



## Mark Scheme (Results)

January 2020

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



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

Question Number	Answer	Mark
<b>1(b)</b>	<p>B ovary (1)</p> <p><i>A is incorrect because the brain does not produce progesterone</i></p> <p><i>C is incorrect because the pituitary does not produce progesterone</i></p> <p><i>D is incorrect because the testis does not produce progesterone</i></p>	<b>1</b>

Question Number	Answer	Mark
<b>1(c)</b>	<p>D yes yes (1)</p> <p><i>A is incorrect because both organs excrete</i></p> <p><i>B is incorrect because the kidney excretes</i></p> <p><i>C is incorrect because the skin excretes</i></p>	<b>1</b>

Question Number	Answer	Additional guidance	Mark
<b>1(d)</b>	<p>A description that makes reference to three of the following points:</p> <ul style="list-style-type: none"> <li>• protease / pepsin / peptidase (1)</li> <li>• digest / breaks down <u>protein</u> (1)</li> <li>• hydrochloric acid (1)</li> <li>• kill pathogens / eq / optimum pH ignore germs (1)</li> <li>• churning/ mechanical digestion (1)</li> </ul>	<b>Allow</b> lipase digest lipid as alternative to mp1 and 2	<b>3</b>

Total = 6 marks



Question Number	Answer	Mark
<b>2(a)(i)</b>	<p>B P and S</p> <p><i>A is incorrect because Q contains oxygenated blood</i></p> <p><i>C is incorrect because R contains oxygenated blood</i></p> <p><i>D is incorrect because Q and R contain oxygenated blood</i></p> <p>/</p>	<b>1</b>

Question Number	Answer	Mark
<b>2(a)(ii)</b>	<p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> <li>• prevent backflow / blood returning (1)</li> <li>• to heart / ventricles (1)</li> <li>• blood transported to lungs / body (1)</li> <li>• pressure in ventricles drop / artery pressure is greater than ventricle pressure (1)</li> </ul>	<b>2</b>

Question Number	Answer	Additional guidance	Mark
<b>2(b)(i)</b>	<p>An answer that makes reference to the following points:</p> <ul style="list-style-type: none"> <li>• heart disease increases with age / older people more likely to have heart disease / more over 75 /eq (1)</li> <li>• males more at risk than females / men more at risk than women (1)</li> </ul>	<b>Allow</b> converse	<b>2</b>

Question Number	Answer	Additional guidance	Mark
<b>2(b)(ii)</b>	<ul style="list-style-type: none"> <li>• <math>32\,500\,000 \div 1000 = 32\,500</math></li> <li>• <math>32\,500 \times 5 = 162\,500</math> (2)</li> </ul>	<p>Award full marks for correct numerical answer without working</p> <p>one mark for <math>\times 5</math> or <math>32\,500\,000</math> or <math>32\,500</math></p>	<b>2</b>

Question Number	Answer	Additional Guidance	Mark
<b>2(c)</b>	<p>An explanation that makes reference to three of the following points:</p> <ul style="list-style-type: none"> <li>• blockage of (coronary) artery / less blood to heart (1)</li> <li>• cholesterol / fatty deposits (1)</li> <li>• less oxygen / out of breath / breathless /eq (1)</li> <li>• less (aerobic) respiration / less energy /unable to exercise / eq (1)</li> <li>• heart stops beating / heart contracts less / heart attack / death (1)</li> </ul>	<p><b>Ignore</b> causes heart disease</p>	<b>3</b>

Total = 10 marks



Question Number	Answer	Mark
<b>3(a)</b>	<ul style="list-style-type: none"> <li>• lung(s) (1)</li> </ul>	<b>1</b>

Question Number	Answer	Mark
<b>3(b)</b>	<ul style="list-style-type: none"> <li>• <math>5.0 \times 10^6</math> or <math>5 \times 10^6</math></li> </ul>	<b>1</b>

