



Mark Scheme (Results)

January 2021

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

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

| Question Number | Answer | Mark |
|-----------------|--|----------|
| 1(a)(ii) | <p>The only correct answer is C human</p> <p><i>A is not correct because crustaceans are not a tertiary consumer</i></p> <p><i>B is not correct because fin whales are not a tertiary consumer</i></p> <p><i>D is not correct because whale sharks are not a tertiary consumer</i></p> | 1 |

| Question Number | Answer | | Mark |
|-----------------|---|--|----------|
| 1(b) | <p>An explanation that makes reference to five of the following points:</p> <ul style="list-style-type: none"> • (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) | <p>Allow less energy idea from less food / glucose / eq ONCE</p> | 5 |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|--|---|----------|
| 1(c) | <p>An answer that makes reference to the following points:</p> <ul style="list-style-type: none"> • 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) | <p>Allow toxin for plastic</p> <p>Allow plastic not excreted / not removed from bodies / stay in the bodies</p> | 2 |

| Question Number | Answer | Additional guidance | Mark |
|-----------------|---|--|----------|
| 1(d) | <ul style="list-style-type: none"> • $2000 - 200 = 1800$ • $1800 \times 365 = 657\,000$ or $660\,000$ • $= 6.57 \times 10^5$ or 6.6×10^5 (3) | <p>Award full marks for correct numerical answer without working</p> <p>Allow one mark for 1800</p> <p>Allow two marks for 657 000 / 660 000</p> <p>Allow two marks for any 6.57 / 6.6 with wrong power</p> | 3 |

| Question Number | Answer | Additional guidance | Mark |
|-----------------|--|---|----------|
| 1(e) | <p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"> • reduced biodiversity / eq (1) • fewer species / lower populations (1) • fewer food sources / eq / fewer niches (1) | <p>Allow some species become extinct/ die out</p> <p>Allow food chain disruption idea</p> | 2 |

| Question Number | Answer | Additional guidance | Mark |
|-----------------|--|---|----------|
| 1(f) | <p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • 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) | <p>Allow less bioaccumulation / less toxin passed along food chains / eq</p> <p>Ignore (bio)degrade</p> | 2 |

Total = 16 marks

| Question Number | Answer | Mark |
|-----------------|---|----------|
| 2(a) | <p>The only correct answer is A</p> <p><i>B is not correct because it does not contain nephrons</i></p> <p><i>C is not correct because it does not contain nephrons</i></p> <p><i>D is not correct because it does not contain nephrons</i></p> | 1 |

| Question Number | Answer | Mark |
|-----------------|---|----------|
| 2(b) | <p>An answer that makes reference to one of the following points:</p> <ul style="list-style-type: none">• water (1)• urea (1)• ions / named ion / salts (1) | 1 |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|--|--|----------|
| 2(c)(i) | <p>An explanation that makes reference to five of the following points:</p> <ul style="list-style-type: none"> • 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) | <p>Allow converse for salt</p> <p>Allow correct water potentials Allow blood is more dilute / higher water levels</p> | 5 |

| Question Number | Answer | Mark |
|-----------------|--|----------|
| 2(c)(ii) | An answer that makes reference to two of the following points: <ul style="list-style-type: none">• 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: <ul style="list-style-type: none">• increases up to pH 6 and decreases above pH 6 (1)• enzymes (1)• <u>optimum pH</u> is 6 / (enzymes) denature at high / low pH / eq (1) | 2 |

| Question Number | Answer | Additional guidance | Mark |
|-----------------|--|---|----------|
| 3(b)(ii) | <p>A description that makes reference to five of the following points:</p> <ul style="list-style-type: none"> • 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) | <p>Ignore sterilised alone</p> <p>Allow rooting powder</p> <p>Allow sterile cotton wool / Allow disinfected / ensure sterile conditions / sterilise equipment</p> <p>Allow roots</p> | 6 |

| Question Number | Answer | Mark |
|-----------------|--|----------|
| 3(c) | An answer that makes reference to two of the following points: <ul style="list-style-type: none">• 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) | <p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • 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) | <p>Allow light to reach layer B / Allows cells underneath to photosynthesise</p> | 2 |

