Pearson Edexcel

Mark Scheme (Results)

November 2021

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

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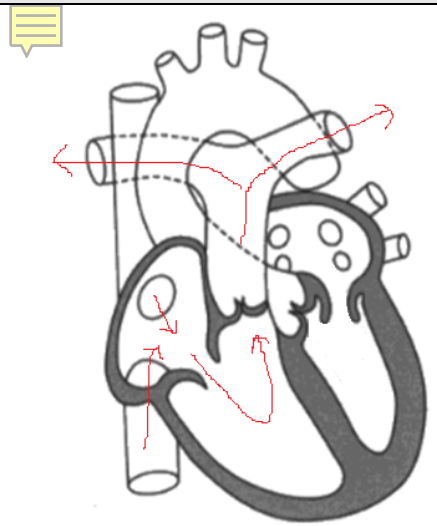
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General Marking Guidance

- 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.

Question Number	Answer	Additional Guidance	Mark
1 (a)(i)	An answer that makes reference to the following: • arrows on right hand side of heart only (1) • arrows enter heart through vena cava and leaves heart through pulmonary artery (1)		**(2)**

Question Number	Answer	Additional Guidance	Mark
1 (a)(ii)	An answer that makes reference to the following: • atrial systole		**(1)**

Question Number	Answer	Additional Guidance	Mark
1 (b)	An answer that makes reference to the following:		**(2)**

	• {atrioventricular / AV} (valve) (1) • semilunar (valve) (1)	ALLOW tricuspid / bicuspid / mitral (valve) ALLOW pulmonary / aortic (valve)	

Question Number	Answer	Additional Guidance	Mark
2 (a)(i)	Artery (1)		**(1)**

Question Number	Answer	Additional Guidance	Mark
2 (a)(ii)	C - S *A is incorrect because it does not contract to maintain blood pressure* *B is incorrect because it does not contract to maintain blood pressure* *D is incorrect because an atheroma does not contract to maintain blood pressure*		**(1)**

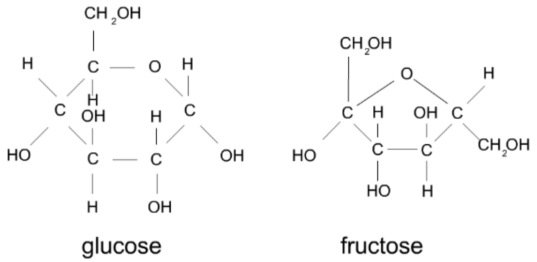
Question Number	Answer	Additional Guidance	Mark
2 (a)(iii)	A –Q *B is incorrect because collagen is not found in T* *C is incorrect because collagen is not found in T* *D is incorrect because collagen is not found in R and T*		**(1)**

Question Number	Answer	Additional Guidance	Mark
2 (a)(iv)	A–2.01cm^2 *B is incorrect because it is not 0.8^2 × ∏* *C is incorrect because it is not 0.8^2 × ∏* *D is incorrect because it is not 0.8^2 × ∏*		**(1)**

Question Number	Answer	Additional Guidance	Mark
2 (b)	An explanation that makes reference to four of the following: • high(er) salt intake (1) • (which) increases blood pressure (1) • high blood pressure causes damage to endothelium (of artery) (1) • high intake of {cholesterol / saturated fat} (1) • high {LDL's / saturated fat} linked to {atheroma / plaque formation} (1)		**(4)**

Question Number	Answer	Additional Guidance	Mark
3 (a)(i)	Condensation (1)		**(1)**

Question Number	Answer	Additional Guidance	Mark
3 (a)(ii)	B- glycosidic *A is incorrect because ester bonds are found in lipids* *C is incorrect because disaccharides do not contain hydrogen bonds* *D is incorrect because peptide bonds are found in proteins*		**(1)**

Question Number	Answer	Additional Guidance	Mark
3 (b)(i)	An answer that makes reference to the following: • correct glucose molecule drawn (1) • correct fructose molecule drawn (1)	 glucose fructose	**(2)**

Question Number	Answer	Additional Guidance	Mark
3 (b)(ii)	Glucose and fructose		**(1)**

