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Mark Scheme (Results)
November 2020

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

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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.

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Question Number	Answer	Mark
1(a)(i)	**B** cell wall *A is incorrect because it is not the cell membrane* *C is incorrect because it is not mitochondria* *D is incorrect because it is not the nucleus*	**1 comp**

Question Number	Answer	Mark
1(a)(ii)	**D** starch *A is incorrect because it is not chlorophyll* *B is incorrect because it is not glucose* *C is incorrect because it is not glycogen*	**1 comp**

Question Number	Answer	Additional guidance	Mark
1 (b) (i)	An answer that makes reference to the following points: • A: (chloroplasts absorb light) for photosynthesis / absorb light energy to make carbohydrate / eq (1) • B: (nucleus) controls protein synthesis / contains DNA / contains genes / controls cell / eq (1) • C: (vacuole) contains cell sap eq (1) • D: (cytoplasm) were chemical reactions occur (1)	**Allow** starch / glucose /sugar **Allow** maintains turgor / stores water / salts / pigments / toxins **Allow** where protein synthesis occurs / respiration occurs / medium for reactions	**4 grad**

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Question Number	Answer	Mark
1 (b) (ii)	An answer that makes reference to the following points: • contains chloroplasts to absorb light / for photosynthesis eq (1) • long / arranged in a vertical plane / large surface area / rectangular shape, to absorb most light / eq (1) • large vacuole to store water (1)	**2 grad**

Total 8 marks

Question Number	Answer	Mark
2(a)	**C** plasmid *A is incorrect because it is not the cell wall* *B is incorrect because it is not the nucleoid* *D is incorrect because it is not RNA*	**1 comp**

Question Number	Answer	Additional guidance	Mark
2(b)	An answer that makes reference to three of the following points: • insulin / glucagon (1) • steam / hot water (1) • competition / contamination / eq (1) • mix / stir / agitate / distribute / eq (1) • oxygen / O_2 (1) • temperature (1)	**Allow** disinfectant / bleach / sterilising fluid / alcohol / ethanol **Allow** infection	**6 grad**

Total 7 marks

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Question Number	Answer	Mark
3(a)(i)	**D** trachea *A is incorrect because it is not the bronchiole* *B is incorrect because it is not the bronchus* *C is incorrect because it is not the oesophagus*	**1 comp**

Question Number	Answer	Mark
3(a)(ii)	**B** pulmonary artery *A is incorrect because it is not the aorta* *C is incorrect because it is not the pulmonary vein* *D is incorrect because it is not the vena cava*	**1 comp**

Question Number	Answer	Mark
3(a)(iii)	**A** contract contract *B is incorrect because the external intercostals do not relax* *C is incorrect because the diaphragm does not relax* *D is incorrect because the diaphragm and the intercostals do not relax*	**1 comp**

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Question Number	Answer		Mark
3(b)	An answer that makes reference to four of the following points: • more blood to muscles / less blood to intestine (during exercise) / eq (1) • supply oxygen / oxygenated blood / glucose (1) • respiration (1) • energy / ATP (1) • muscle contraction (1) • less absorption of food / eq, in intestine when running / (1)	**Allow** converse for at rest **Allow** blood is diverted to the muscles from the intestine **Allow** prevent anaerobic respiration / enable aerobic respiration for two marks **Allow** high blood flow at rest to intestine to absorb food / maintain concentration gradient	**4 exp**

Question Number	Answer	Mark
3(c)	An explanation that makes reference to two of the following points: • (supply (more)) oxygen / there was a shortage of oxygen (1) • breakdown / remove lactic acid (1) • repay oxygen debt (1) • anaerobic respiration had occurred (1)	**2 exp**

Total 9 mark

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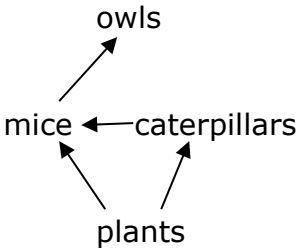
Question Number	Answer	Additional guidance	Mark
4(a)	An answer that makes reference to the following points: • arrows in correct direction (1) • food web includes four organisms (in correct places) (1)  	**Allow** MP1 if only one food chain plants →caterpillars →mice→owls = one mark No marks if more than one web drawn and one is incorrect	**2 grad**

Question Number	Answer	Mark
4(b)	• primary consumer / 1° consumer	**1 cler**

Question Number	Answer	Additional guidance	Mark
4(c)(i)	• $3 \times 10^3 = 3000$ per km^2 (1) • × 5 = 15 000 (1)	**Allow** x 5 for **one** mark **Allow** 3000 for one mark **Allow** $1.5x\ 10^4$ / 15×10^3 Award full marks for correct numerical answer without working	**2 grad**

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Question Number	Answer	Additional guidance	Mark
4(c)(ii)	An answer that makes reference to three of the following points: • more food / plants / caterpillars / other sources of food available (1) • warmer weather (1) • fewer other predators / owls ate other species (1) • less disease / infection (1) • higher birth rate than death rate (1)	**Ignore** fewer owls	**3 exp**

