Pearson Edexcel

Mark Scheme

October 2020

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

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications come from Pearson, the world's leading learning company. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information, please visit our website at www.edexcel.com.

Our website subject pages hold useful resources, support material and live feeds from our subject advisors giving you access to a portal of information. If you have any subject specific questions about this specification that require the help of a subject specialist, you may find our Ask The Expert email service helpful.

www.edexcel.com/contactus

Pearson: helping people progress, everywhere

Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

October 2020
Publications Code 8BN0_01_2010_MS
All the material in this publication is copyright
© Pearson Education Ltd 202o

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)	• ester (bond) (1)	ALLOW covalent (bond)	(1)

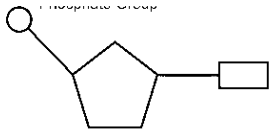
Question Number	Answer	Mark
1(a)(ii)	The only correct answer is – C - glycolipid A is incorrect because structure P is not a carrier protein B is incorrect because structure S is cholesterol D is incorrect because structure R is a glycoprotein	(1)

Question Number	Answer	Mark
1(a)(iii)	The only correct answer is – A - Q B is incorrect because structure R is not involved in cell recognition C is incorrect because structure S is not involved in cell recognition D is incorrect because structure T is not involved in cell recognition	(1)

Question Number	Answer	Mark
1(a)(iv)	The only correct answer is – D - T which is a channel protein A is incorrect because structure P is involved in cell recognition B is incorrect because structure Q does not allow ions to diffuse into a cell C is incorrect because structure R does not allow ions to diffuse into a cell	(1)

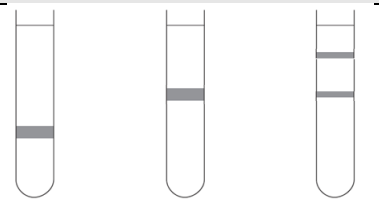
Question Number	Answer	Additional guidance	Mark
1(b)(i)	An explanation which makes reference to the following: • sodium ions are being moved against the concentration gradient (1) • (through proteins) using active transport (1)	ALLOW from low concentration in tissue fluid to a higher concentration in cytoplasm	(2)

Question Number	Answer	Additional guidance	Mark
1(b)(ii)	A description which makes reference to the following: • by facilitated diffusion (1) • through (carrier) proteins (in the phospholipid bilayer) (1)	ignore channel proteins	(2)

Question Number	Answer	Additional guidance	Mark
2(a)(i)	• phosphate group bonded correctly to pentose sugar (1) • base bonded correctly to pentose sugar (1)		(2)

Question Number	Answer	Mark
2(a)(ii)	The only correct answer is – C (phosphodiester bond, thymine, deoxyribose) A is incorrect because a DNA molecule does not contain a glycosidic bond B is incorrect because a DNA molecule does not contain glycosidic bond, uracil or ribose D is incorrect because a DNA molecule does not contain uracil or ribose	(1)

Question Number	Answer	Mark
2(a)(iii)	The only correct answer is – B 33% A is incorrect because there would be 17% cytosine C is incorrect because that is the answer for A and T together D is incorrect because that is A and C and T percentages added together	(1)

Question Number	Answer	Additional guidance	Mark
2(b)	• tube 2 with a band above the level of the band in tube 1 (1) • tube 3 with 2 bands, one the same height as in tube 2 and the other higher (1)		(2)

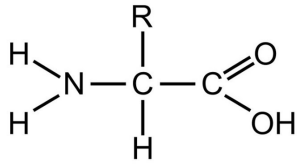
Question Number	Answer	Additional guidance	Mark
2(c)	An answer which makes reference to three of the following: • replication involves DNA nucleotides whereas transcription involves RNA nucleotides (1) • replication produces double stranded DNA molecules whereas transcription produces a single stranded RNA molecule (1) • replication uses DNA polymerase whereas transcription requires RNA polymerase (1) • replication produces identical copies whereas transcription produces a complementary copy (1)	ALLOW mRNA nucleotides ALLOW replication copies the all the DNA whereas transcription copies {part of the DNA / one gene}	(3)

Question Number	Answer	Additional guidance	Mark
3(a)(i)	• correct BMI calculated (1) • correct risk determined from graph (1)	<u>Example of calculation</u> $(61 \div 1.54^2) = 25.72$ Relative risk = 2.1 Correct risk with no working scores full marks	(2)

Question Number	Answer	Additional guidance	Mark
3(a)(ii)	• waist to hip ratio / waist:hip		(1)

