



# Mark Scheme (Results)

Summer 2019

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

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Summer 2019

Publications Code 4BI1\_1BR\_msc\_20190822

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Question Number	Answer	Mark
<b>1(a)</b>	<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>	<b>1</b>

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

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

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

Question Number	Answer	Mark
<b>1(d)(ii)</b>	<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>	<b>1</b>

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

Total 12 mark

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

Question Number	Answer	Mark
<b>2(b)</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>	<b>1</b>

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

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

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

Total 12 marks

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

Total 6 marks

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

Question Number	Answer	Mark
<b>4(b)</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>	<b>1</b>

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

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

Total 9 marks

Question Number	Answer	Mark
<b>5(a)</b>	<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>	<b>1</b>

Question Number	Answer	Additional guidance	Mark
<b>5(b)(i)</b>	<ul style="list-style-type: none"> <li>• correct measurement of lengths</li> <li>• divide decrease in diameter by diameter of lumen</li> <li>• multiplication to get percentage</li> </ul> <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 <b>and</b> 15 or 36 <b>and</b> 21 or 3.6 <b>and</b> 1.5 or 3.6 <b>and</b> 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>	<b>3</b>

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

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

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

Total 12 marks

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

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

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

Question Number	Answer	Mark
<b>6(c)(ii)</b>	<p>An answer that makes reference to the following points:</p> <ul style="list-style-type: none"> <li>fast(er) production at higher temperature / at 43°C / more produced in stated time (1)</li> <li>fast(er) production at low oxygen / more produced in stated time (1)</li> <li>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)</li> </ul>	<p><b>3</b></p> <p>Allow converse for Mp1 and Mp2</p>

Total 7 marks

Question Number	Answer	Additional guidance	Mark
<b>7(a)(i)</b>	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>	<b>1</b>

Question Number	Answer	Mark									
<b>7(a)(ii)</b>	<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	<b>2</b>
	Mode	Median									
females	163 to 164	163 to 164									
males	176 to 178	176 to 178									

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

Question Number	Answer	Additional guidance	Mark
<b>7(b)(i)</b>	<p>An explanation that makes reference to four of the following points:</p> <ul style="list-style-type: none"> <li>• parents both Hh (1)</li> <li>• gametes are H and h (1)</li> <li>• offspring are HH, Hh, (Hh) and hh (1)</li> <li>• first child is hh / second child is HH or Hh (1)</li> </ul>	<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>	<b>4</b>

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

Total 11 marks

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

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

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

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

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

Total 12 marks

Question Number	Answer	Additional guidance	Mark
<b>9(a)</b>	$6\text{CO}_2 + 6\text{H}_2\text{O} \longrightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2 \text{ (2)}$	<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>	<b>2</b>

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

Question Number	Answer	Mark
<b>9(b)(ii)</b>	remove carbon dioxide / remove CO <sub>2</sub>	<b>1</b>

Question Number	Answer	Mark
<b>9(c)(i)</b>	<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>	<b>1</b>

Question Number	Answer	Mark
<b>9(c)(ii)</b>	<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>	<b>1</b>

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

Total 9 marks

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

Question Number	Answer	Additional guidance	Mark
<b>10(b)</b>	<p>An explanation that makes reference to four of the following points:</p> <ul style="list-style-type: none"> <li>• vitamin A for (foetus) eyes / vision / sight (1)</li> <li>• vitamin C for (foetus) skin / (connective) tissue (1)</li> <li>• vitamin D for (foetus) bones / teeth / calcium absorption (1)</li> <li>• calcium for (foetus) bones / teeth / milk (1)</li> <li>• iron for (foetus) haemoglobin / Hb / <u>red</u> blood cells (1)</li> <li>• phosphate for (foetus) ATP / bones / DNA / RNA (1)</li> </ul>	<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>	<b>4</b>

Question Number	Answer	Mark
<b>10(c)(i)</b>	(70 × 126 =) 8820	<b>1</b>

Question Number	Answer	Additional guidance	Mark
<b>10(c)(ii)</b>	<ul style="list-style-type: none"> <li>determine difference in energy requirement</li> <li>multiplication to get percentage</li> </ul> <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  <math>167 - 84 = 83</math>  <math>\div 84</math>  percentage increase = <math>83 \div 84 \times 100</math></p> <p>or</p> <p><math>167 \times 80 = 13360</math>  <math>84 \times 80 = 6720</math></p> <p><math>6640 \div 6720 = 0.98809 \times 100</math></p> <p>Allow one mark for 83 <b>and</b> 84 or 13360 <b>and</b> 6720</p>	<b>2</b>

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

Total 14 marks

Question Number	Answer	Additional guidance	Mark
<b>11</b>	<p>An answer that makes reference to the following points:</p> <ul style="list-style-type: none"> <li>• C venom and no venom / different concentration / different volumes / different amounts of venom (1)</li> <li>• O same species / sex / age / size of wasp (1)</li> <li>• R repeat / group / eq (1)</li> <li>• M1 number of wasps / count wasps (1)</li> <li>• M2 in stated time period (1)</li> <li>• 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)</li> </ul>	S2 Ignore carbon dioxide / oxygen / prey	<b>6</b>

Total 6 marks

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