Question Number	Answer	Mark
4(c)(iii)	An answer that makes reference to two of the following points: • feed on other prey (1) • insufficient food / energy to maintain more owls (1) • have no predators (1) • birth rate = death rate / birth rate and death rate are similar (1) • owls produce few offspring (so population will not rapidly increase) (1)	**2 exp**

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Question Number	Answer	Mark
4(c)(iv)	An answer that makes reference to three of the following points: • use a trap / use filming / use a sample area / use a quadrat (1) • random sampling (1) • repeat (1) • count number of mice / faeces (in quadrat) (1) • calculate average (1) • multiply up to total area (1)	**3 exp**

Total 12 marks

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Question Number	Answer	Mark
5(a)(i)	An explanation that makes reference to three of the following points: • oxygen (1) • glucose (1) • respiration (1) • energy / ATP (1)	**3 exp**

Question Number	Answer	Additional guidance	Mark
5(a)(ii)	An explanation that makes reference to two of the following points: • antibodies (from mother) (1) • (bind to) antigens (1) • to kill bacteria / pathogen / virus eq (1)	**Allow** destroy / bind to pathogens / clump pathogens / mark / label pathogen	**2 grad**

Question Number	Answer	Additional guidance	Mark
5(b)	An answer that makes reference to two of the following points: • fetus is female / a girl (1) • cells contain 46 chromosomes / 23 pairs / has a diploid number / has two sets of chromosomes / normal number of chromosomes / eq (1) • chromosomes have different lengths / sizes / shapes (1)	**Allow** does not have Down's syndrome /	**2 exp**

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Question Number	Answer	Mark
5(c)(i)	An answer that makes reference to four of the following points: • calcium for bone / teeth growth / bone / teeth development / prevent rickets (1) • protein to grow / for enzymes / antibodies / eq (1) • iron for haemoglobin / red blood cells / prevent anaemia (1) • vitamin D for bone growth / bone development / calcium absorption / strong bones (1) • more energy as baby is heavy / mother becomes heavy / more energy for fetal development / to carry baby / eq (1)	**4 exp**

Question Number	Answer	Additional guidance	Mark
5(c)(ii)	• 9 = 50% more (1) • 100% = 9 × 2 = 18 (1) • 18 + 9 = 27 (1)	**Allow** one mark for 0.5 / 50% / ½ / times 2 **Allow** 18 for two marks Award full marks for correct numerical answer without working	**3 exp**

Total 14

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Question Number	Answer	Additional guidance	Mark
6(a)	An explanation that makes reference to two of the following points: • as distance from city centre increases, percentage coverage by lichen increases (1) • more cars in city centre / more car pollution in city centre (1) • more sulfur dioxide in city centre (1)	**Allow** correlation idea eg as lichen increases so does distance **Allow** converse **Allow** converse **Allow** converse	**2 grad**

Question Number	Answer	Additional guidance	Mark
6(b)	An answer that makes reference to three of the following points: • measure area of lichen (1) • measure the (total) area of stone (1) • divide (lichen) cover by total area and x 100 (1) • repeat (to find mean) (1)	**Allow** use a grid / quadrat to measure percentage cover / count **squares** with lichen	**3 exp**

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Question Number	Answer		Mark
6(c)	An answer that makes reference to six of the following points: • C seeds exposed to SO_2 and not exposed to SO_2 / different concentrations of SO_2 (1) • O same species / age / variety/ type of seed (1) • R lots of seeds / repeat experiments (1) • M1 measure temperature change (1) • M2 using thermometer (1) • S1 thermos flask to contain seeds / insulate / prevent heat loss / eq (1) • S2 same moisture / humidity oxygen / water carbon dioxide / same starting temperature / light intensity / wash seeds with disinfectant / time / eq (1)	**Allow** seeds with metabisulphite and seeds without	**6 exp**

Total 11 marks

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Question Number	Answer	Mark
7(a)	An explanation that makes reference to the following points: • produces maltose / glucose (1) • turns red / green /yellow/orange /eq (with Benedict's test) (1)	**2 exp**

Question Number	Answer	Additional guidance	Mark
7(b)	An explanation that makes reference to four of the following points: • same/stated volume / concentration of amylase (1) • same/stated mass of bread (1) • same/stated time (before pouring water) (1) • same/stated volume of water (1) • same/stated volume / concentration of Benedict's (1) • same time of heating / same temp for Benedict's test (1) • stated range of temperatures (1) • repeat each temperature / calculate mean time (1)	**Ignore** amount for all **Allow** same size /volume / piece of bread /same type of bread **Allow** same number of drops at least two stated temperatures	**4 exp**

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Question Number	Answer	Mark
7(c)	An answer that makes reference to four of the following points: (increased temperature increases rate) • (due to increased) kinetic energy (1) • (more) movement of molecules / collisions (1) • until optimum temperature (1) • rate decreases at high temperature / digestion stops at high temperature (1) • (because) enzyme denatured / change to active site / no longer binds (1)	**4 exp**

