



Mark Scheme (Results)

January 2020

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

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Question Number	Answer	Mark
1(a)	liver	1

Question Number	Answer	Mark
1(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>	1

Question Number	Answer	Mark
1(c)	<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>	1

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

Total = 6 marks

Question Number	Answer	Mark
2(a)(i)	<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>	1

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

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

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

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

Total = 10 marks

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

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

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

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

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

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

Total 12 marks

Question Number	Answer	Mark
4(a)	plasmid	1

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

Question Number	Answer	Additional guidance	Mark
4(c)(i)	$10 - 0.7 = 9.3$ $10\ 000\ 000 - 700\ 000 = 9\ 300\ 000$ $9.3 \div 0.7 \times 100$ $9\ 300\ 000 \div 700\ 000 \times 100$ 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>	2

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"> • stopping antibiotics allows non-resistant bacteria to increase / grow / no more increase in resistance or antibiotics allow resistant bacteria to increase / grow (1) • less selection pressure (for antibiotic resistance) / competition (for resources) (1) • most infections (would now be) caused by non-resistant bacteria (1) • antibiotics will be effective in most cases / against more bacteria (1) • use new / different antibiotics (instead of not using any) (1) • some patients may die / suffer / eq if not given antibiotics / from other things (1) 	<p>Allow converse</p>	4

Total = 10 marks

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

Question Number	Answer	Mark
5(a)(ii)	<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>	1

Question Number	Answer	additional guidance	Mark
5(b)(i)	<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 and 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>	5

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

Question Number	Answer	Mark
5(c)	A description that makes reference to two of the following points: <ul style="list-style-type: none">• measure / collect volume / cm³ / eq (1)• readings at smaller intervals (of temperature) / (1)• between 40 and 55 (1)	2

Total = 11 marks

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

Question Number	Answer	Mark
6(b)	1122	1

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

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

Total 7 marks

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

Question Number	Answer	Mark
7(b)(i)	<p>An explanation that makes reference to four of the following points:</p> <ul style="list-style-type: none"> place plant in dark (for 24 hours) (1) to remove starch / destarch (1) place plant in light (1) test leaf no CO_2 / from flask <u>and</u> normal / control leaf (1) sodium hydroxide removes CO_2 using iodine solution / iodine test (1) to show presence of starch (1) 	4

Question Number	Answer	Mark
7(b)(ii)	<p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> fewer plants needed (1) more students can do test / repeats / identify anomalies (1) different shapes can be used to distinguish no CO_2 from control (1) 	2

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

Total 11 marks

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

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

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

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

Total 12 marks

Question Number	Answer	Additional guidance	Mark																								
<p>9 (a)(i)</p>	<p>An answer that makes reference to the following points:</p> <ul style="list-style-type: none"> • parents dd and Dd (1) • gametes d and D or d (1) • (child) genotype(s) dd (1) • child without syndactyly identified as dd (1) <p>Also allow 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 style="text-align: center;">Man (Father)</td> <td style="text-align: center;">Women (Mother)</td> <td></td> </tr> <tr> <td>Genotype</td> <td style="text-align: center;">$x^d y$</td> <td style="text-align: center;">$x^D x^d$</td> <td></td> </tr> <tr> <td>Gametes</td> <td style="text-align: center;"> x^d y </td> <td style="text-align: center;"> x^D x^d </td> <td></td> </tr> <tr> <td>Phenotype of their child</td> <td style="text-align: center;">x^d</td> <td style="text-align: center;">y</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">$x^D x^d x^d$</td> <td style="text-align: center;">$x^D y$</td> <td></td> </tr> <tr> <td></td> <td style="text-align: center;">$x^d x^d x^d$</td> <td style="text-align: center;">$x^d y$</td> <td></td> </tr> </table> <p> $x^D x^d$ - Female girl child with syndactyly $x^D y$ - Male child with syndactyly $x^d x^d$ - Female child with no syndactyly $x^d y$ - 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	y			$x^D x^d x^d$	$x^D y$			$x^d x^d x^d$	$x^d y$		<p>allow ECF for max of 2</p> <p>allow mp 1 2 3 4 from Punnett square</p>	<p>4</p>
	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	y																									
	$x^D x^d x^d$	$x^D y$																									
	$x^d x^d x^d$	$x^d y$																									

Question Number	Answer	Additional guidance	Mark
9 (a)(ii)	<ul style="list-style-type: none"> probability of having syndactyly = 0.5 probability of being female = 0.5 = 0.25 (2) <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>	2

Question Number	Answer	Additional guidance	Mark
9(b)	<p>An explanation that makes reference to three of the following points:</p> <ul style="list-style-type: none"> 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) dominant condition more common / frequent / high probability of passing on / eq (1) recessive condition has carriers (1) recessive version can appear when both parents unaffected / skips generations / eq (1) 	<p>Allow converse</p> <p>Allow converse for dominant</p>	3

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

Total 11 marks

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

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

Question Number	Answer	Mark
10(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>	1

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

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

Total 10 marks

Question Number	Answer	Mark
11(a)(i)	carbon (cycle)	1

Question Number	Answer	Mark
11(a)(ii)	<p>A</p> <p><i>B is incorrect because it is decomposition increases CO₂</i> <i>C is incorrect because it is combustion increases CO₂</i> <i>D is incorrect because respiration increases CO₂</i></p>	1

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

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

Total 10 marks

