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Mark Scheme (Results)

November 2023

Pearson Edexcel International GCSE
In Biology (4BI1) Paper 1B and Science Double Award (4SD0) Paper 1B

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November 2023
Question Paper Log Number P73490A
Publications Code 4BI1_1B_MS_2311
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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)	The only correct answer is C (oak tree) A is not the answer as caterpillar is not a producer B is not the answer as earthworm is not a producer D is not the answer as stoat is not a producer	**1**

Question Number	Answer	Mark
1(a)(ii)	The only correct answer is D (ladybird) A is not the answer as caterpillar is not a secondary consumer B is not the answer as earthworm is not a secondary consumer C is not the answer as fox is not a secondary consumer	**1**

Question Number	Answer	Mark
1(a)(iii)	The only correct answer is A (blackbird) B is not the answer as earthworm is not a secondary and a tertiary consumer C is not the answer as fox is not a secondary and a tertiary consumer D is not the answer as stoat is not a secondary and a tertiary consumer	**1**

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Question Number	Answer	Additional guidance	Mark
1 (b) (i)	An explanation that makes reference to three of the following: • fewer blackbirds / numbers fall / population reduces / die / migrate /eq (1) • less food (for blackbirds) fewer (caterpillars) to eat / fewer ladybirds / eq (1) • less food for ladybirds / fewer greenfly for ladybirds to eat/ eq (1) • (blackbirds) will eat more earthworms / will eat only earthworms / eq (1) • blackbirds consume pesticide / bioaccumulation / pesticide kills blackbirds / eq (1)	Allow might / may fall	**3**

Question Number	Answer	Mark
1 (b) (ii)	A description that makes reference to the following: • <u>biological control</u> (1) • introduce predator / increase ladybirds / eq (1) • to eat / consume / prey on greenfly / eq (1)	**3**

Total 9 marks

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Question Number	Answer	Mark
2(a)	4 (1)	**1**

Question Number	Answer	additional guidance	Mark
2(b)	An explanation that makes reference to two of the following • remove surface moisture / liquid /eq (1) • that would add / alter / affect mass /affect results / eq (1) • so valid comparison can be made between with pre-solution dried cylinder / eq(1)	 Ignore water Ignore reliable /accurate	**2**

Question Number	Answer	additional guidance	Mark
2(c)(i)	change in mass 2.3-2.2 = 0.1g % = 0.1÷2.2 ×100 = 4.5 (2)	allow 1 mark for 0.1 full marks for correct answer no working allow 4.55 or 4.545 allow 4.54 dot / recurring etc	**2**

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Question Number	Answer	additional guidance	Mark
2(c)(ii)	An answer that makes reference to five of the following 1. loses mass in high(er) (sucrose) concentration / 1.0 / 0.8 / eq (1) 2. gains mass in low(er) (sucrose) concentration/ 0.0 / 0.2 / 0.4/ eq (1) 3. as water exits / enters / eq (1) 4. by osmosis / eq (1) 5. from higher water potential / to low water potential / eq (1) 6. no change in mass / no (net) movement of water in 0.6 / eq (1) 7. potato has same water potential / same concentration / isosmotic / eq (1)	allow weight As conc increases mass decreases As conc decreases mass of potato increases Allow dilute to more concentrated / from higher water conc to lower /eq	**5**

Total 10 marks

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Question Number	Answer	Additional guidance	Mark
3(a)(i)	• limewater / hydrogen carbonate indicator/ sodium hydrogen carbonate / sodium bicarbonate / bicarbonate indicator /eq	allow calcium hydroxide for limewater	**1**

Question Number	Answer	Additional Guidance	Mark
3(a)(ii)	An explanation that makes reference to three of the following: • tube A (stays) clear / (stays) red / (stays) orange / no change /eq (1) • tube B goes cloudy / milky / yellow /eq (1) • (more) carbon dioxide in exhaled air / in tube B /eq (1)	Mp 1-2 Must be true for answer in (a)(i) If (a)(i) blank can only score mp 1 if write no change and mp 3 allow tube A changes slowly/ eq	**3**

Question Number	Answer	Additional guidance	Mark
3(a)(iii)	• warmer / less oxygen / more water (vapour) /eq (1)	allow converse	**1**

Question Number	Answer	Mark
3(b)(i)	• duration (of exercise)/ time / eq (1)	**1**

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Question Number	Answer	additional guidance	Mark
3(b)(ii)	An answer that includes • Scales linear and at least 2 big squares on y and 3 on x (1) • Lines straight and through all points (1) • Axis correct way round (duration on x and breathing rate y)(1) • Units labelled with duration/ exercise in seconds/s and breathing rate in breaths per minute / breathing rate/min eq (1) • Points correctly plotted within a small square (1)	allow truncated y even if unlabelled Bar chart max 3 no S no L	**5**

Question Number	Answer	Additional guidance	Mark
3(b)(iii)	A description that includes two of the following points: • breathing rate increases until 180 seconds / up to 42 (breathes)/ eq (1) • decreases slightly (between 180 -210) / eq (1) • (then) levels out / becomes constant / eq (1)	Need number ref for mp 1 but not for mp 2 mp3 Increases decreases then constant scores =2	**2**

Question Number	Answer	Mark
3(b)(iv)	• repeat / use more students / people / eq (1)	**1**

Total 14 marks

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Question Number	Answer	additional guidance	Mark
4(a)	An answer that makes reference to two of the following • more red cells / erythrocytes / eq (1) • fewer lymphocytes / eq (1) • fewer monocytes / eq (1) • fewer neutrophils / eq (1)	**Allow converse for condition** fewer (in condition) more lymphocytes more monoctyes more neutrophils if no ref to named wbc allow fewer wbc for 1	**2**

	Answer	additional guidance	Mark
4(b)	line length = 14 (mm) 14 mm = 14 × 1000 magnification = 14 000 ÷ 25 = x 560 (2) Allow range 520 - 600	1 mark for correct length and units 13-15mm or 1.3-1.5cm OR ÷ 25	**2**

	Answer	additional guidance	Mark
4(c)	$5.0 \times 10^9 \times 1000$ 5.0×10^{12} $5.0 \times 5.0 \times 10^{12}$ $= 2.5 \times 10^{13}$ (2)	allow 1 mark for 25 etc in answer	**2**

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Question Number	Answer	additional guidance	Mark
4(d)	An answer that makes reference to four of the following 1. less haemoglobin (1) 2. less (transport of) oxygen /eq(1) 3. less energy / less ATP / respiration / eq (1) 4. tired / out of breath / lactic acid build up / eq (1) 5. more immune response / greater immunity / more memory cells/ eq (1) 6. more antibodies / eq (1) 7. more phagocytosis / eq (1) 8. less infection / may be infected / eq (1)	allow more anaerobic respiration allow pathogens present	**4**

Total 10 marks

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Question Number	Answer	Mark
5(a)	• (alternative) form / version of a gene /eq (1)	**1**

Question Number	Answer	additional guidance	Mark
5(b)(i)	An answer that makes reference to the following • genotypes of parents Ss and Ss (1) • gametes formed S and s S and s (1) • genotypes of offspring SS Ss ss(1) • phenotypes of offspring stated or ratio 3 **short** to 1 **long** / eq (1)	Allow any symbols including different letters but not X or Y AB x AB A or B AA 2AB BB allow all marks from Punnet square allow te for incorrect parents 2 max gametes and offspring	**4**

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Question Number	Answer	additional guidance	Mark
5(b)(ii)	An answer that makes reference to the following • prob of male 0.5 / prob of short hair 0.75 • combined prob = 0.375 (2)	allow 1 mark for 0.5 or ½ or 0.75 ¾ allow 37.5% or 3/8	**2**

Question Number	Answer	additional guidance	Mark
5(b)(iii)	An explanation that makes reference to two of the following • cross with long-haired / ss / homozygous recessive / eq (1) • if SS/ homozygous / all offspring short-haired / no long-haired / eq (1) • if Ss/ heterozygous some long-haired / eq (1)	allow other letters	**2**

Question Number	Answer	additional guidance	Mark
5(c)	A description that makes reference to four of the following • mutation / eq (1) • variation (in behaviour) / eq (1) • (guinea pigs) not eaten / survive not noticed by predators / eq (1) • reproduce / eq (1) • pass on allele / gene to offspring / eq (1)	allow converse	**4**

Total 13 marks

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Question Number	Answer	Mark
6(a)(i)	The only correct answer is A (L) B is not the answer as P is not the sensory receptor C is not the answer as Q is not the sensory receptor D is not the answer as S is not the sensory receptor	**1**

Question Number	Answer	Mark
6(a)(ii)	The only correct answer is D (P) A is not the answer as L is not the cell body of the relay neurone B is not the answer as N is not the cell body of the relay neurone motor neurone C is not the answer as M is not the cell body of the relay neurone	**1**

Question Number	Answer	Mark
6(a)(iii)	The only correct answer is C (R) A is not the answer as L is not the motor neurone B is not the answer as M is not the motor neurone D is not the answer as S is not the motor neurone	**1**

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Question Number	Answer	Mark
6(a)(iv)	The only correct answer is D (S) A is not the answer as L is not the effector B is not the answer as M is not the effector C is not the answer as Q is not the effector	**1**

Question Number	Answer	additional guidance	Mark
6(b)(i)	180 cm = 1.8m time = 1.8 ÷ 50 = 0.036 or 3.6 x 10^{-2}(2)	allow 1 mark for ÷50 or ÷5000 allow full marks for correct answer alone	**2**

Question Number	Answer	additional guidance	Mark
6(b)(ii)	An explanation that makes reference to four of the following 1. response time slower / longer /delay / (more) time taken / eq (1) 2. (delay / transmission) between neurones / in between neurones / not just speed along neurones / eq (1) 3. (includes time) to generate impulse (in receptor) / (time) for muscle to contract / eq (1) 4. chemical coordination / diffusion / eq (1) 5. <u>synapse</u> (1) 6. <u>neurotransmitter</u> / named neurotransmitter (1)	ignore impulse travels faster synapses between neurones scores mp 2 and 5	**4**

Total 10 marks

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Question Number	Answer	Mark
7(a)	• single / one / unicellular (1) • wall (1) • photosynthesis (1) • decomposers / saprophytic / saprophytes/ saprotrophic (1) • chromosome / nucleoid (1) • plasmids (1) • *Lactobacillus* / *Streptococcus* (1) • pathogens / pathogenic (1)	**8**

Question Number	Answer	additional guidance	Mark
7(b)	A description that makes reference to four of the following points • yeast respires (aerobically) / eq (1) • yeast (then) <u>respires anaerobically</u> / eq (1) • converts starch to maltose / maltose to glucose / starch to glucose / eq (1) • using amylase / maltase /eq (1) • releases carbon dioxide /eq(1) • causes (dough / bread) to rise / bubbles trapped / volume increases /eq (1)	allow fermentation allow gets bigger	**4**

Total 12 marks

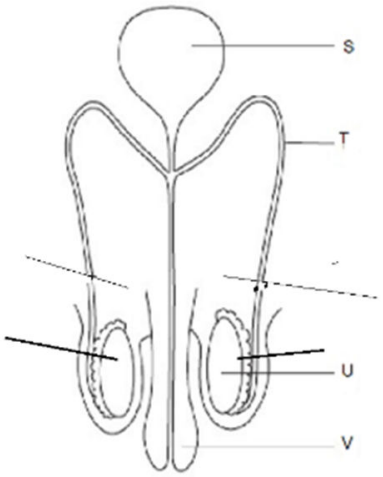
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Question Number	Answer	Mark
8(a)(i)	The only correct answer is C (U) A is not the answer as R does not produce gametes B is not the answer as S does not produce gametes D is not the answer as X does not produce gametes	**1**

Question Number	Answer	Mark
8(a)(ii)	The only correct answer is A (R) B is not the answer as S is not the site of fertilisation C is not the answer as W is not the site of fertilisation D is not the answer as X is not the site of fertilisation	**1**

Question Number	Answer	Mark
8(a)(iii)	The only correct answer is D (X) A is not the answer as R is not where the placenta usually develops B is not the answer as S is not where the placenta usually develops C is not the answer as W is not where the placenta usually develops	**1**

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Question Number	Answer	additional guidance	Mark
8(b) (i)		any cut of **both** sperm ducts / in or out of scrotum eq	**1**

Question Number	Answer	additional guidance	Mark
8(b)(ii)	An explanation that makes reference to two of the following • no sperm in semen / no sperm released / eq (1) • in / from urethra / penis no sperm ejaculated / (1) • transferred to female / eq (1) • egg not fertilised /no fertilisation /eq (1)	ignore sperm not produced ignore no semen released/ ejaculated	**2**

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Question Number	Answer	additional guidance	Mark
8(c)	An answer that makes reference to four of the following 1. easier / simpler operation / testes scrotum outside/ less invasive / eq (1) 2. large study / reliable /significant / valid / eq (1) 3. no deaths in males / eq (1) 4. fewer complications in male / eq (1) 5. fewer failures in male / more successful / eq (1) 6. cheaper in male / eq (1) 7. no data on age / illness / medical conditions / mass / eq (1)	**allow converse** ignore risky / safe / dangerous ignore fewer deaths in males allow some deaths / more deaths in females	**4**

Total 10 marks

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Question Number	Answer	additional guidance	Mark
9(a)	An explanation answer that makes reference to three of the following: • plants produce many more (seeds) / offspring /more yield / eq (1) • quicker to reach maturity / quicker to develop / shorter life cycle / eq (1) • plants can be self-pollinated / eq (1) • easier to control plants environment / eq (1)	allow converse allow grow fully not just reproduce quicker	**3**

Question Number	Answer	Additional guidance	Mark
9(b)	A description that makes reference to four of the following: • select / choose / mate breed bulls / fathers that produce daughters / have mothers/ sisters with highest milk yield / selecting for twins / eq (1) • select choose / mate breed cows / mothers that have highest milk yield / or from mothers / have sisters with highest milk yield / eq (1) • select choose / mate breed offspring (cows) that have highest milk yield of all (female) offspring / eq (1) • repeat for many generations /eq (1)	Ignore cattle allow male Inseminate allow female / cow	**4**

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Question Number	Answer	Mark
9(c)(i)	An answer that makes reference to two of the following: • cows easier to manage / move around farm / milk / eq (1) • cows less likely to fight / harm farmer / harm other animals /eq (1) • cows less lightly to run around /eq(1) • more energy used in growth/ more milk production / more yield / eq (1)	**2**

Question Number	Answer	Mark
9(c)(ii)	A description that makes reference to four of the following: 1. produced by adrenal glands (1) 2. causes heart rate to increase /eq (1) 3. prepares body for fight / flight / fright / eq (1) 4. increases blood flow to muscles / blood diverted from intestines/eq (1) 5. increases breathing rate / depth / eq (1) 6. converts glycogen into glucose / increase blood glucose /increase blood sugar / eq (1) 7. pupils dilate / eq (1) 8. reactions are faster / eq (1)	**4**

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Question Number	Answer	Additional guidance	Mark
9(c)(iii)	A description that makes reference to three of the following: • allows <u>diffusion</u> (1) • provides oxygen / glucose / amino acids / nutrients / vitamins / minerals /eq/(1) • provides antibodies (1) • removes of carbon dioxide / urea / eq (1) • secretes hormones / progesterone / eq (1)	**Must indicate direction** named vitamin / mineral ignore food alone **Must indicate direction** ignore waste allow oestrogen	**3**

Total 16 marks

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Question Number	Answer	Additional guidance	Mark
10	C use light bulbs / lamps different colours / wavelengths / eq (1) O of same species (of water) plant / age / size / condition / eq (1) R repeat / (calculate mean for each different colour) / eq (1) M1 measure volume of oxygen evolved / count bubbles /eq M2 in stated time period / minutes / eq (1) S1 at same temperature / same distance /same light intensity / same bulb / eq S2 same carbon dioxide concentration / same mineral ions / same pH /eq (1)	allow change in suitable indicator / allow testing leaves for starch	**6**

Total 6 marks

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with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom