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# Mark Scheme (Results)

## January 2020

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

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| Question Number | Answer | Mark |
|---|---|---|
| **1(a)** | liver | **1** |

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

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

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **1(d)** | A description that makes reference to three of the following points:<br><br>• protease / pepsin / peptidase (1)<br><br>• digest / breaks down <u>protein</u> (1)<br><br>• hydrochloric acid (1)<br><br>• kill pathogens / eq / optimum pH ignore germs (1)<br><br>• 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<br>*A is incorrect because Q contains oxygenated blood*<br>*C is incorrect because R contains oxygenated blood*<br>*D is incorrect because Q and R contain oxygenated blood*<br>/ | **1** |

| Question Number | Answer | Mark |
|---|---|---|
| **2(a)(ii)** | An explanation that makes reference to two of the following points:<br>• prevent backflow / blood returning (1)<br>• to heart / ventricles (1)<br>• blood transported to lungs / body (1)<br>• 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:<br>• heart disease increases with age / older people more likely to have heart disease / more over 75 /eq (1)<br>• 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 ÷ 1000 = 32 500<br>• 32 500 × 5 = 162 500 (2) | Award full marks for correct numerical answer without working<br><br>one mark for x 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:<br>• blockage of (coronary) artery / less blood to heart (1)<br>• cholesterol / fatty deposits (1)<br>• less oxygen / out of breath / breathless /eq (1)<br>• less (aerobic) respiration / less energy /unable to exercise / eq (1)<br>• 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)** | • $5.0 \times 10^6$ or $5 \times 10^6$ | **1** |

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **3(c)** | An explanation that makes reference to three of the following points:<br>• (concentration) <u>gradient</u> (1)<br>• more oxygen in alveoli than in blood / more carbon dioxide in blood than in alveoli (1)<br>• diffusion (into / out of blood) (1)<br>• thin wall / one cell thick / moist (1)<br>• 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:<br>• as surface area increases respiration rate increase (1)<br>• bigger animals respire more (1)<br>• 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:<br><br>• humans have a small(er) surface area to volume ratio (1)<br><br>• less heat loss (1)<br><br>• (less respiration is required) to maintain body temperature / eq (1) | **Allow** converse for mice<br><br>mice have a larger surface to volume area<br><br>mice have more heat loss<br><br>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:<br><br>• measure / record distance moved by coloured liquid / record starting position and final position of liquid on scale / eq (1)<br><br>• ref to time (1)<br><br>• use syringe to reset liquid / eq (1)<br><br>• 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:<br>• mutation (1)<br>• survive/ not killed (1)<br>• reproduce / multiply / eq (1)<br>• 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<br>10 000 000 – 700 000 = 9 300 000<br>9.3 ÷ 0.7 x 100<br>9 300 000 ÷ 700 000 × 100<br>1329 % allow 1328.6 or 1328.57 (2) | award full marks for correct numerical answer without working<br>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:<br><br>• stopping antibiotics allows non-resistant bacteria to increase / grow / no more increase in resistance **or** antibiotics allow resistant bacteria to increase / grow (1)<br><br>• less selection pressure (for antibiotic resistance) / competition (for resources) (1)<br><br>• most infections (would now be) caused by non-resistant bacteria (1)<br><br>• antibiotics will be effective in most cases / against more bacteria (1)<br><br>• use new / different antibiotics (instead of not using any) (1)<br><br>• 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<br><br>*B is incorrect because the gas is not nitrogen*<br>*C is incorrect because the gas is not oxygen*<br>*D is incorrect because the gas is not water vapour* | **1** |

| Question Number | Answer | additional guidance | Mark |
|---|---|---|---|
| **5(b)(i)** | An answer that makes reference to the following points:<br><br>S scale linear and half the axes (1)<br><br>L lines straight and through each point (1)<br><br>A1 axes correct way (1)<br><br>A2 axes labelled <u>temperature in $^0$C</u> **and** <u>bubbles per min(ute)</u> (1)<br><br>P points plotted accurately (1) | <br><br>bar charts / extrapolations: no L mark<br><br><br><br><br>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:<br><br>• enzymes denatured (1)<br><br>• changes shape of active site (1)<br><br>• 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:<br>• measure / collect volume / $cm^3$ / eq (1)<br>• readings at smaller intervals (of temperature) / (1)<br>• 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:<br>• digest / break down (1)<br>• dead organisms / waste / faeces / organic matter / eq (1)<br>• 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:<br><br>• producers / plants contain cellulose (1)<br><br>• less energy in producers absorbed / transferred to (primary) consumers / eq (1)<br><br>• (more) producers / plants are undigested / not digested / not eaten / eq (1)<br><br>• decomposers can digest cellulose / eq (1)<br><br>• (primary) consumers lose more energy in respiration / respire more / more heat loss (1)<br><br>• (primary) consumers lose more energy in movement / eq (1) | **3** |

Total 7 marks

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **7(a)** | • $6CO_2 + 6H_2O \longrightarrow C_6H_{12}O_6 + 6O_2$ (2) | award one mark for correct but unbalanced equation<br><br>no credit for word equation | **2** |

| Question Number | Answer | Mark |
|---|---|---|
| **7(b)(i)** | An explanation that makes reference to four of the following points:<br><br>• place plant in dark (for 24 hours) (1)<br><br>• to remove starch / destarch (1)<br><br>• place plant in light (1)<br><br>• test leaf no $CO_2$ / from flask <u>and</u> normal / control leaf (1)<br><br>• sodium hydroxide removes $CO_2$<br><br>• using iodine solution / iodine test (1)<br><br>• 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:<br><br>• fewer plants needed (1)<br><br>• more students can do test / repeats / identify anomalies (1)<br><br>• 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:<br><br>• keep all leaves in normal atmosphere / no NaOH (1)<br><br>• use variegated leaf / eq / use a leaf with chlorophyll and one without (1)<br><br>• 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:<br>• A iris (1)<br>• B cornea (1)<br>• C pupil (1)<br>• D lens (1) | **4** |

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

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

| Question Number | Answer | Mark |
|---|---|---|
| **8(b) (iii)** | An answer that makes reference to two of the following points:<br><br>• repeat with more patients / different patients / eq (1)<br><br>• longer study / for a greater period / more years / monitor the progress of the patients / eq (1)<br><br>• 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:<br><br>• parents dd and Dd (1)<br><br>• gametes d and D or d (1)<br><br>• (child) genotype(s) dd (1)<br><br>• child without syndactyly identified as dd (1)<br><br>Also **allow** sex linkage cross as below:<br><br>(i) Use a genetic diagram to show the genotypes of the parents, the possible gametes and the genotype and phenotype of their child.<br><br>Use D to represent the dominant allele and d to represent the recessive allele. (4)<br><br>Man (Father) Women (Mother)<br>Genotype $X^dY$ $X^DX^d$<br>Gametes $X^d$ $Y$ $X^D$ $X^d$<br><br>Phenotype of their child<br>$X^d$ $Y$<br>$X^D$ $X^DX^d$ $X^DY$<br>$X^d$ $X^dX^d$ $X^dY$<br><br>$X^DX^d$ - Female girl child with syndactyly<br>$X^DY$ - Male child with syndactyly<br>$X^dX^d$ - Female child with no syndactyly<br>$X^dY$ - Male child with no syndactyly | **allow** ECF for max of 2<br><br>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<br>• probability of being female = 0.5<br>• = 0.25 (2)<br><br>allow 25% or 1/4 | award full marks for correct numerical answer without working<br><br>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:<br>• 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)<br>• dominant condition more common / frequent / high probability of passing on / eq (1)<br>• recessive condition has carriers (1)<br>• recessive version can appear when both parents unaffected / skips generations / eq (1) | **Allow** converse<br><br>**Allow** converse for dominant | **3** |

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

Total 11 marks

| Question Number | Answer | Additional guidance | Mark |
|---|---|---|---|
| **10 (a)(i)** | 60 ÷ (1.65 X 1.65)<br><br>60 ÷ 2.7225<br><br>= 22.0 (2) | award full marks for correct numerical answer without working<br><br>one mark for 1.65<br><br>**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<br><br>*B is incorrect because fat does not decrease BMI*<br>*C is incorrect because fat does affect BMI*<br>*D is incorrect because cannot have a negative BMI* | **1** |

| Question Number | Answer | Mark |
|---|---|---|
| **10(c) (i)** | An explanation that makes reference to the following points:<br><br>• (carbohydrate and lipid) are (high) energy molecules (1)<br><br>• energy intake is less than energy use (1)<br><br>• 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:<br>• muscle (contraction) (1)<br>• exercise requires / uses energy (1)<br>• 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<br><br>*B is incorrect because it is decomposition increases $CO_2$*<br>*C is incorrect because it is combustion increases $CO_2$*<br>*D is incorrect because respiration increases $CO_2$* | **1** |

| Question Number | Answer | Mark |
|---|---|---|
| **11(a)(iii)** | An answer that includes two from:<br><br>• bacteria / named correct genus / but not named bacteria (1)<br><br>• fungi / *Mucor* / 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:<br><br>• C use at least two different stated temperatures (1)<br><br>• O use same species of bacteria / fungi / same species of plant material (1)<br><br>• R repeat each temperature / eq (1)<br><br>• M1 measure change in mass / area of plant material / collect volume of gas / carbon dioxide /methane (1)<br><br>• M2 measure after stated time (1)<br><br>• S1 use same mass / volume / age / of plant material (1)<br><br>• S2 use same moisture / humidity / oxygen / pH / soil / water / eq (1) | **6** |

Total 10 marks

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