



# Mark Scheme (Results)

January 2020

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

Question Number	Answer	Additional guidance	Mark
<b>1(a)</b>	<p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> <li>• (damage to) alveoli (1)</li> <li>• reduces / less / small surface area (1)</li> <li>• (less) diffusion / (less) oxygen in / (less) carbon dioxide out (1)</li> </ul>	<p>Less surface area of alveoli = two marks</p>	<b>2</b>

Question Number	Answer	Additional guidance	Mark
<b>1(b)</b>	<p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"> <li>• bacteria / microorganisms / pathogens are killed / destroyed / removed / eq (1)</li> <li>• no / less chance of infection (with TB) / disease / catching <i>Mycobacterium</i> / <i>Mycobacterium bovis</i> / catching TB / eq (1)</li> </ul>	<p><b>Allow</b> converse</p> <p><b>Ignore</b> get sick / ill</p>	<b>2</b>

Question Number	Answer	Additional guidance	Mark
<b>1(c)</b>	<p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> <li>• fewer cattle (to be infected) (1)</li> <li>• fewer people in Europe (than in rest of world) (1)</li> <li>• cattle are screened / if infected are killed (1)</li> <li>• cattle are given antibiotics (1)</li> <li>• vaccination (of cattle / people / badgers in Europe) (1)</li> <li>• more pasteurised milk drunk / milk pasteurised (1)</li> <li>• fewer badgers (in Europe to transmit TB) / fewer other animals (in Europe to transmit TB) / badgers culled (in Europe) (1)</li> </ul>	<b>Allow</b> converse	<b>2</b>

Question Number	Answer	Additional guidance	Mark
<b>1(d)</b>	<ul style="list-style-type: none"> <li>• <math>149\,000 - 1290 = 147\,710</math> and <math>13\,400 - 103 = 13\,297</math> (1)</li> <li>• <math>147\,710 \div 13\,297 = 11.1 : 1</math> (2)</li> </ul>	<p>award full marks for correct numerical answer without working</p> <p><b>Allow</b> 11.11, 11.108 etc</p> <p><b>Allow</b> full marks for 11.1 to 1</p> <p>one mark for 13297 <b>and</b> 147710</p> <p>or</p> <p>one mark for 1:11.1</p> <p>or</p> <p>one mark for 11.1 alone</p>	<b>2</b>

Question Number	Answer	Mark
<b>1(e)</b>	<p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> <li>• (find / protect / less competition for) mates / females (1)</li> <li>• (protect) food / less competition for food / resources / obtain more food (1)</li> <li>• protect young (1)</li> </ul>	<b>2</b>

Question Number	Answer	Additional guidance	Mark
<b>1(f)</b>	<p>An explanation that makes reference to three of the following points:</p> <ul style="list-style-type: none"> <li>• use attenuated / dead / weak / inactive pathogen / bacterium / eq (1)</li> <li>• antigens (1)</li> <li>• <u>memory cells</u> (1)</li> <li>• <u>secondary immune</u> (response) (1)</li> <li>• antibody production fast(er) / soon(er) / more / large amounts (1)</li> </ul>	<p><b>Ignore</b> disease / virus</p> <p>no credit for antibody production alone</p>	<b>3</b>

Question Number	Answer	Mark
<b>1(g)</b>	<p>An answer that makes reference to three of the following points:</p> <ul style="list-style-type: none"> <li>• vaccinate badgers in one area and not in another / eq (1)</li> <li>• (count) number of cattle with TB / see if there are fewer / more cases of TB (1)</li> <li>• same number / control number of badgers in each area (1)</li> <li>• same field size / area (1)</li> <li>• same number of cattle (1)</li> </ul>	<b>3</b>

Total = 16 marks

Question Number	Answer	Additional guidance	Mark
<b>2(a)</b>	<p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"> <li>• draws water up (to leaves) / enables water to be taken up (by roots) (1)</li> <li>• cooling (1)</li> <li>• (transport) minerals / named mineral (1)</li> <li>• prevent wilting / eq (1)</li> <li>• (water for) photosynthesis (1)</li> </ul>	<b>Allow</b> maintain turgidity	<b>2</b>

Question Number	Answer	Additional guidance	Mark
<b>2(b)(i)</b>	<ul style="list-style-type: none"> <li>• reading from graph multiplied = <math>21.5 \times 10^{-4} = 0.00215</math></li> <li>• multiply by 250</li> </ul> <p>Answer: 0.5375 or 0.538 or 0.537 or 0.54 scores two (2)</p>	<p>award full marks for correct numerical answer without working</p> <p>one mark for x 250</p> <p>one mark for 0.00215</p> <p>one mark for 5400 or 5375 or 5380 or 5370</p>	<b>2</b>

Question Number	Answer	Additional guidance	Mark
<b>2(b)(ii)</b>	<p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"> <li>• wind moves water (away from plant surface) / blows water away (1)</li> <li>• creates / maintains / increases (concentration) gradient (1)</li> <li>• (more) (water moves out of plant by) diffusion / evaporation (1)</li> </ul>	<p><b>Allow</b> converse for still air for all marking points</p> <p>Maintains diffusion gradient = two marks</p>	<b>3</b>

Question Number	Answer	Additional guidance	Mark
<b>2(c)</b>	<p>An answer that makes reference to the following points:</p> <ul style="list-style-type: none"> <li>• (same) light (intensity) (1)</li> <li>• as it affects stomata opening / eq (1)</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• (same) temperature (1)</li> <li>• as it affects diffusion / speed of molecules / (kinetic) energy / evaporation (1)</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• humidity (1)</li> <li>• reduces / affects concentration / diffusion gradient (1)</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• (same) species / age / size / mass / leaf area of plant (1)</li> <li>• as this affects number of stomata / thickness of leaves / eq (1)</li> </ul> <p>OR</p> <ul style="list-style-type: none"> <li>• same CO<sub>2</sub> concentration (1)</li> <li>• as it affects stomata opening (1)</li> </ul>	<p>Mark in pairs</p> <p><b>Ignore</b> transpiration</p>	<b>4</b>

Total = 11 mark

Question Number	Answer	Mark
<b>3(a)</b>	<p>A the left ventricle is thick to pump blood to the body</p> <p><i>B is not correct because the left ventricle wall is not thin</i></p> <p><i>C is not correct because the right ventricle pumps to the lungs</i></p> <p><i>D is not correct because the right ventricle wall is not thick</i></p>	<b>1</b>

Question Number	Answer	Additional guidance	Mark
<b>3(b)</b>	<p>An explanation that makes reference to three of the following points:</p> <ul style="list-style-type: none"> <li>• ventricle (wall) is thinner / ventricle (wall) has less muscle (1)</li> <li>• <u>coronary artery</u> is blocked / coronary artery has less blood passing through / eq (1)</li> <li>• less oxygen / glucose (1)</li> <li>• less (aerobic) respiration / anaerobic respiration occurs / not enough energy / less ATP (1)</li> <li>• cell / muscle / tissue death (1)</li> </ul>	<b>Ignore</b> heart dies	<b>3</b>

Question Number	Answer	Additional guidance	Mark
<b>3(c)(i)</b>	<p>An explanation that makes reference to three of the following points:</p> <ul style="list-style-type: none"> <li>• (stem cells can) differentiate / can become muscle cells / can make any cell types / stem cells are undifferentiated / unspecialised cells / eq (1)</li> <li>• stem cells divide / (carry out) mitosis / cell division (1)</li> </ul>	<b>Allow</b> stem cells are pluripotent / totipotent / multipotent	<b>2</b>

