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Mark Scheme (Results)

Summer 2016

Pearson Edexcel GCE
in Biology Spec A (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.

Using the Mark Scheme

Examiners should look for qualities to reward rather than faults to penalise. This does NOT mean giving credit for incorrect or inadequate answers, but it does mean allowing candidates to be rewarded for answers showing correct application of principles and knowledge. Examiners should therefore read carefully and consider every response: even if it is not what is expected it may be worthy of credit.

The mark scheme gives examiners:
- an idea of the types of response expected
- how individual marks are to be awarded
- the total mark for each question
- examples of responses that should NOT receive credit.

/ means that the responses are alternatives and either answer should receive full credit.
( ) means that a phrase/word is not essential for the award of the mark, but helps the examiner to get the sense of the expected answer.
Phrases/words in **bold** indicate that the meaning of the phrase or the actual word is **essential** to the answer.
ecf/TE/cq (error carried forward) means that a wrong answer given in an earlier part of a question is used correctly in answer to a later part of the same question.

Candidates must make their meaning clear to the examiner to gain the mark. Make sure that the answer makes sense. Do not give credit for correct words/phrases which are put together in a meaningless manner. Answers must be in the correct context.

Quality of Written Communication
Questions which involve the writing of continuous prose will expect candidates to:
- write legibly, with accurate use of spelling, grammar and punctuation in order to make the meaning clear
- select and use a form and style of writing appropriate to purpose and to complex subject matter
- organise information clearly and coherently, using specialist vocabulary when appropriate.

Full marks will be awarded if the candidate has demonstrated the above abilities.
Questions where QWC is likely to be particularly important are indicated (QWC) in the mark scheme, but this does not preclude others.

Question Number	Answer	Additional Guidance	Mark
1(a)	• correct genetic diagram with reference to parental and offspring genotypes (1) • correct probability (1)	Allow correct gametes and offspring genotypes e.g. T and t for gametes, offspring TT, Tt and tt 0.25/ 25% / $\frac{1}{4}$ Do not accept 1:4 or 1:3	**(2)**

Question Number	Answer	Additional Guidance	Mark
1(b)	chorionic villus sampling	Accept CVS Accept phonetic spelling Do not accept chronic villus sampling	**(1)**

Question Number	Answer	Additional Guidance	Mark
1(c)	An explanation that makes reference to three of the following: • test result may be inaccurate (1) • (increased) risk of miscarriage (due to the procedure) (1) • false positive may lead to termination of healthy fetus (1) • { prenatal testing / abortion } against values or beliefs of the parents (1)	Ignore reference to amniocentesis Allow false positives / false negatives Allow spontaneous abortion Allow 'parents do not want to know'	**(3)**

Question Number	Answer	Additional Guidance	Mark
2(a)(i)	• correct answer (1) • correct unit (1)	<u>Example of calculation</u> (400 – 150) ÷ 2 = **125** nmol dm^{-3} min^{-1} Allow per min Allow 2.083 (nmol dm^{-3} s^{-1})	**(2)**

Question Number	Answer	Additional Guidance	Mark
2(a)(ii)	An answer which makes reference to the following: • (blood sample) without CVX (1) • to compare with normal rate of thrombin production (1)	Allow untreated blood / blood treated with saline / blood treated with water	**(2)**

Question Number	Answer	Additional Guidance	Mark
2(b)	An answer which makes reference to five of the following: • increased thrombin production as CVX concentration increases (1) • the relationship between CVX concentration and rate of thrombin production is not { directly proportional / linear } (1) • little difference between control and 0.5 ng cm^{-3} (CVX) / greatest increase from 5ng cm^{-3} to 50 ng cm^{-3} (1) • { no significant difference / standard deviations overlap } between the control and 0.5 (1) • greater thrombin production leads to { faster / increased } conversion of fibrinogen to fibrin (1) • greater thrombin production leads to { faster / increased } clotting of blood (1)	Allow control and 0.5 ng cm^{-3} are similar **ACCEPT** reference to bars instead of standard deviation	**(5)**

Question Number	Answer	Additional Guidance	Mark
2(c)	An explanation that makes reference to the following: • (different primary structure) results in a different sequence of amino acids (1) • change in R groups changes { folding / bonding / secondary structure / tertiary structure } (1) • changing { shape / charge } of the active site prevents substrate from being able to bind (1) • { stopping / reducing } the production of fibrin (1)	Do not accept peptide bonds ALLOW another specific aspect of blood clotting cascade	**(4)**