Question Number	Answer	Additional Guidance	Mark
3(c)	An answer which makes reference to four of the following: <u>Similarities</u> • both contain carbon, hydrogen and oxygen (1) • both contain glycosidic bonds (1) • both contain glucose (1) <u>Differences</u> • glycogen contains 1,4 and 1,6-glycosidic bonds whereas disaccharides only contain one type of glycosidic bond (1) • glycogen only contains glucose whereas disaccharides can contain glucose and other monosaccharides (1)	Answer must contain at least one similarity and one difference ALLOW C,H,O ALLOW named example e.g. lactose contains glucose and galactose ALLOW disaccharide have 2 monosaccharides whereas glycogen have many ALLOW glycogen have only hexose monomers whereas disaccharides can have pentose or hexose monomers	**(4)**

Question Number	Answer	Additional Guidance	Mark
4 (a)	An explanation that makes reference to four of the following: • some people's perception of lifetime risk was lower (than the predicted lifetime risk) (1) • due to inaccuracies in their reported intake of a dietary factor (1) • due to {underestimating / overestimating} a named factor (1) • lack of knowledge of family history (1) • lack of education on developing CVD (1)	ALLOW converse e.g. salt intake, HDL:LDL, cholesterol, alcohol intake e.g. BMI, waist:hip, blood pressure, number of cigarettes smoked, stress, exercise ALLOW converse ALLOW converse	**(4)**

Question Number	Answer	Additional Guidance	Mark
4 (b)	A description that makes reference to the following: • blood test to measure {HDL and LDL / cholesterol} levels (1) • higher HDL:LDL decreases risk / high cholesterol increases risk (1) • measurement of {height and mass / waist and hip size} / calculation of {BMI / waist:hip} (1) • {BMI above 30 / waist:hip above 1} increases risk (1)	ALLOW correct BMI formula	**(4)**

Question Number	Answer	Mark
5 (a)(i)	D–S *A is incorrect because it is a glycolipid* *B is incorrect because it is an intrinsic protein* *C is incorrect because it is cholesterol*	**(1)**

Question Number	Answer	Additional Guidance	Mark
5 (a)(ii)	An answer that makes reference to the following: • genotype of one parent has one A allele (and no B) (1) • genotype of other parent has one B allele (and no A allele) (1) • correct phenotypes identified – (blood group) A for one parent and B for the other parent (1)		**(3)**

Question Number	Answer	Mark
5 (b)(i)	B –A,C,G,U / 1 / ribose *A is incorrect because mRNA does not contain deoxyribose* *C is incorrect because mRNA does not contain deoxyribose* *D is incorrect because mRNA does not contain 2 strands*	**(1)**

Question Number	Answer	Additional Guidance	Mark
5 (b)(ii)	phosphate (group)		**(1)**

Question Number	Answer	Mark
5 (b)(iii)	C –nucleus *A is incorrect because RNA polymerase is found in the nucleus* *B is incorrect because RNA polymerase is found in the nucleus* *D is incorrect because RNA polymerase is found in the nucleus*	**(1)**

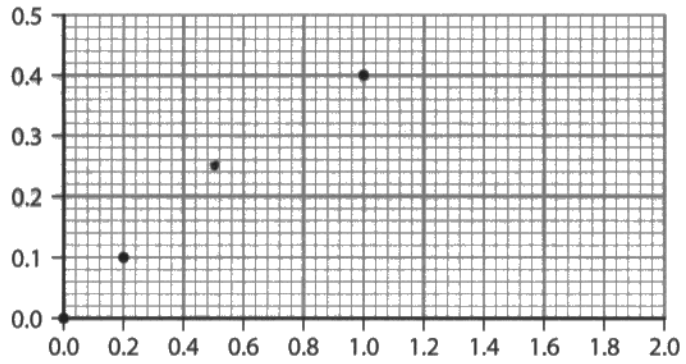
Question Number	Answer	Additional Guidance	Mark
5 (b)(iv)	A description that makes reference to two of the following: • each tRNA brings a specific amino acid (to the ribosome) (1) • the tRNA with the complementary anticodon binds to the mRNA codon (1) • tRNA bonds to ribosome (1)	ALLOW tRNA anticodons are complementary to mRNA codons	**(2)**

