of / denature} proteins (in cell surface membrane) (1) • (as vinegar) affects bonds (in protein) (1) • (vinegar / ethanoic acid) could dissolve lipids (in the cell membrane) (1)	ALLOW tonoplast ALLOW change in pH / acidic conditions would {change the shape of / denature} proteins	**(3)**

Question Number	**Answer**	**Additional Guidance**	**Mark**
6(a)(i)	• amine group correctly circled on diagram		**(1)**

Question Number	**Answer**	**Additional Guidance**	**Mark**
6(a)(ii)	An answer which makes reference to the following: • nitrogen / sulfur	ALLOW N or S sulphur	**(1)**

Question Number	**Answer**	**Additional Guidance**	**Mark**
6(b)(i)	An answer which makes reference to the following: • cell recognition / receptors (on cell surface membrane) / antigens	ALLOW involved in cell signalling	**(1)**

Question Number	Answer	Additional Guidance	Mark
6(b)(ii)	An explanation which makes reference to the following: • (phospholipid molecule) contains a {polar / hydrophilic} (phosphate) head and {non-polar / hydrophobic} fatty acid chains (1) • allows {fat-soluble/non-polar} molecules to pass through (the membrane) (1) • {polar / ionic} molecules cannot pass through (phospholipid bilayer) (1)	ALLOW tail for fatty acid chain ALLOW charged	**(3)**

Question Number	Answer	Additional Guidance	Mark
6(c)	An explanation which makes reference to three of the following: <u>Similarities</u> • both processes involve vesicles (1) • both processes involve energy from ATP (1) <u>Differences</u> • exocytosis involves {molecules / substances} leaving the cell whereas endocytosis involves {molecules / substances} entering the cell (1) • exocytosis involves vesicles fusing with cell surface membrane whereas endocytosis involves the formation of vesicles (from the cell surface membrane) (1)	IGNORE secretory IGNORE active transport	**(3)**

Question Number	Answer	Mark
7(a)(i)	**The only correct answer is C two complementary organic bases** ***A*** *is incorrect because there is not a deoxyribose molecule shown.* ***B*** *is incorrect because there is not a mononucleotide shown* ***D*** *is incorrect because there are not two mononucleotides shown*	**(1)**

Question Number	Answer	Mark
7(a)(ii)	**The only correct answer is C hydrogen** ***A*** *is incorrect because a disulphide bond is not found between DNA molecules* ***B*** *is incorrect because a glycosidic bond is not found between DNA molecules* ***D*** *is incorrect because a peptide bond is not found between DNA molecules*	**(1)**

Question Number	Answer	Additional Guidance	Mark
7(a)(iii)	• 15 (%)		**(1)**

Question Number	Answer	Additional Guidance	Mark
7(b)(i)	A description which makes reference to two of the following: • (RNA) nucleotides align with complementary bases (on DNA) (1) • RNA nucleotides joined together by {RNA polymerase / phosphodiester bonds} (1)	ALLOW correct description of base pairing (A-U / C-G)	**(2)**

Question Number	Answer	Additional Guidance	Mark
7(b)(ii)	A description which includes reference to the following: • DNA is double stranded whereas RNA is single stranded (1) • DNA contains deoxyribose whereas RNA contains ribose (1) • DNA contains {thymine / T} whereas RNA contains {uracil / U} (1)		**(3)**

Question Number	Answer	Additional Guidance	Mark
7(c)	An answer which includes reference to four of the following: Similarities • involve formation of {polynucleotide / phosphodiester bonds} (1) • involve DNA helicase (unzipping the DNA) (1) Differences • transcription uses RNA nucleotides whereas replication uses DNA nucleotides (1) • transcription uses RNA polymerase whereas replication uses DNA polymerase (1) • transcription {produces single strand of mRNA / only copies template strand of DNA} whereas replication {produces double stranded DNA / copies both strands of DNA} (1)	ALLOW condensation reaction occurs ALLOW transcription involves pairing of A with U whereas replication involves pairing of A with T	**(4)**

Question Number	Answer	Mark
8(a)(i)	**The only correct answer is D** ***A*** *is incorrect because it labels the vena cava* ***B*** *is incorrect because it labels the aorta* ***C*** *is incorrect because it labels a pulmonary artery*	**(1)**

Question Number	Answer	Mark
8(a)(ii)	**The only correct answer is A** ***B*** *is incorrect because* the aorta carries blood under highest pressure ***C*** *is incorrect because* arteries carry blood under higher pressure than a vein ***D*** *is incorrect because* arteries carry blood under higher pressure than a vein	**(1)**

Question Number	Answer	Additional Guidance	Mark
8(a)(iii)	• capillary		**(1)**

Question Number	Answer	Additional Guidance	Mark
8(b)	An explanation that makes reference to the following: • collagen is exposed when wall of blood vessel is damaged (1) plus any three from the following • leading to release of thromboplastin (1) • (thromboplastin catalyses) conversion of prothrombin to thrombin (1) • (thrombin catalyses) conversion of fibrinogen to fibrin (1) • fibrin forms a mesh of fibres and traps (red) blood cells (to form a clot) (1)	ALLOW damage to endothelium exposes collagen ALLOW platelets release thromboplastin	**(4)**

Question Number	Answer	Additional Guidance	Mark
8(c)(i)	An answer that makes reference to the following: • statins do not break down blood clots	ALLOW statins lower LDL / blood cholesterol / risk of a blood clot	**(1)**

Question Number	Answer	Additional Guidance	Mark
8 (c)(ii)	A explanation that makes reference to three of the following: • if the blood clot is at {A / larger artery} it will result in the largest reduction in blood oxygen saturation (1) • because it would result in reduced blood flow (in the lung) (1) • this would result in reduced gas exchange (1) • (therefore) fewer red blood cells can be oxygenated (1)	ALLOW converse for {C / smaller artery} ALLOW less blood can be oxygenated	**(3)**

Question Number	Answer
8*(d)	Answers will be credited according to candidate's knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. • reduce blood pressure • analysis of data to show higher blood pressure increases risk of second ischaemic stroke • analysis of data to discuss variability in data • antihypertensive drugs • reduce / stop smoking as smoking increases BP • reduce salt in diet • analysis of data to show effect of high salt diet on blood pressure effect of reducing additional risk factors on deaths due to CVD • reduce blood cholesterol levels • reduce saturated fat in diet / take statins • anticoagulants • reduce BMI • increase exercise **(6)**

Level 0	0	No awardable content	
Level 1	1-2	An answer may be attempted but with limited interpretation or analysis of the scientific information with a focus on mainly just one piece of scientific information. The explanation will contain basic information with some attempt made to link knowledge and understanding to the given context.	Discussion of how to reduce one risk factor with reference to one of the graphs OR Discussion of how to reduce at least two risk factors without reference to the graphs
Level 2	3-4	An answer will be given with occasional evidence of analysis, interpretation and/or evaluation of both pieces of scientific information. The explanation shows some linkages and lines of scientific reasoning with some structure.	Discussion of how to reduce two risk factors with reference to two of the graphs Demonstrates analysis of data
Level 3	5-6	An answer is made which is supported throughout by sustained application of relevant evidence of analysis, interpretation and/or evaluation of both pieces of scientific information. The explanation shows a well-developed and sustained line of scientific reasoning which is clear and logically structured.	Discussion of how to reduce three risk factors with reference at least two of the graphs. Demonstrates analysis of data

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