Question Number	Answer	Additional guidance	Mark
<b>3(c)(ii)</b>	<p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> <li>• cells have same DNA / genes / alleles / eq (1)</li> <li>• same antigens / tissue type / blood group (1)</li> <li>• less risk of rejection / not rejected (1)</li> <li>• no immune response / by immune system / no need to take immunosuppressants (1)</li> <li>• no risk of infection / disease spread (1)</li> </ul>	<p>No immune rejection = two marks</p>	<b>2</b>

Total = 8 marks

Question Number	Answer	Additional guidance	Mark
<b>4 (a)</b>	<p>An answer that makes reference to three of the following points:</p> <ul style="list-style-type: none"> <li>• (DNA is) double stranded / helix (1)</li> <li>• (DNA has) thymine / T / does not have uracil / U (1)</li> <li>• (DNA has) deoxyribose (1)</li> <li>• (DNA is) long(er) / large(r)</li> </ul>	<p><b>Allow</b> converse</p> <p>(RNA) is single stranded</p> <p>(RNA) has uracil / U / does not have thymine / T</p> <p>(RNA) has ribose</p> <p>(RNA is) shorter</p>	<b>3</b>

Question Number	Answer	Additional guidance	Mark
<b>4 (b)</b>	<p>A description that makes reference to five the following points:</p> <ul style="list-style-type: none"> <li>• transcription occurs in the nucleus (1)</li> <li>• transcription uses <u>DNA</u> to make <u>RNA</u> / eq (1)</li> <li>• DNA unzips / one strand is copied / eq (1)</li> <li>• transcription makes / produces <u>messenger RNA</u> / <u>mRNA</u> (1)</li> <li>• translation takes place at the ribosomes / in cytoplasm (1)</li> <li>• translation involves <u>messenger RNA</u> / <u>mRNA</u> <b>and</b> <u>transfer RNA</u> / <u>tRNA</u> (1)</li> <li>• anticodons bind to codons / eq (1)</li> <li>• translation produces amino acid chain / protein / polypeptide / eq (1)</li> </ul>	<p>Transcription uses DNA to make messenger RNA = two marks</p> <p>Anticodons on tRNA bind to codons on mRNA = two marks</p>	<b>5</b>

Question Number	Answer	Additional guidance	Mark
<b>4 (c)</b>	An answer that makes reference to the following points: <ul style="list-style-type: none"> <li>• (if read in threes) = <math>4^3</math> <b>or</b> <math>4 \times 4 \times 4</math> (1)</li> <li>• = 64 (1)</li> <li>• (64 is) greater / more than 20 (combinations) required / needed / eq (1)</li> <li>• (if read in twos) = <math>4^2</math> <b>or</b> <math>4 \times 4 = 16</math> (1)</li> </ul>	64 is greater than 20 is two marks	<b>3</b>

Total = 11 marks

Question Number	Answer	Mark
<b>5(a)(i)</b>	<p>A collecting duct</p> <p><i>B is not correct because it is not the collecting duct</i></p> <p><i>C is not correct because it is not the collecting duct</i></p> <p><i>D is not correct because it is not the collecting duct</i></p>	<b>1</b>

Question Number	Answer	Mark
<b>5(a)(ii)</b>	<p>D T</p> <p><i>A is not correct because ultrafiltration does not occur here</i></p> <p><i>B is not correct because ultrafiltration does not occur here</i></p> <p><i>C is not correct because ultrafiltration does not occur here</i></p>	<b>1</b>

Question Number	Answer	Mark
<b>5(a)(iii)</b>	<p>A P</p> <p><i>B is not correct because not affected by ADH</i></p> <p><i>C is not correct because not affected by ADH</i></p> <p><i>D is not correct because not affected by ADH</i></p>	<b>1</b>

Question Number	Answer	Mark
<b>5(a)(iv)</b>	<p>B R</p> <p><i>A is not correct because glucose not absorbed</i></p> <p><i>C is not correct because glucose not absorbed</i></p> <p><i>D is not correct because glucose not absorbed</i></p>	<b>1</b>