Question Number	Answer	Additional Guidance	Mark
5 (c)	An answer that makes reference to the following: • 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)	ALLOW exocytosis involves vesicles fusing with cell surface membrane whereas endocytosis does not involve vesicles fusing with cell surface membrane	**(2)**

Question Number	Answer	Additional Guidance	Mark
6 (a)(i)	• 4 phospholipids drawn correctly with phosphate head and 2 fatty acid tails (1) • the phosphate head should be in the water and fatty acid tails should be in the air (1)		**(2)**

Question Number	Answer	Mark
6 (a)(ii)	C – phospholipids, channel proteins and cholesterol *A is incorrect because phospholipids and cholesterol also have hydrophilic regions* *B is incorrect because cholesterol also has hydrophilic regions* *D is incorrect because channel proteins and cholesterol also have hydrophilic regions*	**(1)**

Question Number	Answer	Additional Guidance	Mark
6 (b)	An explanation which makes reference to the following: • betalain molecules are too large (to move through the cell membrane) (1) • there are no {carrier / channel} proteins for betalain molecules (to move through) (1) • betalain molecules are polar and {are repelled by hydrophobic fatty acid tails / cannot move through fatty acid tails}		**(3)**

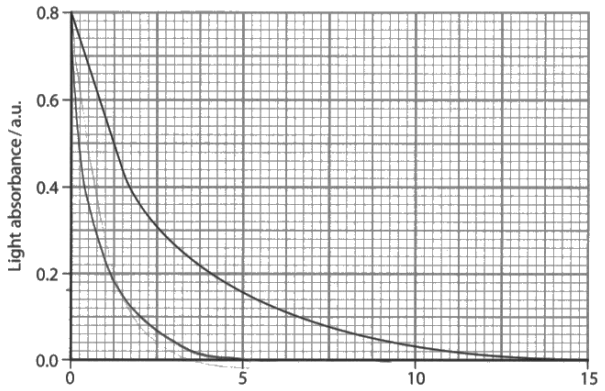
Question Number	Answer	Additional Guidance	Mark
6 (c)(i)	correctly plotted point on graph (1)	Example of plot:  	**(1)**

Question Number	Answer	
***6 (c)(ii)**	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. Basic • use of beetroot cores / use of cork borer • method for removal of excess pigment • replicates / repeats • use of colorimeter to measure absorbance / transmission of light • reference to at least three detergent concentrations • same {volume of / time in} solution • relevant safety aspect Linkages • use of at least five / range of detergent concentrations from {0% / 0.2}% to {1.8 / 2}% • variables controlled e.g. {age / source} of beetroot / SA of core • use of water bath to control temperature Sustained • reference to use of reference in colorimeter • reference to use of appropriate colorimeter filter (blue-green) • recognition of the peak colour intensity being different in graph A and B • so use of smaller intervals between 0.8 and 1.0 to see which peak was correct • reference to investigating multiple concentrations beyond 1.0% to determine if there is a decrease in colour intensity as in graph B or not **(6)**	

Level 0	0	No awardable content	
Level 1	1-2	An explanation of how the investigation should be modified may be attempted but with limited analysis, interpretation and/or evaluation of the scientific information. Generalised comments made. The explanation will contain basic information with some attempt made to link knowledge and understanding to the given context.	A basic method described with reference to range of detergent concentrations and use of beetroot. Use of colorimeter mentioned.
Level 2	3-4	An explanation of how the investigation should be modified will be given with occasional evidence of analysis, interpretation and/or evaluation of the scientific information. The explanation shows some linkages and lines of scientific reasoning with some structure.	Consideration of testing full range of concentrations shown on graph A and B. Consideration of how to control more than one variable.
Level 3	5-6	An explanation of how the investigation should be modified is given which is supported throughout by evidence from the analysis, interpretation and/or evaluation of the scientific information. The explanation shows a well-developed and sustained line of scientific reasoning which is clear, coherent and logically structured.	Consideration of how to use colorimeter to obtain valid results. Consideration of collecting valid data to address differences shown in graph A and graph B.