| Question Number | Answer | Additional guidance | Mark |
|-----------------|--|---|----------|
| 4(b) | <p>An answer that makes reference to two of the following points:</p> <p>two from:</p> <p><i>(Layer B)</i></p> <ul style="list-style-type: none"> • vertical cells / rectangular / tightly packed / many chloroplasts (1) • large surface area (1) • absorb / capture / harvest / trap light / eq (1) <p>and two from</p> <p><i>(Layer C)</i></p> <ul style="list-style-type: none"> • air spaces / gaps between cells / loosely packed / eq (1) • for gas exchange (1) • diffusion of CO₂ / diffusion of O₂ (1) | <p>Allow for one mark gases diffuse if not mp5 / 6</p> | 4 |

| Question Number | Answer | Additional Guidance | Mark |
|-----------------|--|---|----------|
| 4(c) | <p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"> • 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) | <p>An explanation that makes reference to four of the following points:</p> <ul style="list-style-type: none"> • reduce / stop transpiration / water loss (from plant) (1) • so plant does not wilt / go flaccid (1) • (but) allows absorption of carbon dioxide / CO₂ 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) | <p>The only correct answer is C 5</p> <p><i>A is not correct because it does code for 1 amino acid</i></p> <p><i>B is not correct because it does code for 3 amino acids</i></p> <p><i>D is not correct because it does code for 15 amino acids</i></p> | 1 |

| Question Number | Answer | Additional guidance | Mark |
|------------------|-------------------------|---|----------|
| 5(a) (ii) | GUA AGU UAA GUA AAG (2) | <p>One error scores 1</p> <p>Allow one mark for GTA AGT TAA GTA AAG</p> | 2 |

| Question Number | Answer | Additional Guidance | Mark |
|-------------------|---|--|----------|
| 5(a) (iii) | <p>An explanation that makes reference to the following two points:</p> <ul style="list-style-type: none"> • 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) | <p>Allow one codon / triplet determines each / one amino acid</p> <p>Allow nucleotides / bases are not shared between amino acid (codes)</p> <p>Allow triplets read CAT TCA etc / or CAT/TCA</p> | 2 |

| Question Number | Answer | Additional guidance | Mark |
|-----------------|---|--|----------|
| 5(b) | <p>A description that makes reference to four of the following points:</p> <ul style="list-style-type: none"> • (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) | <p>Allow ribosome moves along to next codon</p> <p>Allow codon is complementary to anticodon</p> | 4 |

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

Total 10 marks

| Question Number | Answer | | Mark |
|-----------------|---|---|----------|
| 6(a) | <p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • increasing enzyme concentration increases the rate of oxygen production / eq (2) <p>one mark for naming the enzyme concentration / number of potato discs as independent variable <u>and</u> the oxygen production as the dependent variable (1)</p> | <p>Allow increasing catalase concentration / number of potato discs increases the amount of oxygen produced / eq (2)</p> <p>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)</p> | 2 |

| Question Number | Answer | Mark |
|-----------------|--|----------|
| 6(b) | <p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • 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) | <ul style="list-style-type: none"> • $4.2 \div 3$ • 1.4 (2) | <p>Allow one mark for mean using all values</p> <p>e.g. $4.2 \div 4 = 1.05$ or 1.1 or 1.0</p> | 2 |

| Question Number | Answer | Additional guidance | Mark |
|------------------|--|--|----------|
| 6(c) (ii) | <ul style="list-style-type: none"> • $8.3 - 7.3 \div 7.3 \times 100$ • = 13.7 (2) | <p>Allow one mark for 1(.0) or (8.3 – 7.3)</p> <p>Allow one mark for \div by 7.3</p> <p>Allow one mark for 0.137</p> <p>Allow 13.6986 / 14 for 2 marks</p> <p>Allow one mark for 13.69</p> | 2 |

| Question Number | Answer | Additional guidance | Mark |
|-------------------|--|---------------------|----------|
| 6(c) (iii) | <p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none">• 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) | <p>An explanation that makes reference to the following two points</p> <ul style="list-style-type: none"> • 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) | <p>Allow converse for mp1 and mp2</p> <p>Allow reaction will slow down Allow the rate of oxygen production / bubbles produced will slow</p> <p>Allow reaction is not limited by substrate concentration Allow reaction may have finished by 10 min</p> | 2 |

Total 12 marks