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Mark Scheme (Results)

Summer 2024

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

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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	Additional guidance	Mark
1(a)	The only correct answer is B (1 and 3) *A is incorrect as yeast has no nervous system* *C is incorrect as yeast has no nervous system* *D is incorrect as yeast has no nervous system*		**1**

Question Number	Answer	Additional guidance	Mark
1(b)	An explanation that makes reference to three of the following: • <u>competition</u> (between megalodon and whales) (1) • whales ate more food / eq (1) • whales better adapted / swam faster / better at feeding / better at hunting / eq (1) • whales survived / eq (1) • whales reproduced more / had more offspring / eq (1)	**Accept** less food left for megalodon / no food / megalodon starve **Accept** megalodon less well adapted **Accept** megalodon did not survive **Accept** megalodon died (out) **Ignore** extinct **Accept** megalodon did not reproduce	**3**

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Question Number	Answer	Additional guidance	Mark
1(c)(i)	A description that makes reference to two of the following: • acid rain (1) • deforestation / death of trees / death of plants / eq (1) • death of fish / death of animals in lakes / loss of species in lakes or rivers / eq (1)	**Accept** sulphuric acid **Accept** damages plants / trees / eq **Accept** loss of food chains / loss of biodiversity **Accept** harms fish / eq	**2**

Question Number	Answer	Additional guidance	Mark
1(c)(ii)	An explanation that makes reference to three of the following: • (less) photosynthesis (1) • so less glucose / sugar / starch / eq (1) • fewer producers / fewer plants / less mass of producers / producers die / plants do not grow as much / eq (1) • less food for consumers / less energy for consumers / eq (1)	**Ignore** cannot produce food for mp2 **Accept** fewer consumers **Accept** fewer herbivores / carnivores **Accept** less food for animals	**3**

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Question Number	Answer	Additional guidance	Mark
1(d)(i)	An answer that makes reference to two of the following: • prevents <u>osmosis</u> / less <u>osmosis</u> (1) • so water will not enter cells / eq (1) • so cells do not burst / eq (1)	 **Accept** osmosis would occur if in water **Accept** water will enter if in (pure) water **Accept** cells burst if in water	**2**

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Question Number	Answer	Additional guidance	Mark
1(d)(ii)	A description that makes reference to four of the following: • place diploid nucleus into enucleated egg cell / place body cell nucleus into enucleated egg cell / eq (1) • electric shock / eq (1) • mitosis / cell division / eq (1) • place <u>embryo</u> into uterus / womb (1) • of surrogate (mother) (1)	**Accept** <u>fuse</u> body cell with enucleated egg **Accept** empty egg cell for enucleated egg cell **Accept** shock **Reject** meiosis	**4**

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Question Number	Answer	Additional guidance	Mark
1(e)	A description that makes reference to three of the following: *max two of* • mammoth population increases / over-population occurs / eq (1) • mammoth eats too much food / mammoth eats lots of food / less food for other species / mammoth competes with other species / eq (1) *and max two of* • less global warming / less greenhouse effect / climate change / less ice cap melting / eq (1) • decomposition of faeces / decay of faeces / eq (1) • more amino acid / protein / DNA / chlorophyll, synthesis in plants / producers / eq (1) • (soil nutrients means) more plants / increased plant growth / more producers / eq (1)	**Accept** high mammoth reproduction rate / population not controlled **Accept** overeats prey / animals / prey could go extinct **Accept** less greenhouse gas **Accept** decay of dead mammoths **Accept** better plant growth	**3**

(Total for Question 1 = 18 marks)

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Question Number	Answer	Additional guidance	Mark
2(a)(i)	A description that makes reference to four of: 1. cut shoot underwater / cut shoot diagonally / eq (1) 2. dry leaves / check seals / make sure sealed / use petroleum jelly / bung is in / eq (1) 3. measure distance bubble moves / distance water moves / how many mm bubble moves / eq (1) 4. in set time / stated time / eq (1) 5. place lamp different distances from shoot / move lamp / eq (1) 6. stated control variable e.g. temperature / humidity / wind speed / eq (1) 7. repeats / use reservoir to reset / eq (1)	**Accept** Vaseline **Accept** time taken to move set distance = mp3 and mp4 **Ignore** use different intensities **Ignore** repeat at different intensities	**4**

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Question Number	Answer	Additional guidance	Mark
2(a)(ii)	• water loss / distance moved by bubble / volume of water taken up / time taken to move bubble / rate of bubble movement / eq	**Accept** water uptake / transpiration speed	**1**

Question Number	Answer	Additional guidance	Mark
2(b)(i)	An explanation that makes reference to two of the following: • more water loss as light intensity increases / eq (1) • because (more) stomata open / stomata open wider / eq (1) • until all stomata are open (completely) / (1)	**Accept** more transpiration / evaporation, as light intensity increases **Accept** converse **Accept** fewer stomata open in dark **Accept** until stomata are fully open	**2**