Question Number	Answer	Additional Guidance	Mark
7 (a)(i)	colorimeter	DO NOT ACCEPT calorimeter	**(1)**

Question Number	Answer	Additional Guidance	Mark
7 (a)(ii)	• correct calculation of change in absorbance during initial stage of reaction (1) • correct calculation of (initial) rate of reaction (1) • correct answer with units (1)	<u>Example of calculation</u> e.g. 0.8- 0.5 = 0.3 0.3 ÷ 75= 0.004 0.004 au s^{-1} / 0.24 au min^{-1} ALLOW ecf for correct calculation using incorrect figures ALLOW '/ s' , '/ min' , 'per second' or 'per minute' for units if answer correct	**(3)**

Question Number	Answer	Additional Guidance	Mark
7 (a)(iii)	line with same starting and finishing position but showing a faster decrease in light absorbance / y=0 at less than 13 minutes (1)	Example of line:  	**(1)**

Question Number	Answer	Additional Guidance	Mark
7 (b)	An explanation which makes reference to the following: • light absorbance decreased (1) • (because) starch hydrolysed by {amylase / enzyme} (1) • (therefore) iodine solution stays yellow-brown colour (1)	ALLOW amylase broke down starch ALLOW less light absorbed by yellow-brown / more light absorbed by blue-black ALLOW converse for transmission of light	**(3)**

Question Number	Answer	Additional Guidance	Mark
7(c)	An answer which makes reference to four of the following: • for Tube A the surface area was greater (than tubing B / shorter distance for diffusion in Tube A (1) • (Ficks law states that) rate of diffusion is {proportional to surface area / inversely proportional to distance for diffusion} (1) • (therefore) increased rate of diffusion (of maltose) (1) • Tube A could have had a higher {concentration of starch / temperature} (1) • a higher {concentration gradient / higher temperature} would increase the rate of diffusion (1)	ALLOW length of tubing A was greater ALLOW movement for diffusion	**(4)**

Question Number	Answer	Additional Guidance	Mark
8 (a)(i)	An answer which makes reference to the following: • (pond /plain) water / solvent used for caffeine solution (1) • to compare with the caffeine solutions / to show {normal/ resting / starting} heart rate (1)	ALLOW solution with no caffeine	**(2)**

Question Number	Answer	Additional Guidance	Mark
8 (a)(ii)	An answer which makes reference to the following: • {temperature / aeration} of solution / acclimatisation time (1) • correct justification relating to effect on heart rate (1) • same {sex / size / age} of ghost shrimp (1) • so caffeine would affect the ghost shrimp equally / to produce more valid results (1)	e.g. a cold temperature would decrease the heart rate ignore species ignore accuracy	**(4)**

Question Number	Answer	Additional Guidance	Mark
8 (b)(i)	• correct calculation of percentage change in heart rate (1) • correct calculation of percentage change given to one decimal place and with correct unit (1)	Example of calculation $\frac{270-242}{270} \times 100 = 10.37$ (-)10.4%	**(2)**

Question Number	Answer	Additional Guidance	Mark
8 (b) (ii)	An explanation which makes reference to four of the following: • as the concentration of caffeine increases the heart rate decreases / there is a negative correlation (for 2 shrimps) (1) • heart rate for shrimp 3 increased from caffeine 10 to 13 mg cm^{-3} (1) • normal heart rate is not known (as there was no 0% caffeine concentration) (1) • largest decrease in heart rate between 10-13 mg cm^{-3} (for shrimps 1 and 2) (1) • much greater decrease in heart rate for shrimp 1 than shrimp 2 (1)	ALLOW reference to shrimp 3 showing anomalous results eg decrease of 120 compared to 56	**(4)**

Question Number	Answer	Additional Guidance	Mark
8 (c)	An explanation which includes the following: • transparent body (1) • therefore heart is visible / procedure is non-invasive (1) OR • aquatic organism (1) • therefore can take in caffeine from solution (1) OR • invertebrate (1) • therefore less likely to feel pain (1)	ALLOW skin is see-through	**(2)**

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