



Mark Scheme (Results)

Summer 2019

Pearson Edexcel International GCSE
In Biology (4BI1) Paper 1BR

Edexcel and BTEC Qualifications

Edexcel and BTEC qualifications are awarded by Pearson, the UK's largest awarding body. We provide a wide range of qualifications including academic, vocational, occupational and specific programmes for employers. For further information visit our qualifications websites at www.edexcel.com or www.btec.co.uk. Alternatively, you can get in touch with us using the details on our contact us page at www.edexcel.com/contactus.

Pearson: helping people progress, everywhere

Pearson aspires to be the world's leading learning company. Our aim is to help everyone progress in their lives through education. We believe in every kind of learning, for all kinds of people, wherever they are in the world. We've been involved in education for over 150 years, and by working across 70 countries, in 100 languages, we have built an international reputation for our commitment to high standards and raising achievement through innovation in education. Find out more about how we can help you and your students at: www.pearson.com/uk

Summer 2019

Publications Code 4BI1_1BR_msc_20190822

All the material in this publication is copyright

© Pearson Education Ltd 2019

| Question Number | Answer | Mark |
|-----------------|--|----------|
| 1(a) | <p>D owl</p> <p><i>A is incorrect because corn is a producer</i></p> <p><i>B is incorrect because the grasshopper is a primary consumer</i></p> <p><i>C is incorrect because the mouse is a primary consumer</i></p> | 1 |

| Question Number | Answer | Mark |
|-----------------|---|----------|
| 1(b) | <p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • <u>photosynthesis</u> (1) • (light energy to) <u>chemical</u> energy / ATP (1) • carbohydrate / sucrose / glucose / starch (1) | 2 |

| Question Number | Answer | Additional guidance | Mark |
|-----------------|---|-------------------------------|----------|
| 1(c) | <p>An explanation that makes reference to three of the following points:</p> <ul style="list-style-type: none"> • respiration / movement / heat loss (1) • egested / undigested / faeces / not absorbed / not assimilated (1) • excretion / urine / urea (1) • uneaten / bone / teeth / fur (1) • death / <u>decomposition</u> (1) | <p>Excreted as faeces = 1</p> | 3 |

| Question Number | Answer | Additional guidance | Mark |
|-----------------|--|---|----------|
| 1(d)(i) | <p>An explanation that makes reference to three of the following points:</p> <ul style="list-style-type: none"> • hyphae / mycelium (1) • enzymes / named enzyme (1) • extracellular <u>digestion</u> / <u>digestion</u> outside fungus (1) • <u>absorption</u> / <u>absorbed</u> (1) • saprotrophic / saprophytic / saprobiontic (1) | <p>Ignore breakdown</p> <p>Ignore reabsorbed</p> <p>Allow parasitic</p> | 3 |

| Question Number | Answer | Mark |
|-----------------|---|----------|
| 1(d)(ii) | <p>C rabbit</p> <p><i>A is incorrect because grass is not hunted by predators</i></p> <p><i>B is incorrect because the owl is a predator</i></p> <p><i>D is incorrect because the snake is a predator</i></p> | 1 |

| Question Number | Answer | Mark |
|-----------------|--|----------|
| 1(e) | <p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"> • takes long(er) / increases time / digestion slow(er) (1) • whole mouse has a small(er) surface area (to volume ratio) / <p>chewed mouse has larg(er) surface area (to volume ratio) (1)</p> | 2 |

Total 12 mark

| Question Number | Answer | Additional guidance | Mark |
|-----------------|---|--|----------|
| 2(a) | <p>An answer that makes reference to the following points:</p> <ul style="list-style-type: none"> • S scale linear and half the grid (1) • L straight lines joining points (1) • A axes correct way around and labelled 'days' and 'number of cells $\times 10^3$' (1) • P points plotted correctly within one square (1) • K key shown (1) | <p>Allow truncated y axis</p> <p>Bar graph loses S and L</p> <p>Extrapolation to 0 loses L</p> <p>Non-linear scale loses S and P</p> | 5 |

| Question Number | Answer | Mark |
|-----------------|---|----------|
| 2(b) | <p>B number of cells</p> <p><i>A is incorrect because germination rate is not measured in the investigation</i></p> <p><i>C is incorrect because pollution is the independent variable</i></p> <p><i>D is incorrect because time after germination is an independent variable</i></p> | 1 |