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Question Number	Answer	Additional guidance	Mark
2(b)(ii)	An explanation that makes reference to three of the following: • desert plant loses less water (in total) / eq (1) • (desert plant) water is lost in low light / water is not lost in high light / eq (1) • stomata close in light / day / stomata open in dark / night / eq (1) • (desert plants) have fewer stomata / eq (1) • reduces wilting / stops plant going flaccid / eq (1)	**Accept** less transpiration / evaporation / diffusion as eq to less water loss for all mps **Accept** retains water / conserves water / eq **Accept** water loss increases as light intensity decreases / water loss decreases as light intensity increases **Accept** <u>less</u> water loss in high(er) light **= mp1 and mp2** **Accept** stomata close in high light intensities / open in low light intensities	**3**

(Total for Question 2 = 10 marks)

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Question Number	Answer	Additional guidance	Mark
3(a)	An explanation that makes reference to two of the following: • exercise increase body temperature / eq (1) • (more) sweat / eq (1) • cool down / lose heat / eq (1) • by evaporation (1)	**Accept** exercise heats up body / eq	**2**

Question Number	Answer	Additional guidance	Mark
3(b)(i)	An explanation that makes reference to three of the following: • blood concentration increases / less water in blood / eq (1) • (detected by) hypothalamus / pituitary gland (1) • releases ADH (1) • collecting duct becomes permeable / eq (1) • increased water reabsorption (so less urine produced) (1)	**Accept** water concentration **Accept** osmoreceptors **Accept** water absorbed into blood	**3**

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Question Number	Answer	Additional guidance	Mark
3(b)(ii)	An explanation that makes reference to two of the following: • with (pure water) blood becomes more dilute / less concentrated / has high water concentration / eq (1) • less / no ADH released when drinking water / eq (1) • less water reabsorbed (by kidney) when water drunk / eq (1) • salt / sugar absorbed into blood (in intestine) (from isotonic drink) / eq (1)	**Accept** with isotonic drink, blood is less dilute / more concentrated (than drinking water) / correct concentration / lower water concentration (than with water) **Accept** more / some ADH released when drinking isotonic / eq **Accept** more water reabsorbed when drinking isotonic drink / eq **Accept** water absorbed into blood when drinking isotonic drink **Ignore** absorption of sugar in kidney	**2**

(Total for Question 3 = 7 marks)

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Question Number	Answer	Mark
4(a)(i)	The only correct answer is A W (pituitary gland) *B is incorrect as X the pancreas does not release LH* *C is incorrect as Y the adrenal does not release LH* *D is incorrect as Z the ovary does not release LH*	**1**

Question Number	Answer	Additional guidance	Mark
4(a)(ii)	A description that makes reference to the following: • ovulation / release egg / eq (1) • (stimulates) progesterone release (1)	 **Accept** release oocyte / eq **Accept** oestrogen release	**2**

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Question Number	Answer	Additional guidance	Mark
4(b)	An explanation that makes reference to the following: • (amniotic fluid) prevents physical damage / bumps / equalize pressure / eq (1) *and two from:* • (placenta) allows diffusion / active transport / eq (1) • gives the fetus amino acids / glucose / oxygen / antibodies / vitamins / minerals / eq (1) • removes from the fetus urea / carbon dioxide / eq (1) • makes sure mother's and baby's blood do not mix / eq (1)	**Accept** shock absorber / cushioning **Accept** named vitamins / minerals	**3**

Question Number	Answer	Additional guidance	Mark
4(c)(i)	• 27% (3)	**Correct answer gains all three marks** 27.27…. = **two marks** **One mark** for:- (2800 – 2200) **OR** 600 **OR** division by 2200	**3**

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Question Number	Answer	Additional guidance	Mark
4(c)(ii)	An answer that makes reference to four of the following points: 1. smoking results in slower growth / less mass / grow less / eq (1) 2. taking minerals results in faster growth / higher mass / grow more / eq (1) 3. biggest increase in mass / fastest growth is non-smokers with minerals (1) 4. smoking has a bigger impact than not taking mineral supplements / eq (1) 5. carbon monoxide (in smoke) (1) 6. (carbon monoxide) binds to haemoglobin / produces carboxyhaemoglobin / eq (1) 7. less respiration / energy release / eq (1) 8. less iron so less haemoglobin made / fewer red blood cells made / eq (1) 9. less calcium so less bone growth / eq (1)	**Accept** converse **Accept** converse **Accept** smallest increase / slowest growth is smokers without minerals **Accept** smoking reduces mass more than minerals increase mass **Accept** reduces oxygen (transport) **Accept** other correct minerals linked to function	**4**

(Total for Question 4 = 13 marks)

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Question Number	Answer	Mark
5(a)(i)	The only correct answer is A ATG GCA TTA ATA *B is incorrect because DNA does not have U* *C is incorrect because the pairing is wrong* *D is incorrect because DNA does not have U*	**1**

Question Number	Answer	Mark
5(a)(ii)	The only correct answer is A DNA, transcription, RNA, translation, protein *B is incorrect because translation is in the wrong place* *C is incorrect because RNA is in the wrong place* *D is incorrect because RNA is in the wrong place*	**1**

Question Number	Answer	Additional guidance	Mark
5(b)(i)	• 3		**1**

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Question Number	Answer	Additional guidance	Mark
5(b)(ii)	An explanation that makes reference to three of the following points: 1. some sequences / codons / different codes / different bases / may code for same amino acid /eq (1) 2. (same amino acid so) no change in protein / no change in enzyme / protein has same function / eq (1) 3. may not affect bonding / (3D) shape / active site of enzyme / still binds to substrate / eq (1) 4. mutation / allele / gene, may be recessive / not expressed / eq (1) 5. non-coding DNA / eq (1)	**Accept** (amino acid W has two codes / (amino acid) Y has two codes / eq **Accept** same polypeptide	**3**

Question Number	Answer	Additional guidance	Mark
5(b)(iii)	• (ionising) radiation / UV light / tar / tobacco / mutagen / carcinogen / gamma rays / X-rays / radioactivity / eq (1)	**Do not accept** infra-red radiation **Accept** smoking **Accept** other correct mutagens	**1**

(Total for Question 5 = 7 marks)

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Question Number	Answer	Additional guidance	Mark
6(a)(i)	• 1 : 2.4 : 1	**Accept** 1: 2.375: 1 **Accept** 1: 2.38 : 1 **Accept** 1: 2 : 1	**1**

Question Number	Answer	Additional guidance	Mark
6(a)(ii)	A description that makes reference to the following points: • ethanol / alcohol <u>and</u> add water (1) • goes white / cloudy / white emulsion forms / milky / eq (1) **OR** • add Sudan III (1) • red colour (in top layer) (1)	**Accept** • rub on paper / eq (1) • paper goes transparent / clear / eq (1)	**2**

Question Number	Answer	Additional guidance	Mark
6(a)(iii)	• growth / repair / enzymes / build muscle / antibodies / eq (1)		**1**

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Question Number	Answer	Additional guidance	Mark
6(b)(i)	• 357 (2)	**Correct answer gains both marks** 357 = two marks **Accept** one mark for: 2500 **or** division by 7 **or** (3750-1250) **or** 357.14…	**2**

Question Number	Answer	Additional guidance	Mark
6(b)(ii)	• 3002 / 3000 (g) (1)		**1**

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Question Number	Answer	Additional guidance	Mark
6(b)(iii)	An answer that makes reference to the following points: • (GM fish) grow more / bigger / faster / eq (1) • produce less faeces / can digest more efficiently / absorb more / eq (1) • less respiration / lower metabolic rate / eq (1) • move less / slower swimming / eq (1) • eat more <u>food</u> / less <u>food</u> wasted / eq (1)	**Accept** converse **Accept** have more / different enzymes **Accept** less undigested waste **Accept** more energy used in growth / biomass / waste less energy / eq **Accept** pellets or protein for food	**2**

Question Number	Answer	Additional guidance	Mark
6(b)(iv)	• temperature / light (intensity) / oxygen / salinity / pH / eq (1)		**1**

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Question Number	Answer	Additional guidance	Mark
6(b)(v)	An answer that makes reference to the following points: 1. GM-fish grow bigger / faster / harvest sooner / eq (1) 2. less food wasted / more food eaten / eq (1) 3. less faeces / urea / excretion / ammonia / eq (1) 4. less decomposition / fewer decomposers / eq (1) 5. less nitrification / fewer nitrifying bacteria / eq (1) 6. less eutrophication / algal growth / plant growth / eq (1) 7. less oxygen loss / more oxygen in water / eq (1) 8. due to less (bacterial) respiration / (more oxygen for) respiration of animals / eq (1) 9. no information about disease spread / pathogen spread / eq (1) 10. GM fish are (genetically) similar so may be more likely to catch / spread disease / infection / eq (1) 11. not repeated / need more experiments / no idea of sample size / eq (1) 12. (GM) fish that escape may harm food chains / outcompete wild fish / may breed with wild fish / eq (1) 13. did not measure nitrates / eq (1)	**Accept** converse throughout **Accept** don't need to keep as long / eq **Accept** fish feed more efficiently / don't need to give as much food **Accept** GM fish are also kept in nets so disease would spread **Accept** GM are genetically weaker so likely to get disease **Accept** no idea of age / sex of fish	**5**

(Total for Question 6 = 15 mark

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