Pearson Edexcel

Mark Scheme (Results)

January 2021

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.

Question Number	Answer	Mark
1(a)(i)	The only correct answer is B microscopic plankton *A is not correct because crustaceans are not producers* *C is not correct because sea birds are not producers* *D is not correct because turtles are not producers*	**1**

Question Number	Answer	Mark
1(a)(ii)	The only correct answer is C human *A is not correct because crustaceans are not a tertiary consumer* *B is not correct because fin whales are not a tertiary consumer* *D is not correct because whale sharks are not a tertiary consumer*	**1**

Question Number	Answer		Mark
1(b)	An explanation that makes reference to five of the following points: • (less) food taken in / eaten / taken in (to stomach) / starve (1) • food cannot be digested / less digestion (1) • fewer amino acids / less glucose / fatty acids / glycerol (1) • less gas exchange / less air <u>taken</u> in / can't breathe / <u>air</u> cannot flow through trachea / bronchi / suffocate (1) • less oxygen (in blood) / less oxygen (to lungs) (1) • less carbon dioxide removed / eq (1) • less (aerobic) respiration / more anaerobic respiration (1) • less energy / ATP / more lactic acid (1)	**Allow** less energy idea from less food / glucose / eq **ONCE**	**5**

Question Number	Answer	Additional Guidance	Mark
1(c)	An answer that makes reference to the following points: • plastic concentrate (along food chain) / plastic increases in bodies (along food chain) / more plastic in higher trophic levels / plastic works along food chain / plastic builds up / eq (1) • humans at end of food chain / humans eat plastic when eating fish / eq / humans gain plastic from the fish (1) • less catch of fish / less food for humans (if fish populations decrease) (1)	**Allow** toxin for plastic **Allow** plastic not excreted / not removed from bodies / stay in the bodies	**2**

Question Number	Answer	Additional guidance	Mark
1(d)	• 2000 – 200 = 1800 • 1800 × 365 = 657 000 or 660 000 • = 6.57×10^5 or 6.6×10^5 (3)	Award full marks for correct numerical answer without working **Allow one mark** for 1800 **Allow two marks** for 657 000 / 660 000 **Allow two marks** for any 6.57 / 6.6 with wrong power	**3**

Question Number	Answer	Additional guidance	Mark
1(e)	An explanation that makes reference to the following points: • reduced biodiversity / eq (1) • fewer species / lower populations (1) • fewer food sources / eq / fewer niches (1)	**Allow** some species become extinct/ die out **Allow** food chain disruption idea	**2**

Question Number	Answer	Additional guidance	Mark
1(f)	An answer that makes reference to two of the following points: • less microplastic produced (1) • fewer animals harmed / suffocated / killed / damaged / not eaten by animals (1) • broken down / digested / decomposed (1) • by microorganisms / bacteria / fungi (1)	**Allow** less bioaccumulation / less toxin passed along food chains / eq **Ignore** (bio)degrade	**2**

Total = 16 marks

Question Number	Answer	Mark
2(a)	The only correct answer is A *B is not correct because it does not contain nephrons* *C is not correct because it does not contain nephrons* *D is not correct because it does not contain nephrons*	**1**

Question Number	Answer	Mark
2(b)	An answer that makes reference to one of the following points: • water (1) • urea (1) • ions / named ion / salts (1)	**1**

Question Number	Answer	Additional Guidance	Mark
2(c)(i)	An explanation that makes reference to five of the following points: • more urine produced when drinking water / less urine when drinking salt solution (1) • lower blood concentration (when drinking water) / higher blood concentration (when drinking salt solution) (1) • detected by hypothalamus / osmoreceptors (1) • less / no ADH released by (pituitary) (with water) / (more) ADH released (with salt) (1) • collecting ducts are less permeable (with water) / collecting ducts are more permeable (with salt) (1) • less water reabsorbed / absorbed into blood (with water) / (more) water reabsorbed / absorbed into blood (with salt) (1)	**Allow** converse for salt **Allow** correct water potentials **Allow** blood is more dilute / higher water levels	**5**

Question Number	Answer	Mark
2(c)(ii)	An answer that makes reference to two of the following points: • exercise / sweating / activity (1) • volume of fluid consumed before investigation / what they drank (1) • temperature / eq (1) • food eaten / diet (1)	**2**

Total 9 marks

Question Number	Answer	Mark
3(a)	in glass / in test tube / in (Petri) dish (1)	**1**

Question Number	Answer	Mark
3(b)(i)	An explanation that makes reference to two of the following points: • increases up to **pH** 6 and decreases above **pH** 6 (1) • enzymes (1) • optimum pH is 6 / (enzymes) denature at high / low pH / eq (1)	**2**

Question Number	Answer	Additional guidance	Mark
3(b)(ii)	A description that makes reference to five of the following points: • use forceps / scalpel / knife / eq to remove explants / pieces from plant (1) • wash in bleach / hypochlorite / ethanol / alcohol / sterile wipes / eq (1) • (grow on) agar (1) • nutrients / minerals / carbohydrates / amino acids / named mineral / eq / growth factors / hormones (1) • add acid / alkali / buffer (1) • use several / multiple explants / repeat (1) • control temperature / carbon dioxide / light (1) • sterile agar / sterile tubes (1) • same age plant / same plant / same size of explants / eq (1) • count number of shoots after same / stated time (1)	**Ignore** sterilised alone **Allow** rooting powder **Allow** sterile cotton wool / **Allow** disinfected / ensure sterile conditions / sterilise equipment **Allow** roots	**6**

Question Number	Answer	Mark
3(c)	An answer that makes reference to two of the following points: • lots produced (1) • genetically identical / no variation / all same type / identical / same characteristics / guaranteed plant / they are clones (1) • can grow GM plants / eq (1) • faster / quicker (1) • any time of year (1) • can be used for plants that are hard to germinate / grow from seed (1)	**2**

Total 11 marks

Question Number	Answer	Additional guidance	Mark
4(a)	An explanation that makes reference to two of the following points: • few / no chloroplasts / thin layer / thin cells / one cell thick (1) • transparent / lets light through / allows light to reach palisade layer (1) • (waxy cuticle) reduces water loss / evaporation / waterproof layer / barrier to water / eq (1) • protects against infection / eq (1)	**Allow** light to reach layer B / **Allows** cells underneath to photosynthesise	**2**

Question Number	Answer	Additional guidance	Mark
4(b)	An answer that makes reference to two of the following points: **two from:** *(Layer B)* • vertical cells / rectangular / tightly packed / many chloroplasts (1) • large surface area (1) • absorb / capture / harvest / trap light / eq (1) **and two from** *(Layer C)* • air spaces / gaps between cells / loosely packed / eq (1) • for gas exchange (1) • diffusion of CO_2 / diffusion of O_2 (1)	**Allow** for one mark gases diffuse if not mp5 / 6	**4**

Question Number	Answer	Additional Guidance	Mark
4(c)	An explanation that makes reference to the following points: • guard cells (1) • open / close stomata (1) • let carbon dioxide in during day / when light (1)	**Allow** oxygen out during day / when light	**2**

Question Number	Answer	Mark
4(d)	An explanation that makes reference to four of the following points: • reduce / stop transpiration / water loss (from plant) (1) • so plant does not wilt / go flaccid (1) • (but) allows absorption of carbon dioxide / CO_2 can still get in / can still pass through (1) • photosynthesis can occur **/** can (still) make glucose / carbohydrates / starch (1) • but less absorption / transport of mineral ions / named mineral ions (1) • less cooling / plant may overheat / eq (1)	**4**