| Question Number | Answer | Mark |
|-----------------|---|----------|
| 2(c)(i) | <ul style="list-style-type: none"> • mitosis | 1 |

| Question Number | Answer | Additional guidance | Mark |
|-----------------|--|---|----------|
| 2(c)(ii) | <p>An answer that makes reference to four of the following points:</p> <ul style="list-style-type: none"> • temperature (1) • affects enzymes (1) <p>or</p> <ul style="list-style-type: none"> • water / moisture (1) • solvent / activates enzymes / dissolve chemicals / reactions (1) <p>or</p> <ul style="list-style-type: none"> • oxygen (1) • respiration (1) <p>or</p> <ul style="list-style-type: none"> • (sun)light (1) • phytochrome (1) <p>or</p> <ul style="list-style-type: none"> • pH (1) • affects enzymes (1) | <p>Mp1 Ignore warmth / heat / cold</p> <p>Mp3 Ignore humidity</p> | 4 |

| Question Number | Answer | Additional guidance | Mark |
|------------------|--|---|----------|
| 2(c)(iii) | <p>An answer that makes reference to the following point:</p> <ul style="list-style-type: none"> • age / species / type / variety / size / mass | <p>Allow from same plant</p> <p>Ignore microbes / pests</p> | 1 |

Total 12 marks

| Question Number | Answer | Additional guidance | Mark |
|-----------------|--|---|----------|
| 3 | <p>An answer that makes reference to the following points:</p> <ul style="list-style-type: none"> • <u>tropism(s)</u> / tropic (responses) (1) • to / toward(s) / (move) towards (1) • phototropic / phototropism (1) • auxin / IAA (1) • gravity (1) • negative (1) | <p>Trophism = 0 Phototropism = 0</p> <p>Mp3 allow phototropic</p> | 6 |

Total 6 marks

| Question Number | Answer | Additional guidance | Mark |
|-----------------|---|--|----------|
| 4(a) | <p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"> • amino acids (1) • protein / enzymes (1) • DNA / RNA / ATP / chlorophyll / (1) | <p>Nitrate contains amino acids / protein = 0</p> <p>Ignore chloroplasts</p> | 2 |

| Question Number | Answer | Mark |
|-----------------|--|----------|
| 4(b) | <p>A small and soluble</p> <p><i>B is incorrect because mineral ions are not insoluble</i></p> <p><i>C is incorrect because mineral ions are not large</i></p> <p><i>D is incorrect because mineral ions are not large and insoluble</i></p> | 1 |

| Question Number | Answer | Additional guidance | Mark |
|-----------------|---|-----------------------------------|----------|
| 4(c)(i) | <p>An answer that makes reference to the following points:</p> <ul style="list-style-type: none"> • fewer plants / fewer algae / less eutrophication (1) • (more) light and (more) photosynthesis (1) • (less) <u>decomposition</u> / <u>decomposed</u> / <u>decomposers</u> (1) • (more) oxygen / not anoxic / less BOD (1) • respiration (ONCE) (1) • (catch) more fish / fewer fish killed / better catch / fish survive / fish do not suffocate / eq (1) | <p>Allow converse for all Mps</p> | 4 |

| Question Number | Answer | Additional guidance | Mark |
|-----------------|---|---------------------|----------|
| 4(c)(ii) | <p>A description that makes reference to the following points:</p> <ul style="list-style-type: none"> • restriction to (cut / eq) DNA / gene / allele / plasmid (1) • ligase to (join / eq) DNA / gene / allele / plasmid (1) | Allow restrictive | 2 |

Total 9 marks

| Question Number | Answer | Mark |
|-----------------|---|----------|
| 5(a) | <p>D arteries have thicker walls</p> <p><i>A is incorrect because veins transport blood to the heart</i></p> <p><i>B is incorrect because veins have a larger lumen</i></p> <p><i>C is incorrect because veins contain valves</i></p> | 1 |

| Question Number | Answer | Additional guidance | Mark |
|-----------------|---|---|----------|
| 5(b)(i) | <ul style="list-style-type: none"> • correct measurement of lengths • divide decrease in diameter by diameter of lumen • multiplication to get percentage <p>42 / 41.7 / 41.67 / 41.667 / 41.6 recurring (3)</p> | <p>Award full marks for correct numerical answer without working</p> <p>36 and 15 or 36 and 21</p> <p>36 – 21 = 15 15 ÷ 36 = 0.42</p> <p>x 100 = 42</p> <p>One mark for 36 and 15 or 36 and 21 or 3.6 and 1.5 or 3.6 and 2.1</p> <p>One mark for ÷ 36 or 3.6 or their measured diameter within range 35 to 45 or 3.5 to 4.5</p> | 3 |