Question Number	Answer	Mark
3(a)(i)	C	(1)

Question Number	Answer	Additional Guidance	Mark
3(a)(ii)	A description that makes reference to four of the following: • involved in facilitated diffusion (1) • movement of { large molecules / polar molecules / ions } (1) • (facilitated diffusion) from a high concentration to a low concentration (1) • involved in active transport (1) • needs ATP to move molecules against concentration gradient (1)	ALLOW charged molecules ALLOW needs ATP to move molecules from low concentration to high concentration	(4)

Question Number	Answer	Additional Guidance	Mark
3(b)	An answer that makes reference to four of the following: • (red) cabbages of at least five different ages used (1) • (red) cabbage leaves with same { surface area / mass / source } (1) • description of how another relevant variable is controlled (1) • method for measuring permeability (1) • {replicates / repeats} for each age to allow calculation of mean values (1)	Ignore descriptions of beetroot core practical Allow either growing conditions or experimental conditions relevant variables could include temperature, pH, time, volume of liquid, light intensity e.g. use of colorimeter	**(4)**

Question Number	Answer	Additional Guidance	Mark
4(a)(i)	A – high blood pressure		**(1)**

Question Number	Answer	Additional Guidance	Mark
4(a)(ii)	• correct numbers inserted into equation (1) • correct answer to one decimal place (1)	<u>Example of calculation</u> $61 \div 1.54^2$ **25.7** Correct answer no working gains full marks Ignore units	**(2)**

Question Number	Answer	Additional Guidance	Mark
4(a)(iii)	An answer which makes reference to the following: • correlation between the number of risk factors and deaths due to CVD (1) • (deaths due to CVD) is higher for diabetics than non-diabetics (1)	 Allow converse	**(2)**

Question Number	Answer	Additional Guidance	Mark
4(b)	An explanation which includes reference to the following: • antihypertensive drugs lower blood pressure (1) • lower blood pressure reduces risk of damage to endothelium of the artery (1) • reduced risk of inflammatory response (1) • reduced risk of { atheroma / plaque } formation (1)	Accept converse argument for marking points 2, 3 and 4 Ignore epithelium Allow description of an inflammatory response	**(4)**

Question Number	Answer	Additional Guidance	Mark
5(a)	An answer which makes reference to four of the following: • both are chains of amino acids joined by peptide bonds (1) • both contain named bonds (holding molecule in its three dimensional shape) (1) • globular proteins have hydrophilic groups on the outside whereas fibrous proteins have hydrophobic groups on the outside (1) • globular have tertiary or quaternary structures whereas fibrous have little or no tertiary structure (1) • globular are folded into compact shapes whereas fibrous have long chains (1)	 i.e. hydrogen bonds, disulfide bridges, ionic bonds Allow converse ALLOW globular being spherical and fibrous being long strands	**(4)**

Question Number	Answer	Additional Guidance	Mark
5(b)	A description which makes reference to five of the following: • the { gene / sequence of DNA } for the (globular) protein is transcribed (1) • complementary base pairing between RNA nucleotides and DNA (to produce mRNA) (1) • mRNA leaves the nucleus and attaches to a ribosome (1) • pairing between codons on mRNA and anticodons on tRNA (1) • tRNA provides specific amino acids (1) • the sequence of { bases / codons } determines the {sequence of amino acids / primary structure of the protein } (1)	Do not allow reference to 'transcripted' Allow a description of complementary base pairing Allow reference to triplet code	**(5)**

Question Number	Answer	Additional Guidance	Mark
6(a)(i)	A – ester		**(1)**

Question Number	Answer	Additional Guidance	Mark
6(a)(ii)	Exocytosis	Allow exocitosis	**(1)**

Question Number	Answer	Additional Guidance	Mark
6(a)(iii)	An explanation that makes reference to the following: • (glycerol and) fatty acids produced (when lipids are hydrolysed) (1) • fatty acids would cause the pH to decrease (1)		**(2)**

Question Number	Answer	Additional Guidance	Mark
6(b)	An explanation that makes reference to: • increased (blood) cholesterol (1) • (because) the triglyceride is saturated (1) • The lipoprotein is an LDL (1) And one of the following: • { lipoproteins / LDLs } transport cholesterol (1) • LDL binds to receptors (on cell surface membranes) / LDL accumulates in blood if receptors overloaded (1)	Do not allow reference to HDL Do not allow if answers also make reference to decreased cholesterol Allow saturated fatty acids	**(4)**