Total 12 marks

Question Number	Answer	Mark
5(a) (i)	The only correct answer is C 5 *A is not correct because it does code for 1 amino acid* *B is not correct because it does code for 3 amino acids* *D is not correct because it does code for 15 amino acids*	**1**

Question Number	Answer	Additional guidance	Mark
5(a) (ii)	GUA AGU UAA GUA AAG (2)	**One error scores 1** Allow **one mark for** GTA AGT TAA GTA AAG	**2**

Question Number	Answer	Additional Guidance	Mark
5(a) (iii)	An explanation that makes reference to the following two points: • each triplet / codon codes for **one** amino acid / eq (1) • codons are discrete / independent of each other / nucleotides / bases are not shared between codons / eq (1) • example of triplet reading frames, e.g. CAT TCA / eq (1)	**Allow** one codon / triplet determines each **/ one** amino acid **Allow** nucleotides / bases are not shared between amino acid (codes) **Allow** triplets read CAT TCA etc / or CAT/TCA	**2**

Question Number	Answer	Additional guidance	Mark
5(b)	A description that makes reference to four of the following points: • (mRNA arrives at) ribosome (1) • mRNA has codons / is a template (1) • ribosome moves along mRNA strand (1) • tRNA brings amino acids (to ribosome) (1) • anticodon (on tRNA) binds with codon (on mRNA) / tRNA binds with mRNA (1) • amino acid chain produced / amino acid joined / polypeptide (1)	**Allow** ribosome moves along to next codon **Allow** codon is complementary to anticodon	**4**

Question Number	Answer	Mark
5(c)	the / its genes / DNA / genetic material (1)	**1**

Total 10 marks

Question Number	Answer		Mark
6(a)	An answer that makes reference to two of the following points: • increasing enzyme concentration increases the rate of oxygen production / eq (2) **one mark** for naming the enzyme concentration / number of potato discs as independent variable and the oxygen production as the dependent variable (1)	**Allow** increasing catalase concentration / number of potato discs increases the amount of oxygen produced / eq (2) **Max one** for correct relationship but variables named wrongly e.g. increasing potato disc number (dependent variable) increases the volume of oxygen produced (independent variable)	**2**

Question Number	Answer	Mark
6(b)	An answer that makes reference to two of the following points: • pH / volume of buffer (1) • volume of hydrogen peroxide / substrate (1) • time / duration of reaction (1) • size / volume / mass / shape / surface area of each disc (1) • temperature (1)	**2**

Question Number	Answer	Additional guidance	Mark
6(c) (i)	• 4.2 ÷ 3 • 1.4 (2)	Allow **one mark** for mean using all values e.g. 4.2 ÷ 4 = 1.05 or 1.1 or 1.0	**2**

Question Number	Answer	Additional guidance	Mark
6(c) (ii)	• 8.3 - 7.3 ÷ 7.3 x 100 • = 13.7 (2)	**Allow one mark** for 1(.0) or (8.3 – 7.3) **Allow one mark** for ÷ by 7.3 **Allow one mark** for 0.137 **Allow** 13.6986 / 14 for 2 marks **Allow one mark** for 13.69	**2**

Question Number	Answer	Additional guidance	Mark
6(c) (iii)	An explanation that makes reference to two of the following points: • increasing enzyme concentration /number of discs increases volume of oxygen produced (1) • more active sites (1) • (increase in enzyme concentration) means more collisions / more enzyme substrate complexes / more enzymes combine with substrates / eq (1)		**2**

Question Number	Answer	Additional guidance	Mark
6(d)	An explanation that makes reference to the following two points • to measure initial / fastest rate (1) • (as time increases) hydrogen peroxide / substrate concentration falls / hydrogen peroxide breaks down / is used up (1) • valid (comparison) (1)	**Allow** converse for mp1 and mp2 **Allow** reaction will slow down **Allow** the rate of oxygen production / bubbles produced will slow **Allow** reaction is not limited by substrate concentration **Allow** reaction may have finished by 10 min	**2**

Total 12 marks

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