| Question Number | Answer | Mark |
|-----------------|--|----------|
| 5(b)(ii) | <p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"> • becomes anaerobic (1) • (less) oxygen (1) | 2 |

| Question Number | Answer | Additional guidance | Mark |
|-----------------|--|------------------------------------|----------|
| 5(c) | <p>An answer that makes reference to two the following points:</p> <ul style="list-style-type: none">• smoking / nicotine (1)• lack of exercise / sedentary lifestyle (1)• salt (1)• stress (1)• alcohol (1)• sex (1)• age (1)• <u>high</u> blood pressure (1)• obesity (1)• high carbohydrate diet / eq (1)• diabetes (1)• genes / genetics / eq (1) | Allow family history / inheritance | 2 |

| Question Number | Answer | Additional guidance | Mark |
|-----------------|---|--|----------|
| 5(d) | <p>An explanation that makes reference to four of the following points:</p> <ul style="list-style-type: none"> • <u>vasodilation</u> (1) • (more) blood to surface / skin (1) • heat loss / cooling / prevents overheating (1) • radiation / convection (1) • affect enzymes (1) | <p>Allow converse</p> <p>Mp2 blood vessel moves close to surface = 0</p> | 4 |

Total 12 marks

| Question Number | Answer | Additional guidance | Mark |
|-----------------|--|-------------------------|----------|
| 6(a) | <ul style="list-style-type: none"> <i>Lactobacillus / Lactobacillus bulgaricus / L. bulgaricus / Streptococcus / Streptococcus thermophilus / S. thermophilus</i> (1) | Allow phonetic spelling | 1 |

| Question Number | Answer | Mark |
|-----------------|--|----------|
| 6(b) | <ul style="list-style-type: none"> lactic / lactate | 1 |

| Question Number | Answer | Additional guidance | Mark |
|-----------------|--|--|----------|
| 6(c)(i) | <ul style="list-style-type: none"> readings from graph line divide by number of hours <p>0.2 (2)</p> | <p>Award full marks for correct numerical answer without working</p> <p>$0.7 - 0.3 = 0.4$</p> <p>$0.4 \div 2 = 0.2$</p> <p>Allow one mark if 0.7 and 0.3 in working</p> | 2 |

| Question Number | Answer | Mark |
|-----------------|---|---|
| 6(c)(ii) | <p>An answer that makes reference to the following points:</p> <ul style="list-style-type: none"> fast(er) production at higher temperature / at 43°C / more produced in stated time (1) fast(er) production at low oxygen / more produced in stated time (1) no effect in first hour / no difference up to one hour / both same in first hour / both similar in first hour / both reach 0.29 after one hour (1) | <p>3</p> <p>Allow converse for Mp1 and Mp2</p> |

Total 7 marks

| Question Number | Answer | Additional guidance | Mark |
|-----------------|-----------------------------|---|----------|
| 7(a)(i) | many/multiple/lots of genes | <p>Allow more than one gene / two or more genes</p> <p>Many genes and the environment / many characteristics by many genes = 0</p> <p>Ignore many alleles</p> | 1 |

| Question Number | Answer | Mark | | | | | | | | | |
|-----------------|---|------------|------|--------|---------|------------|------------|-------|------------|------------|----------|
| 7(a)(ii) | <table border="1" style="margin-left: auto; margin-right: auto;"> <thead> <tr> <th></th> <th>Mode</th> <th>Median</th> </tr> </thead> <tbody> <tr> <td>females</td> <td>163 to 164</td> <td>163 to 164</td> </tr> <tr> <td>males</td> <td>176 to 178</td> <td>176 to 178</td> </tr> </tbody> </table> <p style="text-align: center;">(1) (1)</p> | | Mode | Median | females | 163 to 164 | 163 to 164 | males | 176 to 178 | 176 to 178 | 2 |
| | Mode | Median | | | | | | | | | |
| females | 163 to 164 | 163 to 164 | | | | | | | | | |
| males | 176 to 178 | 176 to 178 | | | | | | | | | |

| Question Number | Answer | Mark |
|------------------|---|----------|
| 7(a)(iii) | <p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • genes / alleles / chromosome (1) • (difference in) nutrition / diet / quality of food / quantity of food (1) • (difference in) <u>metabolism</u> / <u>metabolic rate</u> / <u>respiration</u> (1) • hormones / named hormone (1) • osteoporosis / less bone mass (in women) (1) | 2 |

| Question Number | Answer | Additional guidance | Mark |
|-----------------|---|--|----------|
| 7(b)(i) | <p>An explanation that makes reference to four of the following points:</p> <ul style="list-style-type: none"> • parents both Hh (1) • gametes are H and h (1) • offspring are HH, Hh, (Hh) and hh (1) • first child is hh / second child is HH or Hh (1) | <p>Allow use of different letter</p> <p>Allow Mps 1, 2 and 3 from Punnett square</p> <p>Allow ecf for gametes only</p> | 4 |

| Question Number | Answer | Additional guidance | Mark |
|-----------------|--|---|----------|
| 7(b)(ii) | <p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • pedigree / family history / ancestors / family tree / check parents (1) • born with condition / always had it / condition developed later in life / not born with it (1) • <u>DNA test</u> / <u>genetic test</u> (1) | <p>If (both) parents don't have white patch it is vitiligo / not piebaldism = 2</p> | 2 |

Total 11 marks

| Question Number | Answer | Additional guidance | Mark |
|-----------------|--|--|----------|
| 8(a) (i) | pull (rubber) sheet <u>down</u> / pull ring <u>down</u> | Blowing into tube and pulling sheet down = 0 Pull up and down = 0 | 1 |

| Question Number | Answer | Additional guidance | Mark |
|-----------------|---|--|----------|
| 8(a)(ii) | An explanation that makes reference to three of the following points: <ul style="list-style-type: none"> • increase in <u>volume</u> (1) • decrease in pressure (1) • pressure (inside) lower than atmospheric (outside) (1) • air in (1) | Mp1 Ignore balloons Mp4 Ignore inflate / blown in | 3 |

| Question Number | Answer | Mark |
|-----------------|--|----------|
| 8(b) | <p>An answer that makes reference to four of the following points:</p> <ul style="list-style-type: none"> • reference to diaphragm (1) • balloons represent lungs (1) • reference to trachea / windpipe / bronchus (1) • reference to ribs / ribcage / movement of chest / ribcage / bell jar does not move (1) • reference to <u>intercostal</u> muscles (1) | 4 |

| Question Number | Answer | Additional guidance | Mark |
|-----------------|--|--|----------|
| 8(c)(i) | <p>An answer on that makes reference to the following points:</p> <ul style="list-style-type: none"> • increase diameter / width / expands the airways / bronchi / bronchioles (1) • air / oxygen into lungs / alveoli | <p>Mp1 Ignore dilate Mp1 Allow trachea</p> | 2 |

| Question Number | Answer | Mark |
|-----------------|--|----------|
| 8(c)(ii) | <p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • need <u>oxygen</u> / getting less <u>oxygen</u> / short of <u>oxygen</u> / eq (1) • respiration (1) • (removal of) carbon dioxide (1) | 2 |

Total 12 marks

| Question Number | Answer | Additional guidance | Mark |
|-----------------|--|---|----------|
| 9(a) | $6\text{CO}_2 + 6\text{H}_2\text{O} \longrightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \text{ (2)}$ | <p>Award no marks for word equation</p> <p>One mark for correct equation but not balanced</p> <p>Respiration equation = 0</p> <p>Ignore light / chlorophyll</p> | 2 |

| Question Number | Answer | Additional guidance | Mark |
|-----------------|---|---------------------|----------|
| 9(b)(i) | <p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • (no) photosynthesis (1) • remove <u>starch</u> / <u>destarch</u> / cannot make <u>starch</u> (1) • respiration (1) | Mp1 less = 0 | 2 |

| Question Number | Answer | Mark |
|-----------------|--|----------|
| 9(b)(ii) | remove carbon dioxide / remove CO ₂ | 1 |

| Question Number | Answer | Mark |
|-----------------|--|----------|
| 9(c)(i) | <p>B orange</p> <p><i>A is incorrect because iodine is not white in colour</i></p> <p><i>C is incorrect because starch is not present</i></p> <p><i>D is incorrect because iodine is not brick-red in colour</i></p> | 1 |

| Question Number | Answer | Mark |
|-----------------|--|----------|
| 9(c)(ii) | <p>C blue-black</p> <p><i>A is incorrect because starch is not white when iodine is added</i></p> <p><i>B is incorrect because starch is not orange when iodine is added</i></p> <p><i>D is incorrect because starch is not brick-red when iodine is added</i></p> | 1 |

| Question Number | Answer | Mark |
|-----------------|--|----------|
| 9(d) | <p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"> • control (1) • carbon dioxide not absorbed / plant has carbon dioxide / CO₂ in bell jar / carbon dioxide needed for photosynthesis <p>show <u>bell jar</u> allows photosynthesis / <u>bell jar</u> allows starch production (1)</p> | 2 |

Total 9 marks

| Question Number | Answer | Additional guidance | Mark |
|-----------------|--|--|----------|
| 10(a) | <p>A description that makes reference to the following points:</p> <ul style="list-style-type: none"> • <u>carbohydrate</u> for energy / respiration (1) • lipid / fat for energy / storage / insulation / myelin / hormones / protecting organs (1) • protein for <u>growth</u> / <u>repair</u> / (named) enzyme / hormones / antibodies / neurotransmitter (1) • water as solvent / transport / reactions / temperature regulation / prevent constipation / help egestion (1) • fibre / roughage for peristalsis / move food / prevent constipation / help egestion (1) | <p>Allow correct named hormone for Mp2 and Mp3</p> <p>Mp3 Ignore skin / nails / hair / bones</p> <p>Ignore prevents cancer</p> | 5 |

| Question Number | Answer | Additional guidance | Mark |
|-----------------|--|--|----------|
| 10(b) | <p>An explanation that makes reference to four of the following points:</p> <ul style="list-style-type: none"> • vitamin A for (foetus) eyes / vision / sight (1) • vitamin C for (foetus) skin / (connective) tissue (1) • vitamin D for (foetus) bones / teeth / calcium absorption (1) • calcium for (foetus) bones / teeth / milk (1) • iron for (foetus) haemoglobin / Hb / <u>red</u> blood cells (1) • phosphate for (foetus) ATP / bones / DNA / RNA (1) | <p>Answer makes no mention of foetus / embryo / baby = max 3</p> <p>Mp2 Ignore scurvy</p> <p>Mp3 Ignore rickets</p> <p>Allow other vitamins and minerals eg. vitamin B for nerve development</p> | 4 |

| Question Number | Answer | Mark |
|-----------------|-------------------|----------|
| 10(c)(i) | (70 × 126 =) 8820 | 1 |

| Question Number | Answer | Additional guidance | Mark |
|------------------|---|---|----------|
| 10(c)(ii) | <ul style="list-style-type: none"> determine difference in energy requirement multiplication to get percentage <p>98.8 / 98.81 / 99 (2)</p> | <p>Award full marks for correct numerical answer without working</p> <p>overweight 84 and underweight 167 $167 - 84 = 83$ $\div 84$ percentage increase = $83 \div 84 \times 100$</p> <p>or</p> $167 \times 80 = 13360$ $84 \times 80 = 6720$ $6640 \div 6720 = 0.98809 \times 100$ <p>Allow one mark for 83 and 84 or 13360 and 6720</p> | 2 |

| Question Number | Answer | Additional guidance | Mark |
|-------------------|---|--|----------|
| 10(c)(iii) | <p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> use lipid / fat / glycogen / protein (1) <u>respiration</u> (1) | Mp1 Ignore idea of not having enough lipid / protein = 0 | 2 |

Total 14 marks

| Question Number | Answer | Additional guidance | Mark |
|-----------------|---|--|----------|
| 11 | <p>An answer that makes reference to the following points:</p> <ul style="list-style-type: none"> • C venom and no venom / different concentration / different volumes / different amounts of venom (1) • O same species / sex / age / size of wasp (1) • R repeat / group / eq (1) • M1 number of wasps / count wasps (1) • M2 in stated time period (1) • S1 + S2 same volume of solutions / venom from same source / venom same distance from wasps / same size of container / same size dish / same temperature / light / time of day / time of year / weather / wind / other scents / eq (2) | S2 Ignore carbon dioxide / oxygen / prey | 6 |

Total 6 marks

Pearson Education Limited. Registered company number 872828
with its registered office at 80 Strand, London, WC2R 0RL, United Kingdom