Total 10 marks

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Question Number	Answer	Additional guidance	Mark
8(a)	An answer that makes reference to the following points: • S scales linear and at least half axis (1) • A1 Axes 'correct way round' (1) • L lines straight and joining each point (1) • A2 labelled 'year' and 'percentage of students' (1) • P points accurately plotted (1) • K key or lines labelled for cigarettes and vaping (1)	bar chart lose L only **Do not allow** L if extrapolated Points plotted within one small square	**6 exp**

Question Number	Answer	Mark
8(b)	A description that makes reference to two from the following points: • e-cigarette use increased (from 2011) **up to 2015** then decreased / decreased in 2016 (1) • smoking normal cigarettes decreases (from 2011 to 2016) (1) • at start e-cigarettes lower than smoking / significantly low / at end e-cigarette use higher than smoking / significantly high (1)	**2 grad**

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Question Number	Answer	Additional guidance	Mark
8(c)	• 15.8 - 8 = 7.8 • 7.8 ÷ 100 × 60 000 = 4680 OR • 15.8 / 100 x 60 000 = 9480 • 8.0 /100 x 60 000 = 4800 • 9480 – 4800 = 4680	**Allow** 1 mark for 7.8 or 0.078 Award full marks for correct numerical answer without working	**2 grad**

Question Number	Answer	Additional guidance	Mark
8(d)(i)	An explanation that makes reference to four of the following points • less tar (1) • fewer carcinogens / less risk of cancer (1) • less risk of emphysema / lung disease / damage to alveoli / chronic bronchitis / damage to cilia / eq (1) • less carbon monoxide (1) • less risk of heart disease / strokes (1) • less risk of addiction / can control nicotine levels (1)	**Allow** converse for normal cigarettes for all MPs	**4 exp**

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Question Number	Answer	Mark
8(d)(ii)	An answer that makes reference to two of the following points: • non-smokers may start using e-cigarettes (1) • e-cigarettes may lead to taking up smoking (1) • e-cigarettes are addictive as they contain nicotine (1) • nicotine can increase risk of blood clots / increase blood pressure (1) • e-cigarettes may also be harmful / damage lungs / risks not yet known (1)	**2 exp**

Total 16 marks

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Question Number	Answer	Mark
9(a)(i)	• cleft chin or not / appearance of chin / eq (1)	**1 grad**

Question Number	Answer	Additional guidance	Mark
9(a)(ii)	An answer that makes reference to one of the following points: • (the section of) DNA that determines whether the individual is cleft chin or not (1) • section of DNA that codes for a protein (1)	**Allow** (section of) DNA that codes for cleft chin characteristic	**1 exp**

Question Number	Answer	Mark
9(a)(iii)	• (different) version(s) of the (cleft chin) gene / alternative forms of the gene (1)	**1 exp**

Question Number	Answer	Additional guidance	Mark
9(b)(i)	An answer that makes reference to the following points: • both parents Nn (1) • gametes produced N or n from each parent (1) • offspring genotypes shown NN Nn Nn nn (1) • offspring phenotypes shown 3 cleft 1 without cleft chin (1)	**Allow** full marks from a Punnett square **Allow** MP2 and MP3 for wrong parental genotypes	**4 exp**

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Question Number	Answer	Additional guidance	Mark
9(b)(ii)	0.25 x 0.5 = 0.125 / $^{1}/_{8}$ / 12.5 %	**Allow** 1 mark for 0.25 / 25 % / $^{1}/_{4}$ **Allow** full marks for correct numerical answer without working	**2 grad**

Question Number	Answer	Mark
9(b)(iii)	An answer that makes reference to one of the following points: • environment / diet means different shaped chin(1) • mutation (1)	**1 exp**

Question Number	Answer	Mark
9(c)	A description that makes reference to three of the following points: • use crosses between different rats / test cross pedigree analysis to predict outcomes / look at pedigree diagrams / family trees / family history (1) • if single gene offspring show simple pattern / shows 3:1 ratios / look like one parent / eq(1) • single gene shows discontinuous variation / two or three phenotypes (1) • polygenic leads to continuous variation / intermediate expression many different phenotypes / much more variation / three of more phenotypes (1)	**3 exp**

Total 13 marks

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Question Number	Answer	Mark
10(a)	An explanation that makes reference to four of the following points: • nitrates (for growth) (1) • for amino acids (1) • for protein (1) • magnesium for chlorophyll / chloroplasts (1) • so more photosynthesis (1) • more glucose (1) • phosphates used for ATP / DNA / eq (1) • potassium for control of water movement / eq (1)	**4 exp**

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Question Number	Answer	Mark
10(b)	An answer that makes reference to four of the following points: • fertiliser leaches into river / washed into river / eq (1) • fertiliser would cause algal / plant growth / algal bloom / eutrophication (1) • dead algae are decomposed / broken down by bacteria / decomposers (1) • (bacterial) respiration would reduce oxygen (1) • means were calculated / readings repeated so experiment is reliable / valid (1) • measurements taken at same time of year / in April (so are valid) (1) • direction of river is past farm (1) • reduced oxygen could be due to other factors / sources of fertiliser from other fields (1)	**4 exp**

Question Number	Answer	Mark
10(c)	• manure / faeces / dung / compost / seaweed / bone / blood / animal wastes / eq (1)	**1 grad**

Total 10 marks

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