Question Number	Answer	Additional guidance	Mark
3(a)(iii)	A description which makes reference to the following: • treatment with antihypertensive medication (1) plus any two relevant lifestyle changes: • reduce salt intake (1) • stop smoking (1) • increase exercise (1) • reduce weight (1)	ALLOW named example e.g. ACE inhibitor/ calcium channel blocker / diuretic / beta blocker	(3)

Question Number	Answer	Additional guidance	Mark
3(b)	An explanation which makes reference to the following: • (platelet inhibitors) reduce the risk of blood clots forming (1) • therefore less likely that {coronary arteries / blood flow to heart muscle} will be blocked (1)	ALLOW prevent platelets {aggregating becoming sticky}/ prevent clotting cascade	(2)

Question Number	Answer	Additional guidance	Mark
4(a)(i)	• amine group attached to central carbon (1) • Carboxylic acid group attached to central carbon (1)	e.g. 	(2)

Question Number	Answer	Additional guidance	Mark
4(a)(ii)	• polypeptide and water (1)	Both required for the mark ALLOW oligopeptide	(1)

Question Number	Answer	
*4 (b)	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 information • as prothrombin concentration increases clotting time decreases • prothrombin B results in a faster clotting time / converse Evidence for linkages made • greater the concentration of prothrombin the greater the concentration of thrombin produced • greater the conc of thrombin the faster the conversion of fibrinogen into fibrin • fibrin traps {red blood cells / platelets} to form blood clot • substitution mutation • only one codon affected • only one amino acid affected • prothrombin will have a slightly different shape / charge Evidence for sustained scientific reasoning • prothrombin will have a slightly different shape / charge which means it will form an enzyme-substrate complex more easily • change in one amino acid means more enzyme-{substrate/prothrombin B} complexes can be made per unit time • (as prothrombin concentration increases clotting time decreases) up to a certain point where something else is a limiting factor • reference to a suitable limiting factor e.g. enzyme which converts prothrombin to thrombin (6)	

			Additional guidance
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.	just describing what graph shows
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.	all level 1 plus some linkage ideas
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.	all level 2 plus some sustained ideas

Question Number	Answer	Additional guidance	Mark
5(a)(i)	• incomplete dominance (1)	ALLOW co-dominance	(1)

Question Number	Answer	Mark
5(a)(ii)	The only correct answer is – B - 50% A is incorrect because 25% is the probability for either RR or WW C is incorrect because two heterozygous parents would not result in 75% RW D is incorrect because two heterozygous parents would not result in 100% RW	(1)

Question Number	Answer	Additional guidance	Mark
5(b)(i)	An answer which makes reference to the following: • recessive (1) • two recessive alleles are needed to have condition (1) • individual(s) {8 / 9} do not have alkaptonuria but some of their children do (1) • therefore individuals 8 and 9 must be heterozygous (1)	ALLOW carriers	(4)

Question Number	Answer	Additional guidance	Mark
5(b)(ii)	An answer which makes reference to the following: <u>Either</u> • chorionic villus sampling / CVS (1) • {cells/ tissue} taken from {placenta / chorionic villus} between 10-14 weeks of pregnancy (1) • benefit of earlier diagnosis (1) <u>Or</u> • amniocentesis (1) • amniotic fluid containing cells collected between 14-20 weeks of pregnancy (1) • lower risk of miscarriage (1)		(3)

Question Number	Answer	Additional guidance	Mark
6(a)(i)	An answer which makes reference to the following: <u>Similarities</u> • both have a {double / closed} circulatory system (1) • both have two atria, arteries, veins and capillaries (1) <u>Differences</u> • snake heart has only one ventricle whereas human heart has two / snake heart does not have a (complete) {septum / wall} between the {ventricles / sides of heart} whereas human heart does (1) • in snake heart the oxygenated and deoxygenated blood mix (in the ventricle) whereas they do not mix in a human heart (1)	ALLOW both have two atria and blood vessels ALLOW piecing together ALLOW snake septum has a hole whereas human heart doesn't	(4)

Question Number	Answer	Additional guidance	Mark
6(a)(ii)	An explanation which makes reference to two of the following: • (to pump blood) to supply {oxygen / glucose} to body cells / to remove {carbon dioxide / wastes} from body (1) • by mass transport (1) • because a small surface area to volume ratio does not allow diffusion to occur at a sufficient rate (1)	ALLOW to ensure cells have sufficient {oxygen / glucose}	(2)