Question Number	Answer	Additional Guidance	Mark
6(c)	C - 1,4-glycosidic bonds and 1,6-glycosidic bonds and branched		**(1)**

Question Number	Answer	Additional Guidance	Mark
6(d)(i)	• correct answer (1)	<u>Example of calculation</u> 100 – 20 = 80 20 : 80 = 1 : 4 **1 : 4** Do not allow any reference to percentages	**(1)**

Question Number	Answer	Additional Guidance	Mark
6(d)(ii)	An explanation that makes reference to four of the following: • as amylose content increases the percentage of starch hydrolysed decreases (1) • the less amylose present the greater the proportion of amylopectin (1) • amylose is unbranched / amylopectin is branched (1) • amylopectin contains (1,4 and) 1,6-glycosidic bonds (1) • { branches / a greater number of terminal ends } increases the rate of hydrolysis (1)	Allow converse Allow converse	**(4)**

Question Number	Answer	Additional Guidance	Mark
7(a)(i)	Nucleus	Allow phonetic spelling Do not allow Nuclease, nucleolus, nuclears	(1)

Question Number	Answer	Additional Guidance	Mark
7(a)(ii)	**D** ATGCGACTG / AUGCGACUG		(1)

Question Number	Answer	Additional Guidance	Mark
7(b)(i)	sequence of { bases / nucleotides } in DNA coding for a {polypeptide / protein}		(1)

Question Number	Answer	Additional Guidance	Mark
7(b)(ii)	C – 22 950		(1)

Question Number	Answer	Additional Guidance	Mark
7 (c)	An explanation that makes reference to four of the following: • deletion could affect every codon (on the mRNA) / substitution will only affect one codon (1) • deletion more likely to affect the position of { stop codon / start codon } (1) • deletion results in a different sequence of amino acids / substitution may not affect the sequence of amino acids (1) • substitution may code for the same amino acid (1) • (same amino acid) due to the degenerate nature of the genetic code (1)	Allow reference to 'frame shift'	**(4)**

Question Number	Answer	Additional Guidance	Mark
8(a)(i)	D - S		**(1)**

Question Number	Answer	Additional Guidance	Mark
8(a)(ii)	D - ventricular systole		**(1)**

Question Number	Answer	Additional Guidance	Mark
8(b)(i)	The aorta and pulmonary artery are { attached to the wrong ventricles / the wrong way around }	Allow aorta leaves the right ventricle and the pulmonary artery leaves the left ventricle	**(1)**

Question Number	Answer	Additional Guidance	Mark
8(b)(ii)	An explanation that makes reference to the following: • the hole allows oxygenated and deoxygenated blood to mix (between the two ventricles) (1) • oxygenated blood { travels to the body / enters aorta } / deoxygenated blood { travels to the lungs / enters pulmonary artery } (1) • providing some oxygen for respiration (1)	Allow converse	**(3)**

<table>
<tr><th>Question Number</th><th colspan="2">Answer</th></tr>
<tr><td>8 (b)(iii)</td><td colspan="2">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.
• rate of diffusion would be lower with abnormal heart
• blood entering lungs from an abnormal heart has more oxygen, 8kPa, than blood entering lungs from a normal heart, 5kPa
• oxygen in blood increased by only 2kPa instead of 8kPa with abnormal heart
• resulting in a smaller difference in concentration between the alveoli and the red blood cells i.e. 14-8/14-5 or 6 and 9kPa
• the surface area of the alveoli and distance for diffusion are not affected
• Fick's law states that concentration gradient is proportional to rate of gas exchange
• a lower concentration gradient for oxygen between the alveoli and the blood results in a lower rate of oxygen diffusion
NOTE – 'the pieces of scientific information provided' could be any from: the information about the defective heart / diagram of alveolus / table of data</td></tr>
<tr><td>Level</td><td>Mark</td><td>Descriptor</td></tr>
<tr><td>0</td><td>0</td><td>No awardable content</td></tr>
<tr><td>1</td><td>1-2</td><td>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.</td></tr>
<tr><td>2</td><td>3-4</td><td>An answer will be given with occasional evidence of analysis, interpretation and/or evaluation of the pieces of scientific information provided.
The explanation shows some linkages and lines of scientific reasoning with some structure.</td></tr>
<tr><td>3</td><td>5-6</td><td>An answer is made which is supported throughout by sustained application of relevant evidence of analysis, interpretation and/or evaluation of the pieces of scientific information provided.
The explanation shows a well-developed and sustained line of scientific reasoning which is clear and logically structured.</td></tr>
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