Question Number	Answer	additional guidance	Mark
<b>3(c)</b>	<p>An explanation that makes reference to three of the following points:</p> <ul style="list-style-type: none"> <li>• (concentration) <u>gradient</u> (1)</li> <li>• more oxygen in alveoli than in blood / more carbon dioxide in blood than in alveoli (1)</li> <li>• diffusion (into / out of blood) (1)</li> <li>• thin wall / one cell thick / moist (1)</li> <li>• blood moves / flow (1)</li> </ul>	<p><b>Ignore</b> references to high surface area as question refers to one alveolus</p>	<b>3</b>

Question Number	Answer	Additional guidance	Mark
<b>3(d)(i)</b>	<p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> <li>• as surface area increases respiration rate increase (1)</li> <li>• bigger animals respire more (1)</li> <li>• bigger animals have more surface area of alveoli (1)</li> </ul>	<p><b>Allow</b> converse for all</p>	<b>2</b>

Question Number	Answer	Additional guidance	Mark
<b>3(d)(ii)</b>	<p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> <li>humans have a <u>small(er)</u> surface area to volume ratio (1)</li> <li>less heat loss (1)</li> <li>(less respiration is required) to maintain body temperature / eq (1)</li> </ul>	<p><b>Allow</b> converse for mice</p> <p>mice have a larger surface to volume area</p> <p>mice have more heat loss</p> <p>in mice, (more) respiration is required to maintain body temperature</p>	<b>2</b>

Question Number	Answer	Additional guidance	Mark
<b>3(e)</b>	<p>An explanation that makes reference to three of the following points:</p> <ul style="list-style-type: none"> <li>measure / record distance moved by coloured liquid / record starting position and final position of liquid on scale / eq (1)</li> <li>ref to time (1)</li> <li>use syringe to reset liquid / eq (1)</li> <li>repeat (1)</li> </ul>	<p><b>Allow</b> bubble for liquid</p>	<b>3</b>

Total 12 marks



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

Question Number	Answer	Additional Guidance	Mark
<b>4(b)</b>	<p>An explanation that makes reference to three of the following points:</p> <ul style="list-style-type: none"> <li>• mutation (1)</li> <li>• survive/ not killed (1)</li> <li>• reproduce / multiply / eq (1)</li> <li>• pass on DNA / allele / gene (1)</li> </ul>	<b>Ignore</b> pass on characteristics alone	<b>3</b>

Question Number	Answer	Additional guidance	Mark
<b>4(c)(i)</b>	$10 - 0.7 = 9.3$ $10\ 000\ 000 - 700\ 000 = 9\ 300\ 000$ $9.3 \div 0.7 \times 100$ $9\ 300\ 000 \div 700\ 000 \times 100$ 1329 % allow 1328.6 or 1328.57 (2)	<p>award full marks for correct numerical answer without working</p> <p>one mark for 9.3 or 9 300 000</p>	<b>2</b>





Question Number	Answer	Additional guidance	Mark
4(c)(ii)	<p>An answer that makes reference to four of the following points:</p> <ul style="list-style-type: none"> <li>• stopping antibiotics allows non-resistant bacteria to increase / grow / no more increase in resistance <b>or</b> antibiotics allow resistant bacteria to increase / grow (1)</li> <li>• less selection pressure (for antibiotic resistance) / competition (for resources) (1)</li> <li>• most infections (would now be) caused by non-resistant bacteria (1)</li> <li>• antibiotics will be effective in most cases / against more bacteria (1)</li> <li>• use new / different antibiotics (instead of not using any) (1)</li> <li>• some patients may die / suffer / eq if not given antibiotics / from other things (1)</li> </ul>	<p><b>Allow</b> converse</p>	4

Total = 10 marks



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

Question Number	Answer	Mark
<b>5(a)(ii)</b>	<p>A carbon dioxide</p> <p><i>B is incorrect because the gas is not nitrogen</i></p> <p><i>C is incorrect because the gas is not oxygen</i></p> <p><i>D is incorrect because the gas is not water vapour</i></p>	<b>1</b>