Question Number	Answer	Mark
<b>5 (b)(i)</b>	<p>An answer that makes reference to the following points:</p> <ul style="list-style-type: none"> <li>• increasing birth mass associated with more nephrons / eq (1)</li> <li>• a positive correlation / linear / straight line / (directly) proportional (1)</li> </ul>	<b>2</b>

Question Number	Answer	Mark
<b>5 (b)(ii)</b>	<p>An explanation that makes reference to four of the following points:</p> <ul style="list-style-type: none"> <li>• proteins are big / large / only small molecules (1)</li> <li>• normally will not pass out of glomerulus / through basement membrane / into Bowman's capsule / not present in glomerular filtrate (1)</li> <li>• (high blood pressure) forces / squeezes / pushes protein molecules out (1)</li> <li>• damage to glomerulus / Bowman's capsule / basement membrane / nephron (1)</li> </ul>	<b>4</b>

Question Number	Answer	Additional guidance	Mark
<b>5 (b)(iii)</b>	<p>An answer that makes reference to the following points:</p> <ul style="list-style-type: none"> <li>• add Biuret (1)</li> <li>• (changes to) purple/ lilac / mauve (1)</li> </ul>	<p><b>Allow</b> NaOH and CuSO<sub>4</sub> / use urine testing strips e.g uristix / eq</p> <p><b>Allow</b> green colour for urine testing strip</p>	<b>2</b>

Total = 12 marks

Question Number	Answer	Additional guidance	Mark
<b>6 (a)</b>	<p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> <li>to mix microorganisms / bacteria / fungi with the food substrates / prevent microorganisms / food settling / eq (1)</li> <li>to mix / distribute / eq oxygen (1)</li> <li>to keep temperature uniform / distribute heat (1)</li> </ul>	<p><b>Allow</b> named nutrients e.g. glucose / amino acids</p>	<b>2</b>

Question Number	Answer	Mark
<b>6 (b)</b>	<p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"> <li>oxygen for <u>respiration</u> / for <u>aerobic respiration</u> (1)</li> <li>(filter) remove bacteria / fungi / microorganisms / prevent competition / contamination (1)</li> </ul>	<b>2</b>

Question Number	Answer	Additional guidance	Mark
<b>6 (c)</b>	<p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> <li>monitor temperature (in fermenter) / control / maintain temperature / detect changes in temperature / keep temperature same (1)</li> <li>turn on water supply to cooling jacket if temperature increases / turn off water supply to cooling jacket if temperature drops / release water if too hot / release water to cool down / adjust water supply depending on temperature (1)</li> <li>prevent <u>enzymes</u> being denatured / maintains optimal temperature for <u>enzymes</u> (1)</li> </ul>	<p><b>Grad</b> <b>Ignore</b> record and read temperature</p> <p><b>Ignore</b> release hot water if too cold</p> <p>maintain optimal temperature for <u>enzymes</u> = two marks</p>	<b>2</b>

Total = 6 marks

Question Number	Answer	Mark
<b>7 (a)</b>	<ul style="list-style-type: none"> <li>Hh / Hh and Hh / hH / hH and hH / hH and Hh / Hh and hH</li> </ul>	<b>1</b>

Question Number	Answer	Mark
<b>7 (b)</b>	<ul style="list-style-type: none"> <li>2.1 : 1                      Allow 21 : 10, 2 : 1</li> </ul>	<b>1</b>

Question Number	Answer	Mark
<b>7 (c)</b>	<p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> <li>small sample size / too few crosses / eq (1)</li> <li>random / chance (of fertilisation) (1)</li> <li>of fertilisation / fusion of gametes / eq (1)</li> <li>fewer yellow (than predicted) / more brown (than predicted) (1)</li> <li>no HH offspring survive / ratio is 2 Hh : yellow to 1 hh brown / yellow mice more likely die / brown mice less likely to die (1)</li> <li>mutations (may have occurred) (1)</li> </ul>	<b>4</b>

Total 6 marks