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Mark Scheme (Results)

Summer 2023

Pearson Edexcel International GCSE In Biology (4BI1) Paper 2BR

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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	Mar
1(a)	• in a test tube / culture dish / jar / glass / petri dish / container / in culture solution / in a lab / outside a living organism / eq (1)	**1**

Question Number	Answer	additional guidance	Mark
1(b)	An explanation that makes reference to the following points: • plant cells can differentiate / eq (1) • into all / different types / kinds of tissues or cells / specialised cells eq (1) • throughout the plants life / eq (1) • can form / regenerate (whole) new plant / eq(1)	allow converse for human cells only stem cells can only embryonic	**2**

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Question Number	Answer	additional guidance	Mark
1(c)	An explanation that makes reference to the following points: • mineral 1 (1) • function (1) • mineral 2 (1) • function (1)	allow for eg named minerals to get function mineral must match no mineral no function **not just for growth** nitrate amino acids / proteins / DNA/ nucleic acids /eq Magnesium chlorophyl / chloroplasts / photosynthesis Phosphate ATP / DNA / RNA / nucleic acids / cell membranes/ eq Calcium cell wall / cell membranes / eq Potassium stomatal opening / eq allow other correct mineral ions ignore nitrogen / nitrites / phosphorous /	**4**

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Question Number	Answer	additional guidance	Mark
1(d)	An explanation that makes reference to two of the following points: • <u>enzyme</u> affected by pH / by acid / by alkali / works best at optimum (1) • shape of active site changed / substrate can no longer bind / fit / eq (1) • <u>enzyme /</u> <u>active site</u> denatured (1)	to score mp 1 must mention enzymes somewhere in answer	**2**

Question Number	Answer	additional guidance	Mark
1(e)	A description that makes includes three of the following points: • (shoot) in light from one side / unidirectional light / eq (1) • (shoot) in darkness / light all around / light from other side / eq (1) • leave for both for stated time / use shoots of same type / same temperature / same water / other control variable / eq (1) • description of bending or growing towards light or measure angle / look at curve / bending / eq (1)	allow leave for a few days	**3**

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Question Number	Answer	additional guidance	Mark
1(f)	An answer that makes reference to two of the following points: • maintain biodiversity / reduce damage to food chains / ecosystems / eq (1) • prevent extinction (1) • keep (species / varieties / genotypes) for future generations / future use / eq (1) • in case climate changes / eq (1) • for medicinal properties / eq	ignore increase biodiversity	**2**

Question Number	Answer	Mark
1(g)	An explanation that makes reference to three of the following points: • (agitation) to mix contents / mix media / mix oxygen / mix carbon dioxide (with plant cells) / substrates with plant cells / take up minerals / take up nutrients / eq (1) • (light) for photosynthesis / eq (1) • (suitable temperature) for enzyme action / eq (1)	**3**

Total = 17 marks

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Question Number	Answer	Mark
2(a)(i)	**The only correct answer is D (I is the vacuole)** A is not correct as F is the cell wall B is not correct as G is the nucleus C is not correct as H is the cytoplasm	**1**

Question Number	Answer	Mark
2(a)(ii)	**The only correct answer is B (G is the nucleus)** A is not correct as F is the cell wall C is not correct as H is the cytoplasm D is not correct as J is a mitochondrion	**1**

Question Number	Answer	additional guidance	Mark
2(b)	correct measurement of P to Q conversion to μm division of PQ ÷ actual length correct answer = 475 (3) allow 450-500 for 3 marks allow in standard form (4.75×10^2)	allow 36-40 **mm** or 3.6 to 4.0 **cm** for correct measurement with units 1 mark and 1 mark for ÷ 80	**3**

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Question Number	Answer	additional guidance	Mark
2(c)	An explanation that makes reference to four of the following points: • long (root hair) / reaches into soil / penetrates / branches / eq (1) • increases surface area (1) • to absorb water / eq (1) • by osmosis (1) • to absorb minerals / ions / eq • by diffusion (1) • active transport (1)	protuberance	**4**

Total = 8 marks

Question Number	Answer		Mark
3(a)	mass of starch ÷ mass of carbohydrate × 100 98% (2)	allow 1 mark for ÷ 68 allow 97.8 / 97.79 / 97.794 etc for 2 marks	**2**

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Question Number	Answer	additional guidance	ark
3(b)	An answer that that makes reference to four of the following points: biscuit B , difference and explanation 1. less energy/ kJ so less stored as fat / less weight gain / stored fat used for energy / eq (1) 2. less lipid / so less (energy) stored as fat / less weight gain / less blood cholesterol / less risk of CHD / eq (1) 3. less sugar / so less (energy) stored as fat / less weight gain / less risk of diabetes / eq (1) 4. more starch so energy released (more) slowly / eq (1) 5. less salt so less effect on blood pressure / less risk of CHD/ eq (1) 6. more protein for repair / growth / eq(1)	allow converse for biscuit A **if no reason and explanation** allow one max for biscuit B and correct difference(s) not just to lose weight	**4**

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Question Number	Answer	additional guidance	Mark
3(c)(i)	A description that makes reference to four of the following points: 1. measure out cm^3 / same volume / measure mass of water / eq (1) 2. use sample of biscuits of same mass / known mass / eq (1) 3. hold under boiling tube of water /eq (1) 4. relight if goes out / continue until completely burnt / eq (1) 5. (use thermometer to) measure increase in water temperature / measure initial and final temperature of water/ eq (1) 6. highest temperature rise / ref to equation has most energy / eq (1)	allow mp 1 2 5 6 from equation energy = (mass of water x temp rise x 4.2) ÷ mass of biscuit	**4**

Question Number	Answer	Mark
3(c)(ii)	An answer that includes two of the following • some energy lost / some heat escapes / (to surroundings) / not all energy reaches tube / some released as light /eq (1) • not completely burnt / not all energy released / not burnt in oxygen / eq (1) • temperature of water uneven / eq (1)	**2**

Total = 12 marks

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Question Number	Answer	Mark
4(a)(i)	**The only correct answer is A (P is nitrogen fixation)** B is not correct as Q is not nitrogen fixation C is not correct as T is not nitrogen fixation D is not correct as V is not nitrogen fixation	**1**

Question Number	Answer	Mark
4(a)(ii)	**The only correct answer is C (T is nitrification)** A is not correct as Q is not nitrification B is not correct as U is not nitrification D is not correct as W is not nitrification	**1**

Question Number	Answer	Mark
4(a)(iii)	**The only correct answer is D (W is denitrification)** A is not correct as P is not denitrification B is not correct as T is not denitrification C is not correct as V is not denitrification	**1**

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Question Number	Answer	k
4(b)(i)	A description that that makes reference to five of the following points: 1. increase in nitrates / phosphates/ eq (1) 2. <u>eutrophication</u> (1) 3. algal bloom / more algae / plants grow on surface / eq (1) 4. blocks sunlight / prevents photosynthesis /eq (1) 5. plants die / algae die / eq (1) 6. bacteria decompose / bacteria respire / microorganisms decompose / microorganisms respire /eq (1) 7. oxygen depleted / oxygen used (in respiration) / oxygen required (for respiration) / eq (1) 8. fish / aquatic organisms / die /eq (1)	**5**

Question Number	Answer	Mark
4(b)(ii)	• animal manure / dung / faeces / animal waste / eq (1)	**1**

Total = 9 marks

Question Number	Answer	additional guidance	Mark
5(a)(i)	C C G A T C A A C	all correct 2 marks one letter incorrect 1 mark	**2**

Question Number	Answer	Mark
5(a)(ii)	3 (1)	**1**

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Question Number	Answer	additional guidance	Mar
5(a)(iii)	C C G A U C A A C	all correct 2 marks one letter incorrect 1 mark	**2**

Question Number	Answer	Additional Guidance	Mark
5(b)	30 % of 50 000 so 15 000 are A and 30 % are T 15 000 leaving 20 000 bases 40% (30 % are) T 15 000 (1) (20% will be) C 10 000 (1) (20% will be) G 10 000 (1)	 allow 2 marks if put % in correctly instead of numbers so 30% T 20% C 20% G scores 2 marks	**3**

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Question Number	Answer	additional guidance	Mark
5(c)	A description that includes: **Transcription** Location • transcription in nucleus / eq(1) Produces • transcription produces mRNA/ eq (1) Starts with • transcription starts with DNA /eq (1) Uses • no tRNA in transcription /eq (1)	or converse for **Translation** takes place in cytoplasm / ribosome mRNA exits nucleus / enters cytoplasm/eq produces amino acid chain / polypeptide / protein/eq starts with mRNA /eq (so transcription) from DNA to mRNA = start and produces = 2 marks uses tRNA/eq	**4**

Total 12 marks

Question Number	Answer	additional guidance	Mark
6(a)	number at 2009 = 462 000 number at 2019 = 506 000 change = 506-462 = 44 % change = (44 ÷ 462) × 100 = **9.52 % / 9.5%/ 9.524% / 9.5238 %** / etc (2)	**allow 1 for 44** allow full marks for 9.52 / 9.524 / 9.5238 with no working	**2**

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Question Number	Answer	additional guidance	M
6(b)	An answer that makes reference to four of the following points: 1. number of admissions due to smoking increased (2009 to 2019) /eq (1) 2. number of admissions due to smoking level / little change from 2009 to 2012 / eq (1) 3. number of admissions due to smoking decreased from 2012 to 2013 / least in 2013. (1) 4. but % / proportion of all admissions due to smoking declined / lowest in 2019 / eq (1) 5. as other admissions increased / other illnesses / diseases becoming more frequent / eq (1) 6. smaller percentage of people (started) smoking / greater percentage people stopped / eq (1) 7. population size increases / eq (1) 8. reliable / valid data / covers large numbers / all admissions / long period of time / eq (1)	From Graph 1 must have date ref From Graph 2 fewer people smoking / smoking habits change people using alternatives e cigarettes	**4**

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Question Number	Answer	M
6(c)	A description that makes reference to five of the following points: 1. destroys cilia in trachea / cilia no longer function / eq (1) 2. mucus builds up / cannot be removed /eq (1) 3. leads to (bacterial) infection (of alveoli) /pneumonia / eq (1) 4. loss of surface area / loss of / damage to alveoli /emphysema / eq (1) 5. airways inflamed or narrowed / bronchitis / eq (1) 6. can lead to COPD (1) 7. (lung) cancer (1)	**5**

Total = 11 marks

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