Question Number	Answer	additional guidance	Mark
<b>5(b)(i)</b>	<p>An answer that makes reference to the following points:</p> <p>S scale linear and half the axes (1)</p> <p>L lines straight and through each point (1)</p> <p>A1 axes correct way (1)</p> <p>A2 axes labelled <u>temperature in °C</u> <b>and</b> <u>bubbles per min(ute)</u> (1)</p> <p>P points plotted accurately (1)</p>	<p>bar charts / extrapolations: no L mark</p> <p>no P mark if data plotted for 50</p>	<b>5</b>

Question Number	Answer	Mark
<b>5(b)(ii)</b>	<p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> <li>enzymes denatured (1)</li> <li>changes shape of active site (1)</li> <li>substrate can no longer fit / E/S complexes do not form / eq (1)</li> </ul>	<b>2</b>

Question Number	Answer	Mark
<b>5(c)</b>	<p>A description that makes reference to two of the following points:</p> <ul style="list-style-type: none"><li>• measure / collect volume / cm<sup>3</sup> / eq (1)</li><li>• readings at smaller intervals (of temperature) / (1)</li><li>• between <b>40</b> and <b>55</b> (1)</li></ul>	<b>2</b>

Total = 11 marks



Question Number	Answer	Mark
<b>6(a)</b>	respiration / heat loss	<b>1</b>

Question Number	Answer	Mark
<b>6(b)</b>	1122	<b>1</b>

Question Number	Answer	Additional guidance	Mark
<b>6(c)(i)</b>	<p>A description that makes reference to two of the following points:</p> <ul style="list-style-type: none"> <li>• digest / break down (1)</li> <li>• dead organisms / waste / faeces / organic matter / eq (1)</li> <li>• use extracellular enzymes / secrete enzymes / release enzymes onto / eq (1)</li> </ul>	<b>Ignore feed</b>	<b>2</b>

Question Number	Answer	Mark
<b>6(c)(ii)</b>	<p>A description that makes reference to three of the following points:</p> <ul style="list-style-type: none"> <li>• producers / plants contain cellulose (1)</li> <li>• less energy in producers absorbed / transferred to (primary) consumers / eq (1)</li> <li>• (more) producers / plants are undigested / not digested / not eaten / eq (1)</li> <li>• decomposers can digest cellulose / eq (1)</li> <li>• (primary) consumers lose more energy in respiration / respire more / more heat loss (1)</li> <li>• (primary) consumers lose more energy in movement / eq (1)</li> </ul>	<b>3</b>

Total 7 marks



Question Number	Answer	Additional guidance	Mark
<b>7(a)</b>	<ul style="list-style-type: none"> <li><math>6\text{CO}_2 + 6\text{H}_2\text{O} \longrightarrow \text{C}_6\text{H}_{12}\text{O}_6 + 6\text{O}_2</math></li> </ul> <p style="text-align: right;">(2)</p>	<p>award one mark for correct but unbalanced equation</p> <p>no credit for word equation</p>	<b>2</b>

Question Number	Answer	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>place plant in dark (for 24 hours) (1)</li> <li>to remove starch / destarch (1)</li> <li>place plant in light (1)</li> <li>test leaf no <math>\text{CO}_2</math> / from flask <u>and</u> normal / control leaf (1)</li> <li>sodium hydroxide removes <math>\text{CO}_2</math></li> <li>using iodine solution / iodine test (1)</li> <li>to show presence of starch (1)</li> </ul>	<b>4</b>

Question Number	Answer	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>fewer plants needed (1)</li> <li>more students can do test / repeats / identify anomalies (1)</li> <li>different shapes can be used to distinguish no <math>\text{CO}_2</math> from control (1)</li> </ul>	<b>2</b>

Question Number	Answer	Mark
<b>7(c)</b>	An explanation that makes reference to three of the following points: <ul style="list-style-type: none"><li>• keep all leaves in normal atmosphere / no NaOH (1)</li><li>• use variegated leaf / eq / use a leaf with chlorophyll and one without (1)</li><li>• compare blue black / starch areas with green areas / areas with chlorophyll / eq (1)</li></ul>	<b>3</b>