Question Number	Answer	Additional guidance	Mark
6(b)(i)	• correct measurement of X-Y (1) • correct calculation using given magnification (1) • correct conversion to μm (1)	<u>Example of calculation</u> 8-9 mm 8 ÷ 40 (=0.2mm) 200(μm) Correct answer with no working gains full marks	(3)

Question Number	Answer	Additional guidance	Mark
6(b)(ii)	An explanation which makes reference the following: • large lumen to reduce resistance to blood flow back to the heart (1) • valves prevent back flow of blood (1) • thin layer of {muscular tissue / elastic tissue} (in the wall) to maintain blood pressure (1) • smooth endothelium to reduce resistance to blood flow (1)	ALLOW keep blood flowing in one direction ALLOW thin {walls / muscular tissue / elastic tissue} as pressure is low in the veins	(4)

Question Number	Answer	Additional guidance	Mark
7(a)	An answer which makes reference to the following: • negative correlation between heart rate and body mass (1)	ALLOW animals with a {lower body mass have a higher heart rate / higher body mass have a lower heart rate}	(1)

Question Number	Answer	Additional guidance	Mark
7(b)(i)	An answer which makes reference to the following: • adding caffeine (to dopamine) increases heart rate (1) • {adding / increasing the concentration of} dopamine increases heart rate (1) • larger increase when both are used together at higher concentration (1) • no overlap between error bars indicates significant difference between dopamine and dopamine with caffeine / overlap between error bars indicates no significant difference between dopamine concentrations (1)	ALLOW dopamine with caffeine increases HR more than just dopamine – not to go in final MS ALLOW comparative data	(4)

Question Number	Answer	Additional guidance	Mark
7(b)(ii)	An answer which makes reference to the following: • {distilled / pond} water / the solvent used to make the {dopamine / dopamine and caffeine solutions} (1) • to show the solvent did not have an effect / to see the heart rate in the absence of added chemicals (1)	ALLOW inactive molecule of same size and concentration as dopamine	(2)

Question Number	Answer	Additional guidance	Mark
7(b)(iii)	An answer which makes reference to the following: • Daphnia (immobilised) on (cavity) slide (1) • acclimatisation time in {control / dopamine / dopamine and caffeine} solution (1) • use of concentrations from graph (1) • suitable method for counting and recording heart rate (1) • use Daphnia of same {species / age / sex / size} (1) • repeats and calculation of {mean / SD} (1)		(5)

Question Number	Answer	Mark
8(a)	The only correct answer is – B - a channel protein A is incorrect because it is not a carrier protein C is incorrect because it is not an enzyme D is incorrect because it is not a glycoprotein	(1)

Question Number	Answer	Additional guidance	Mark
8(b)	• correct PEF for 25-year-old without cystic fibrosis read from graph (1) • correct calculation of PEF for man with cystic fibrosis (1)	<u>Example of calculation</u> 620 55% of 620 = 341 ($dm^3\ min^{-1}$) Correct answer with no working gains full marks	(2)

Question Number	Answer	Additional guidance	Mark
8(c)	An explanation which makes reference to the following: • reduced (rate of) gas exchange (1) • (due to) reduced rate of air {entering / leaving} lungs (1) • lower concentration gradient between alveoli and capillaries (1)	ALLOW reduced volume of air {entering / leaving} lungs	(3)

Question Number	Answer	Mark
8(d)(i)	The only correct answer is – B - one A is incorrect because the third statement is correct C is incorrect because statements one and two are incorrect D is incorrect because statements one and two are incorrect	(1)

Question Number	Answer	Additional guidance	Mark
8(d)(ii)	An explanation which makes reference to five of the following: • cystic fibrosis causes the production of {thicker / stickier} mucus (1) • which blocks the pancreatic duct / prevent pancreas enzymes reaching intestine (1) • {reduces / prevents} enzymes digesting {carbohydrates / lipids / proteins} (in intestines) (1) • (resulting in) reduced {absorption / concentration} of products of digestion into the {blood / lymph} (1) • linkage of reduced {amino acids / vitamins / minerals} to slower growth rate (1) • {dietary supplements / digestive enzymes} would increase growth rate (1)	ALLOW converse for given digestive enzymes for mp3+4 ALLOW reduced digestion of food by enzymes e.g. amino acids / glucose / fatty acids / glycerol / vitamins / minerals	(5)

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom