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Mark Scheme (Results)

Summer 2019

Pearson Edexcel International GCSE
Biology (4BI1) Paper 1B

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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)	<table><tr><th>Letter</th><th>Name</th></tr><tr><td>A</td><td>vacuole (1)</td></tr><tr><td>B</td><td>nucleus (1)</td></tr><tr><td>C</td><td>cell wall (1)</td></tr><tr><td>D</td><td>cell membrane (1)</td></tr></table>	**4**

Question Number	Answer	Additional guidance	Mark
1(b) (i)	C / A	C A C and A A and C	**1**

Question Number	Answer	Additional guidance	Mark
1 (b)(ii)	An explanation that makes reference to three of the following: • photosynthesis (1) • (sun)light (1) • many in palisade (1) • few in spongy / few in guard (cells) (1) • none in upper epidermis / root (cells) (1)		**3**

Question Number	Answer	Additional guidance	Mark
1 (c)	An answer that makes reference to one of the following: • protein synthesis (1) • translation (1)	Ignore makes protein / produces protein	**1**

Total 9 marks

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Question Number	Answer	Mark
2(a)	The only correct answer is A it is digested into amino acids *B is not correct as its surface area is not increased by bile* *C is not correct as its pH is not raised by hydrochloric acid* *D is not correct as it is not absorbed by villi*	**1**

Question Number	Answer	Additional guidance	Mark
2(b)	<table><tr><th>Component</th><th>Function</th></tr><tr><td>lipid</td><td>store of energy</td></tr><tr><td>vitamin D</td><td>bone / teeth / calcium absorption / prevent rickets (1)</td></tr><tr><td>iron</td><td>haemoglobin / red blood cells (1)</td></tr><tr><td>fibre</td><td>peristalsis / move food / prevent constipation (1)</td></tr></table>	Ignore egestion Helps digestion and prevents constipation = 1	**3**

Question Number	Answer	Additional guidance	Mark
2(c)(i)	20% of 1250 = 250 250 ÷ 50 = 5 (2)	Award full marks for correct numerical answer without working Allow one mark for 250 in working	**2**

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Question Number	Answer	Mark
2(c)(ii)	An answer that makes reference to six of the following points: • GM salmon grow more / heavier / longer / larger / more mass / grow faster / eq (1) • (more) protein provided (1) • only need protein in correct amount / only need sufficient protein / only need 50g / too much protein / excess protein / eq (1) • balanced diet also needs vitamins / carbohydrate / lipid / minerals / fibre / no idea of other **named** component in salmon (1) • one salmon used / not repeated/ should use several fish (1) • (data) not reliable / result may be anomalous (1) • no information on food supply to salmon / temperature / oxygen / pollution (1) • protein need depends on age / sex / activity / eq (1)	**6** **Mp1 Allow converse**

Question Number	Answer	Additional guidance	Mark
2(d)	An answer that makes reference to the following points: • gene / allele (1) • restriction / endonuclease (1) • ligase (1)	Allow restrictive	**3**

Total 15 marks

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Question Number	Answer	Mark
3(a)		**3**

number of organisms	8
number of producers	1 / one
number of primary consumers	2 / two
number of food chains	10 / ten

Question Number	Answer	Additional guidance	Mark
3(b)	An explanation that makes reference to the following points: • respiration / movement / heat loss (1) • egested / undigested / faeces / not absorbed / not assimilated (1) • excreted / urine / urea (1) • uneaten (1) • death / <u>decomposition</u> (1)	Mp1 Ignore exercise / metabolism Mp3 excreted from the digestive system = 0	**4**

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Question Number	Answer	Additional guidance	Mark
3 (c)	An answer that makes reference to four of the following points: • variation / variety / varied (1) • mutation (1) • longer beak means more worms/food / longer beak can reach deeper for worms/food (1) • survival and reproduction / breeding / offspring (1) • pass on gene / allele / DNA (1)	Allow converse for Mps 3, 4 and 5 mutation passed on = 1	**4**

Total 11 marks

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Question Number	Answer	Additional guidance	Mark
4(a)	An explanation that makes reference to the following points: • moves up / increases (1) • water enters / water passes through membrane (1) • sucrose is a concentrated solution / sucrose has a low(er) water potential / high water potential to low water potential / down a water potential gradient / dilute to concentrated (1)	Mp3 Allow high conc. to low conc. of <u>water</u> / down water conc gradient	**3**

Question Number	Answer	Mark
4(b)	An explanation that makes reference to the following points: • use water bath / use Bunsen (1) • use scale / measurements (on tube)/ ruler / (use pen to) mark tube (1) • use clock / timer / stopwatch (1)	**3**

Total 6 marks

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Question Number	Answer	Mark
5(a)	The only correct answer is D starch *A is not correct as glucose is not the large insoluble molecule* *B is not correct as lipid is not the large insoluble molecule* *C is not correct as protein is not the large insoluble molecule*	**1**

Question Number	Answer	Mark
5(b)(i)	An answer that makes reference to two of the following points: • reset (the coloured water) / eq (1) • repeat readings / reliable results / more results (1) • allow <u>oxygen</u> in / (aerobic) respiration / prevent anaerobic respiration (1)	**2**

Question Number	Answer	Mark
5(b)(ii)	The only correct answer is A absorbs carbon dioxide *B is not correct as it does not absorb oxygen* *C is not correct as it does not release carbon dioxide* *D is not correct as it does not release oxygen*	**1**

Question Number	Answer	Additional guidance	Mark
5(b)(iii)	• multiply by length • determine volume • correct answer 0.0047(13) / 4.7(13) × 10^{-3} (3)	Award full marks for correct numerical answer without working 3.142 x 0.05 x 0.05 = 0.007855 × 0.6 = 0.0047(13) / 4.7(13) × 10^{-3} Allow one mark for × 6.0 / × 0.6 in working Allow two marks for 4.7 / 47 / 0.47 in working Allow three marks for 4.7 $\underline{mm}^3$	**3**

Question Number	Answer	Additional guidance	Mark
5(c)(i)	• oxygen absorbed at 22 and 12 • calculation of percentage increase 100 (2)	Award full marks for correct numerical answer without working rate at 22 = 1.6 ÷ 20 = 0.08 and rate at 12 = 0.8 ÷ 20 = 0.04 percentage increase = (0.08 - 0.04) ÷ 0.04 × 100 = 100(%) Or 1.6 – 0.8 ÷ 0.8 × 100 = 100(%) One mark for 0.08 **and** 0.04 or 1.6 **and** 0.8 in working	**2**

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Question Number	Answer	Additional guidance	**Mark**
5(c)(ii)	An answer that makes reference to two of the following points: • (more) respiration (1) • enzymes (1) • (more)(kinetic) energy / collisions / enzyme substrate complexes / move faster / eq (1)	Allow converse	**2**

Total 11 marks

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Question Number	Answer	Additional guidance	Mark
6(a)(i)	fertilisation / fertilise / fuse with egg / join with egg / combine with egg	Ignore meet with egg	**1**

Question Number	Answer	Additional guidance	Mark
6(a)(ii)	An answer that makes reference to two of the following points: • nucleus (1) • chromosomes (1) • haploid number (1) • DNA (1) • acrosome (1)	Ignore genes / alleles	**2**

Question Number	Answer	Mark
6(a)(iii)	An explanation that makes reference to the following points: • (aerobic) respiration / energy / ATP (1) • movement / swimming (of sperm / of tail) (1)	**2**

Question Number	Answer	Additional guidance	Mark
6(b)(i)	• select 24.8% from table and convert to 0.248 • calculate 24.8% of 58 million 14 384 000 / 14 400 000 / 1.4×10^7 1.44×10^7 14.384×10^6 / 1.4384×10^7 / eq (2)	Award full marks for correct numerical answer without working One mark for 0.248 x 58 million / 24.8 ÷ 100 x 58 million	**2**

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Question Number	Answer	Mark
6(b)(ii)	An explanation that makes reference to five of the following points: <u>Arguments for:</u> • nicotine reduces normal/undamaged cells / nicotine increases damaged cells (1) • less (chance of) fertilisation / eq (1) • rats are similar to humans / rats are mammals / eq (1) <u>Arguments against:</u> • there are normal/undamaged sperm cells in nicotine samples / there are damaged cells with no nicotine (1) • investigation on rats (not humans) / eq (1) • rats were not smoking / small range(of concentrations) / no idea of nicotine concentration in cigarettes / eq (1) • not repeated / no idea of number of rats / not reliable (1)	**5**

Total 12 marks

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Question Number	Answer	Additional guidance	Mark
7 (a) (i)	An answer that makes reference to two of the following: • volume / 5cm^3 of fruit juice (1) • volume / 5cm^3 of Benedict's (1) • temperature / use 70°C (1) • time / for 3 minutes (1)	Ignore amount / concentration / mass	**2**

Question Number	Answer	Additional guidance	Mark
7 (a) (ii)	B C D A (2)	B D C A = 1	**2**

Question Number	Answer	Additional guidance	Mark
7 (a)(iii)	An explanation that makes reference to three of the following: • use 5cm^3 / same volume of each (sugar) solution **and** use 5cm^3 / same volume of Benedict's (1) • heat at same temperature **and** for 3 minutes / heat at 70°C **and** for 3 minutes (1) • match / compare <u>colour</u> of sugar solutions with fruit juices / eq (1)	use the original/ same method alone = 1 only if mp1 or mp2 are not awarded	**3**

Question Number	Answer	Additional guidance	Mark
7 (b) (i)	An answer that makes reference to two of the following: • (sugar) provides energy (1) • respiration (in bacteria) (1) • produce acid / low(ers) pH (1)	Mp1 Ignore food	**2**

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Question Number	Answer	Additional guidance	Mark
7 (b) (ii)	An explanation that makes reference to two of the following: • develop obesity / overweight (1) • sugar provides energy / joules / calories (1) or • (type 2) diabetes (1) • increase in <u>blood</u> glucose/sugar / insulin no longer works (1) or • CVD / heart disease / stroke (1) • sugar converted to fat / fat deposits in arteries (1)	Only credit 1 health risk Can only earn 2 marks if risk and explanation are linked (from same pair) Mp4 Ignore not enough insulin	**2**

Total 11 marks

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Question Number	Answer	Additional guidance	**Mark**
8(a)(i)	A graph that makes reference to the following points: • S scales linear and at least half page (1) • L straight lines joining points (1) • A1 axes the correct way around (time on x axis) (1) • A2 axis labelled 'minutes' and 'breaths per minute' / 'BPM' (1) • P points plotted correctly within one square (1) • K indicates (person) P and (person) Q (1)	Allow truncated y axis Bar graph loses S and L	**6**

Question Number	Answer	**Mark**
8(a)(ii)	An explanation that makes reference to three of the following points: • increases (1) • oxygen for respiration / <u>aerobic</u> respiration (1) • <u>muscle</u> (1) • remove carbon dioxide (1)	**3**

Question Number	Answer	**Mark**
8(a)(iii)	An explanation that makes reference to two of the following points: • (remove) lactic acid (1) • anaerobic respiration (1) • <u>oxygen debt</u> / <u>EPOC</u> / <u>excess post-exercise oxygen consumption</u> (1)	**2**

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Question Number	Answer	Mark
8(b)	An answer that makes reference to four of the following points: (P may be fitter): • P has lower breathing rate at rest / Q has higher breathing rate at rest (1) • P drops more (after exercise) / Q drops less (after exercise)/ P recovers faster (after exercise)/ Q recovers slower (after exercise) (1) (P may not be fitter): • both return to normal in same time / both return to normal by 30 minutes (1) • P breathing rate higher /Q breathing rate lower/ P increase more than Q /Q increase less than P (1) (Design): • no data on age / sex / mass / lung size (1) • may have lung disease / asthma / smoke / drugs / medication / altitude training / nervousness / adrenaline / eq (1) • no data on exercise intensity /type/amount/hardness/ only one measure of fitness / no information on heart rate (1) • not repeated / only tested once / eq (1)	**4**

Total 15 marks

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Question Number	Answer	Additional guidance	**Mark**
9(a)	A description that makes reference to three of the following points: • binds with haemoglobin / forms carboxyhaemoglobin (1) • (less) oxygen (1) • (less) respiration (1) • fatal / death / less growth / suffocation (1)	Less oxyhaemoglobin = 2	**3**

Question Number	Answer	**Mark**
9(b)	An explanation that makes reference to six of the following points: • pathogenic bacteria / cause disease (1) • urea / urine / nitrogenous waste / nitrate / phosphate (1) • <u>decomposition</u> / <u>decomposed</u> / <u>decomposers</u> (ONCE) (1) • eutrophication / plant growth / algae growth (1) • (plants) block light / prevents photosynthesis (1) • respiration (ONCE) (1) • (less) oxygen (1) • death of organisms (ONCE) / reduce biodiversity / eq (1)	**6**

Total 9 marks

Question Number	Answer	Mark
10(a)(i)	The only correct answer is B oestrogen *A is not correct as it is not adrenaline* *C is not correct as it is not progesterone* *D is not correct as it is not testosterone*	**1**

Question Number	Answer	Mark
10(a)(ii)	The only correct answer is A adrenaline *B is not correct as it is not insulin* *C is not correct as it is not progesterone* *D is not correct as it is not testosterone*	**1**

Question Number	Answer	Mark
10(a)(iii)	The only correct answer is C they are transported in the plasma *A is not correct as they do not always produce short term changes* *B is not correct as they are not carried by neurones* *D is not correct as they do not always produce a rapid response*	**1**

Question Number	Answer	Mark
10(b)	An answer that makes reference to two of the following points: • auxin transported in xylem / phloem / auxin not transported in blood / plasma (1) • auxin produced in tips / eq auxin not from endocrine / glands / organs (1) • auxin has different effect on roots and shoots / eq (1)	**2** **Allow converse for Mp1 and Mp2**

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Question Number	Answer	Additional guidance	**Mark**
10(c)	A description that makes reference to six of the following points: • C change / different concentrations of growth substances (1) • O same species / same plant / same type of plant/ named plant / same age / same size / eq (1) • R repeat (1) • M1 count number of roots / length of roots / measure roots with ruler / eq (1) • M2 stated time period of one day plus (1) • S1 same (control) temperature / oxygen / light / carbon dioxide (1) • S2 same compost / water / humidity / soil / mineral ions / named mineral ion / same <u>volume</u> of plant growth substance (1)	Auxin and no auxin = 0 M1 Ignore mass S2 Ignore nutrients	**6**

Total 11 marks