Total 11 marks



Question Number	Answer	Mark
<b>8(a)</b>	An answer that makes reference to the following points: <ul style="list-style-type: none"> <li>• A iris (1)</li> <li>• B cornea (1)</li> <li>• C pupil (1)</li> <li>• D lens (1)</li> </ul>	<b>4</b>

Question Number	Answer	Mark
<b>8(b) (i)</b>	An explanation that makes reference to four of the following points: <ul style="list-style-type: none"> <li>• ciliary muscles relax (1)</li> <li>• suspensory ligaments taut increased tension / taut / tight /eq (1)</li> <li>• lens less curved / thinner (1)</li> <li>• light refracted / bent less (1)</li> <li>• pupil dilates / expands / widens (1)</li> </ul>	<b>4</b>

Question Number	Answer	Mark
<b>8(b) (ii)</b>	An answer that make reference to two of the following points: <ul style="list-style-type: none"> <li>• loss of vision / sight / go blind / can't see / eq (1)</li> <li>• in centre of visual field (1)</li> <li>• loss of detail / colour (1)</li> </ul>	<b>2</b>



Question Number	Answer	Mark
<b>8(b) (iii)</b>	An answer that makes reference to two of the following points: <ul style="list-style-type: none"><li>• repeat with more patients / different patients / eq (1)</li><li>• longer study / for a greater period / more years / monitor the progress of the patients / eq (1)</li><li>• see if treatment causes damage / side effects</li></ul>	<b>2</b>

Total 12 marks



Question Number	Answer	Additional guidance	Mark														
9 (a) (i)	<p>An answer that makes reference to the following points:</p> <ul style="list-style-type: none"> <li>• parents dd and Dd (1)</li> <li>• gametes d and D or d (1)</li> <li>• (child) genotype(s) dd (1)</li> <li>• child without syndactyly identified as dd (1)</li> </ul> <p>Also <b>allow</b> sex linkage cross as below:</p> <p>(i) Use a genetic diagram to show the genotypes of the parents, the possible gametes and the genotype and phenotype of their child.</p> <p>Use D to represent the dominant allele and d to represent the recessive allele. (4)</p> <div style="text-align: center;"> <table border="0"> <tr> <td></td> <td>Man (Father)</td> <td>Women (Mother)</td> </tr> <tr> <td>Genotype</td> <td><math>x^d y</math></td> <td><math>x^D x^d</math></td> </tr> <tr> <td>Gametes</td> <td><math>(x^d) (y)</math></td> <td><math>(x^D) (x^d)</math></td> </tr> </table>   <table border="0"> <tr> <td>Phenotype of their child</td> <td><math>x^D x^d</math></td> <td><math>x^d x^d</math></td> <td><math>x^D y</math></td> <td><math>x^d y</math></td> </tr> </table>   <p> <math>x^D x^d</math> - Female girl child with syndactyly  <math>x^d x^d</math> - Female child with no syndactyly  <math>x^D y</math> - Male child with syndactyly  <math>x^d y</math> - Male child with no syndactyly </p> </div>		Man (Father)	Women (Mother)	Genotype	$x^d y$	$x^D x^d$	Gametes	$(x^d) (y)$	$(x^D) (x^d)$	Phenotype of their child	$x^D x^d$	$x^d x^d$	$x^D y$	$x^d y$	<p><b>allow</b> ECF for max of 2</p> <p>allow mp 1 2 3 4 from Punnett square</p>	4
	Man (Father)	Women (Mother)															
Genotype	$x^d y$	$x^D x^d$															
Gametes	$(x^d) (y)$	$(x^D) (x^d)$															
Phenotype of their child	$x^D x^d$	$x^d x^d$	$x^D y$	$x^d y$													

Question Number	Answer	Additional guidance	Mark
<b>9 (a) (ii)</b>	<ul style="list-style-type: none"> <li>probability of having syndactyly = 0.5</li> <li>probability of being female = 0.5</li> <li>= 0.25 (2)</li> </ul> <p>allow 25% or 1/4</p>	<p>award full marks for correct numerical answer without working</p> <p>one mark for 0.5 or 50% or 1/2</p>	<b>2</b>

Question Number	Answer	Additional guidance	Mark
<b>9(b)</b>	<p>An explanation that makes reference to three of the following points:</p> <ul style="list-style-type: none"> <li>dominant allele is always expressed (in phenotype) / only requires one allele / recessive allele requires two copies to be expressed / recessive alleles are only expressed when homozygous / eq (1)</li> <li>dominant condition more common / frequent / high probability of passing on / eq (1)</li> <li>recessive condition has carriers (1)</li> <li>recessive version can appear when both parents unaffected / skips generations / eq (1)</li> </ul>	<p><b>Allow</b> converse</p> <p><b>Allow</b> converse for dominant</p>	<b>3</b>

Question Number	Answer	Additional guidance	Mark
<b>9(c)</b>	<p>A description that makes reference to two of the following points:</p> <ul style="list-style-type: none"> <li>polygenic (1)</li> <li>many genes /more than one gene (controlling one phenotype) (1)</li> <li>each has small effect (1)</li> </ul>	<p><b>Ignore</b> alleles</p>	<b>2</b>

Total 11 marks



Question Number	Answer	Additional guidance	Mark
<b>10 (a) (i)</b>	$60 \div (1.65 \times 1.65)$  $60 \div 2.7225$  $= 22.0 (2)$	award full marks for correct numerical answer without working  one mark for 1.65  <b>Allow 20</b>	<b>2</b>

Question Number	Answer	Additional guidance	Mark
<b>10(a) (ii)</b>	healthy or whatever indicated in 10(a) (i)	<b>Allow TE</b> from 10 ai	<b>1</b>

Question Number	Answer	Mark
<b>10(b)</b>	A increase your BMI  <i>B is incorrect because fat does not decrease BMI</i> <i>C is incorrect because fat does affect BMI</i> <i>D is incorrect because cannot have a negative BMI</i>	<b>1</b>

Question Number	Answer	Mark
<b>10(c) (i)</b>	An explanation that makes reference to the following points: <ul style="list-style-type: none"> <li>• (carbohydrate and lipid) are (high) energy molecules (1)</li> <li>• energy intake is less than energy use (1)</li> <li>• stored fat / glycogen / carbohydrate is <u>respired</u> / eq (1)</li> </ul>	<b>3</b>

Question Number	Answer	Mark
<b>10(c) (ii)</b>	An explanation that makes reference to the following points: <ul style="list-style-type: none"><li>• muscle (contraction) (1)</li><li>• exercise requires / uses energy (1)</li><li>• from respiration (1)</li></ul>	<b>3</b>

Total 10 marks



Question Number	Answer	Mark
<b>11(a)(i)</b>	carbon (cycle)	<b>1</b>

Question Number	Answer	Mark
<b>11(a)(ii)</b>	<p>A</p> <p><i>B is incorrect because it is decomposition increases CO<sub>2</sub></i>  <i>C is incorrect because it is combustion increases CO<sub>2</sub></i>  <i>D is incorrect because respiration increases CO<sub>2</sub></i></p>	<b>1</b>

Question Number	Answer	Mark
<b>11(a)(iii)</b>	<p>An answer that includes two from:</p> <ul style="list-style-type: none"> <li>• bacteria / named correct genus / but not named bacteria (1)</li> <li>• fungi / <i>Mucor</i> / mould / named genus / but not named fungus (1)</li> </ul>	<b>2</b>

Question Number	Answer	Mark
<b>11(b)</b>	<p>An answer that makes reference to six of the following points:</p> <ul style="list-style-type: none"> <li>• C use at least two different stated temperatures (1)</li> <li>• O use same species of bacteria / fungi / same species of plant material (1)</li> <li>• R repeat each temperature / eq (1)</li> <li>• M1 measure change in mass / area of plant material / collect volume of gas / carbon dioxide / methane (1)</li> <li>• M2 measure after stated time (1)</li> <li>• S1 use same mass / volume / age / of plant material (1)</li> <li>• S2 use same moisture / humidity / oxygen / pH / soil / water / eq (1)</li> </ul>	<b>6</b>

Total 10 marks



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