



Mark Scheme (Results)

January 2020

Pearson Edexcel International GCSE in
Biology (4BI1)
Paper 1BR

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. 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

January 2020

Publications Code 4BI1_1BR_msc_20200305

All the material in this publication is copyright

© Pearson Education Ltd 2020

Question Number	Answer	Mark
1(a)	liver	1

Question Number	Answer	Mark
1(b)	B ovary (1) <i>A is incorrect because the brain does not produce progesterone</i> <i>C is incorrect because the pituitary does not produce progesterone</i> <i>D is incorrect because the testis does not produce progesterone</i>	1

Question Number	Answer	Mark
1(c)	D yes yes (1) <i>A is incorrect because both organs excrete</i> <i>B is incorrect because the kidney excretes</i> <i>C is incorrect because the skin excretes</i>	1

Question Number	Answer	Additional guidance	Mark
1(d)	A description that makes reference to three of the following points: • protease / pepsin / peptidase (1) • digest / breaks down <u>protein</u> (1) • hydrochloric acid (1) • kill pathogens / eq / optimum pH ignore germs (1) • churning/ mechanical digestion (1)	Allow lipase digest lipid as alternative to mp1 and 2	3

Total = 6 marks

Question Number	Answer	Mark
2(a)(i)	B P and S <i>A is incorrect because Q contains oxygenated blood</i> <i>C is incorrect because R contains oxygenated blood</i> <i>D is incorrect because Q and R contain oxygenated blood</i> /	1

Question Number	Answer	Mark
2(a)(ii)	An explanation that makes reference to two of the following points: • prevent backflow / blood returning (1) • to heart / ventricles (1) • blood transported to lungs / body (1) • pressure in ventricles drop / artery pressure is greater than ventricle pressure (1)	2

Question Number	Answer	Additional guidance	Mark
2(b)(i)	An answer that makes reference to the following points: • heart disease increases with age / older people more likely to have heart disease / more over 75 /eq (1) • males more at risk than females / men more at risk than women (1)	Allow converse	2

Question Number	Answer	Additional guidance	Mark
2(b)(ii)	• $32\,500\,000 \div 1000 = 32\,500$ • $32\,500 \times 5 = 162\,500$ (2)	Award full marks for correct numerical answer without working one mark for $\times 5$ or 32 500 000 or 32 500	2

Question Number	Answer	Additional Guidance	Mark
2(c)	An explanation that makes reference to three of the following points: • blockage of (coronary) artery / less blood to heart (1) • cholesterol / fatty deposits (1) • less oxygen / out of breath / breathless /eq (1) • less (aerobic) respiration / less energy /unable to exercise / eq (1) • heart stops beating / heart contracts less / heart attack / death (1)	Ignore causes heart disease	3

Total = 10 marks

Question Number	Answer	Mark
3(a)	lung(s) (1)	1

Question Number	Answer	Mark
3(b)	5.0×10^6 or 5×10^6	1

Question Number	Answer	additional guidance	Mark
3(c)	An explanation that makes reference to three of the following points: (concentration) <u>gradient</u> (1) - more oxygen in alveoli than in blood / more carbon dioxide in blood than in alveoli (1) - diffusion (into / out of blood) (1) - thin wall / one cell thick / moist (1) - blood moves / flow (1)	Ignore references to high surface area as question refers to one alveolus	3

Question Number	Answer	Additional guidance	Mark
3(d)(i)	An answer that makes reference to two of the following points: - as surface area increases respiration rate increase (1) - bigger animals respire more (1) - bigger animals have more surface area of alveoli (1)	Allow converse for all	2

Question Number	Answer	Additional guidance	Mark
3(d)(ii)	An explanation that makes reference to two of the following points: - humans have a <u>small(er)</u> surface area to volume ratio (1) - less heat loss (1) (less respiration is required) to maintain body temperature / eq (1)	Allow converse for mice mice have a larger surface to volume area mice have more heat loss in mice, (more) respiration is required to maintain body temperature	2

Question Number	Answer	Additional guidance	Mark
3(e)	An explanation that makes reference to three of the following points: - measure / record distance moved by coloured liquid / record starting position and final position of liquid on scale / eq (1) - ref to time (1) - use syringe to reset liquid / eq (1) - repeat (1)	Allow bubble for liquid	3

Total 12 marks

Question Number	Answer	Mark
4(a)	plasmid	1

Question Number	Answer	Additional Guidance	Mark
4(b)	An explanation that makes reference to three of the following points: • mutation (1) • survive/ not killed (1) • reproduce / multiply / eq (1) • pass on DNA / allele / gene (1)	Ignore pass on characteristics alone	3

Question Number	Answer	Additional guidance	Mark
4(c)(i)	$10 - 0.7 = 9.3$ $10\,000\,000 - 700\,000 = 9\,300\,000$ $9.3 \div 0.7 \times 100$ $9\,300\,000 \div 700\,000 \times 100$ 1329 % allow 1328.6 or 1328.57 (2)	award full marks for correct numerical answer without working one mark for 9.3 or 9 300 000	2

Question Number	Answer	Additional guidance	Mark
4(c)(ii)	An answer that makes reference to four of the following points: • stopping antibiotics allows non-resistant bacteria to increase / grow / no more increase in resistance or antibiotics allow resistant bacteria to increase / grow (1) • less selection pressure (for antibiotic resistance) / competition (for resources) (1) • most infections (would now be) caused by non-resistant bacteria (1) • antibiotics will be effective in most cases / against more bacteria (1) • use new / different antibiotics (instead of not using any) (1) • some patients may die / suffer / eq if not given antibiotics / from other things (1)	Allow converse	4

Total = 10 marks

Question Number	Answer	Mark
5(a)(i)	respiration / fermentation	1

Question Number	Answer	Mark
5(a)(ii)	A carbon dioxide <i>B is incorrect because the gas is not nitrogen</i> <i>C is incorrect because the gas is not oxygen</i> <i>D is incorrect because the gas is not water vapour</i>	1

Question Number	Answer	additional guidance	Mark
5(b)(i)	An answer that makes reference to the following points: S scale linear and half the axes (1) L lines straight and through each point (1) A1 axes correct way (1) A2 axes labelled <u>temperature in °C</u> and <u>bubbles per min(ute)</u> (1) P points plotted accurately (1)	bar charts / extrapolations: no L mark no P mark if data plotted for 50	5

Question Number	Answer	Mark
5(b)(ii)	An explanation that makes reference to two of the following points: - enzymes denatured (1) - changes shape of active site (1) - substrate can no longer fit / E/S complexes do not form / eq (1)	2

Question Number	Answer	Mark
5(c)	A description that makes reference to two of the following points: • measure / collect volume / cm^3 / eq (1) • readings at smaller intervals (of temperature) / (1) • between 40 and 55 (1)	2

Total = 11 marks

Question Number	Answer	Mark
6(a)	respiration / heat loss	1

Question Number	Answer	Mark
6(b)	1122	1

Question Number	Answer	Additional guidance	Mark
6(c)(i)	A description that makes reference to two of the following points: • digest / break down (1) • dead organisms / waste / faeces / organic matter / eq (1) • use extracellular enzymes / secrete enzymes / release enzymes onto / eq (1)	Ignore feed	2

Question Number	Answer	Mark
6(c)(ii)	A description that makes reference to three of the following points: • producers / plants contain cellulose (1) • less energy in producers absorbed / transferred to (primary) consumers / eq (1) • (more) producers / plants are undigested / not digested / not eaten / eq (1) • decomposers can digest cellulose / eq (1) • (primary) consumers lose more energy in respiration / respire more / more heat loss (1) • (primary) consumers lose more energy in movement / eq (1)	3

Total 7 marks

Question Number	Answer	Additional guidance	Mark
7(a)	$6\text{CO}_2 + 6\text{H}_2\text{O} \longrightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2$ (2)	award one mark for correct but unbalanced equation no credit for word equation	2

Question Number	Answer	Mark
7(b)(i)	An explanation that makes reference to four of the following points: - place plant in dark (for 24 hours) (1) - to remove starch / destarch (1) - place plant in light (1) - test leaf no CO_2 / from flask <u>and</u> normal / control leaf (1) - sodium hydroxide removes CO_2 - using iodine solution / iodine test (1) - to show presence of starch (1)	4

Question Number	Answer	Mark
7(b)(ii)	An answer that makes reference to two of the following points: - fewer plants needed (1) - more students can do test / repeats / identify anomalies (1) - different shapes can be used to distinguish no CO_2 from control (1)	2

Question Number	Answer	Mark
7(c)	An explanation that makes reference to three of the following points: • keep all leaves in normal atmosphere / no NaOH (1) • use variegated leaf / eq / use a leaf with chlorophyll and one without (1) • compare blue black / starch areas with green areas / areas with chlorophyll / eq (1)	3

Total 11 marks

Question Number	Answer	Mark
8(a)	An answer that makes reference to the following points: • A iris (1) • B cornea (1) • C pupil (1) • D lens (1)	4

Question Number	Answer	Mark
8(b) (i)	An explanation that makes reference to four of the following points: • ciliary muscles relax (1) • suspensory ligaments taut increased tension / taut / tight / eq (1) • lens less curved / thinner (1) • light refracted / bent less (1) • pupil dilates / expands / widens (1)	4

Question Number	Answer	Mark
8(b) (ii)	An answer that make reference to two of the following points: • loss of vision / sight / go blind / can't see / eq (1) • in centre of visual field (1) • loss of detail / colour (1)	2

Question Number	Answer	Mark
8(b) (iii)	An answer that makes reference to two of the following points: • repeat with more patients / different patients / eq (1) • longer study / for a greater period / more years / monitor the progress of the patients / eq (1) • see if treatment causes damage / side effects	2

Total 12 marks

Question Number	Answer	Additional guidance	Mark
9 (a) (i)	An answer that makes reference to the following points: • parents dd and Dd (1) • gametes d and D or d (1) • (child) genotype(s) dd (1) • child without syndactyly identified as dd (1) Also allow sex linkage cross as below: (i) Use a genetic diagram to show the genotypes of the parents, the possible gametes and the genotype and phenotype of their child. Use D to represent the dominant allele and d to represent the recessive allele. (4) Man (Father) Genotype $x^d y$ Gametes $(x^d) (y)$ Woman (Mother) Genotype $x^D x^d$ Gametes $(x^D) (x^d)$ Phenotype of their child $x^D x^D x^d$ $x^D x^d x^d$ $x^d x^D x^d$ $x^d x^d x^d$ $x^D y$ $x^d y$ $x^D x^d$ - Female girl child with syndactyly $x^D y$ - Male child with syndactyly $x^d x^d$ - Female child with no syndactyly $x^d y$ - Male child with no syndactyly	allow ECF for max of 2 allow mp 1 2 3 4 from Punnett square	4

Question Number	Answer	Additional guidance	Mark
9 (a)(ii)	- probability of having syndactyly = 0.5 - probability of being female = 0.5 = 0.25 (2) allow 25% or 1/4	award full marks for correct numerical answer without working one mark for 0.5 or 50% or 1/2	2

Question Number	Answer	Additional guidance	Mark
9(b)	An explanation that makes reference to three of the following points: - dominant allele is always expressed (in phenotype) / only requires one allele / recessive allele requires two copies to be expressed / recessive alleles are only expressed when homozygous / eq (1) - dominant condition more common / frequent / high probability of passing on / eq (1) - recessive condition has carriers (1) - recessive version can appear when both parents unaffected / skips generations / eq (1)	Allow converse Allow converse for dominant	3

Question Number	Answer	Additional guidance	Mark
9(c)	A description that makes reference to two of the following points: - polygenic (1) - many genes / more than one gene (controlling one phenotype) (1) - each has small effect (1)	Ignore alleles	2

Total 11 marks

Question Number	Answer	Additional guidance	Mark
10 (a) (i)	$60 \div (1.65 \times 1.65)$ $60 \div 2.7225$ $= 22.0 (2)$	award full marks for correct numerical answer without working one mark for 1.65 Allow 20	2

Question Number	Answer	Additional guidance	Mark
10 (a) (ii)	healthy or whatever indicated in 10(a) (i)	Allow TE from 10 ai	1

Question Number	Answer	Mark
10(b)	A increase your BMI <i>B is incorrect because fat does not decrease BMI</i> <i>C is incorrect because fat does affect BMI</i> <i>D is incorrect because cannot have a negative BMI</i>	1

Question Number	Answer	Mark
10(c) (i)	An explanation that makes reference to the following points: • (carbohydrate and lipid) are (high) energy molecules (1) • energy intake is less than energy use (1) • stored fat / glycogen / carbohydrate is <u>respired</u> / eq (1)	3

Question Number	Answer	Mark
10(c) (ii)	An explanation that makes reference to the following points: • muscle (contraction) (1) • exercise requires / uses energy (1) • from respiration (1)	3

Total 10 marks

Question Number	Answer	Mark
11(a)(i)	carbon (cycle)	1

Question Number	Answer	Mark
11(a)(ii)	A <i>B is incorrect because it is decomposition increases CO₂</i> <i>C is incorrect because it is combustion increases CO₂</i> <i>D is incorrect because respiration increases CO₂</i>	1

Question Number	Answer	Mark
11(a)(iii)	An answer that includes two from: • bacteria / named correct genus / but not named bacteria (1) • fungi / <i>Mucor</i> / mould / named genus / but not named fungus (1)	2

Question Number	Answer	Mark
11(b)	An answer that makes reference to six of the following points: • C use at least two different stated temperatures (1) • O use same species of bacteria / fungi / same species of plant material (1) • R repeat each temperature / eq (1) • M1 measure change in mass / area of plant material / collect volume of gas / carbon dioxide / methane (1) • M2 measure after stated time (1) • S1 use same mass / volume / age / of plant material (1) • S2 use same moisture / humidity / oxygen / pH / soil / water / eq (1)	6

Total 10 marks

