



Mark Scheme (Results)

Summer 2019

Pearson Edexcel International GCSE
Biology (4BI1) Paper 1B

Question Number	Answer	Mark										
1(a)	<table border="1"> <thead> <tr> <th>Letter</th> <th>Name</th> </tr> </thead> <tbody> <tr> <td>A</td> <td>vacuole (1)</td> </tr> <tr> <td>B</td> <td>nucleus (1)</td> </tr> <tr> <td>C</td> <td>cell wall (1)</td> </tr> <tr> <td>D</td> <td>cell membrane (1)</td> </tr> </tbody> </table>	Letter	Name	A	vacuole (1)	B	nucleus (1)	C	cell wall (1)	D	cell membrane (1)	4
Letter	Name											
A	vacuole (1)											
B	nucleus (1)											
C	cell wall (1)											
D	cell membrane (1)											

Question Number	Answer	Additional guidance	Mark
1(b)(i)	C / A	C A C and A A and C	1

Question Number	Answer	Additional guidance	Mark
1(b)(ii)	<p>An explanation that makes reference to three of the following:</p> <ul style="list-style-type: none"> • photosynthesis (1) • (sun)light (1) • many in <u>palisade</u> (1) • few in <u>spongy</u> / few in <u>guard</u> (cells) (1) • none in <u>upper epidermis</u> / <u>root</u> (cells) (1) 		3

Question Number	Answer	Additional guidance	Mark
1(c)	<p>An answer that makes reference to one of the following:</p> <ul style="list-style-type: none"> • protein synthesis (1) • translation (1) 	Ignore makes protein / produces protein	1

Total 9 marks

Question Number	Answer	Mark
2(a)	<p>The only correct answer is</p> <p>A it is digested into amino acids</p> <p><i>B is not correct as its surface area is not increased by bile</i></p> <p><i>C is not correct as its pH is not raised by hydrochloric acid</i></p> <p><i>D is not correct as it is not absorbed by villi</i></p>	1

Question Number	Answer	Additional guidance	Mark										
2(b)	<table border="1"> <thead> <tr> <th>Component</th> <th>Function</th> </tr> </thead> <tbody> <tr> <td>lipid</td> <td>store of energy</td> </tr> <tr> <td>vitamin D</td> <td>bone / teeth / calcium absorption / prevent rickets (1)</td> </tr> <tr> <td>iron</td> <td>haemoglobin / red blood cells (1)</td> </tr> <tr> <td>fibre</td> <td>peristalsis / move food / prevent constipation (1)</td> </tr> </tbody> </table>	Component	Function	lipid	store of energy	vitamin D	bone / teeth / calcium absorption / prevent rickets (1)	iron	haemoglobin / red blood cells (1)	fibre	peristalsis / move food / prevent constipation (1)	<p>Ignore egestion</p> <p>Helps digestion and prevents constipation = 1</p>	3
Component	Function												
lipid	store of energy												
vitamin D	bone / teeth / calcium absorption / prevent rickets (1)												
iron	haemoglobin / red blood cells (1)												
fibre	peristalsis / move food / prevent constipation (1)												

Question Number	Answer	Additional guidance	Mark
2(c)(i)	<p>$20\% \text{ of } 1250 = 250$</p> <p>$250 \div 50 = 5 \text{ (2)}$</p>	<p>Award full marks for correct numerical answer without working</p> <p>Allow one mark for 250 in working</p>	2

Question Number	Answer	Mark
2(c)(ii)	<p>An answer that makes reference to six of the following points:</p> <ul style="list-style-type: none"> • GM salmon grow more / heavier / longer / larger / more mass / grow faster / eq (1) • (more) protein provided (1) • only need protein in correct amount / only need sufficient protein / only need 50g / too much protein / excess protein / eq (1) • balanced diet also needs vitamins / carbohydrate / lipid / minerals / fibre / no idea of other named component in salmon (1) • one salmon used / not repeated/ should use several fish (1) • (data) not reliable / result may be anomalous (1) • no information on food supply to salmon / temperature / oxygen / pollution (1) • protein need depends on age / sex / activity / eq (1) 	<p>6</p> <p>Mp1 Allow converse</p>

Question Number	Answer	Additional guidance	Mark
2(d)	<p>An answer that makes reference to the following points:</p> <ul style="list-style-type: none"> • gene / allele (1) • restriction / endonuclease (1) • ligase (1) 	<p>Allow restrictive</p>	3

Total 15 marks

Question Number	Answer	Mark								
3(a)	<table border="1"> <tbody> <tr> <td>number of organisms</td> <td>8</td> </tr> <tr> <td>number of producers</td> <td>1 / one</td> </tr> <tr> <td>number of primary consumers</td> <td>2 / two</td> </tr> <tr> <td>number of food chains</td> <td>10 / ten</td> </tr> </tbody> </table>	number of organisms	8	number of producers	1 / one	number of primary consumers	2 / two	number of food chains	10 / ten	3
number of organisms	8									
number of producers	1 / one									
number of primary consumers	2 / two									
number of food chains	10 / ten									

Question Number	Answer	Additional guidance	Mark
3(b)	<p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"> • respiration / movement / heat loss (1) • egested / undigested / faeces / not absorbed / not assimilated (1) • excreted / urine / urea (1) • uneaten (1) • death / <u>decomposition</u> (1) 	<p>Mp1 Ignore exercise / metabolism</p> <p>Mp3 excreted from the digestive system = 0</p>	4

Question Number	Answer	Additional guidance	Mark
3 (c)	<p>An answer that makes reference to four of the following points:</p> <ul style="list-style-type: none"> • <u>variation</u> / <u>variety</u> / <u>varied</u> (1) • mutation (1) • longer beak means more worms/food / longer beak can reach deeper for worms/food (1) • <u>survival</u> and reproduction / breeding / offspring (1) • pass on gene / allele / DNA (1) 	<p>Allow converse for Mps 3, 4 and 5</p> <p>mutation passed on = 1</p>	4

Total 11 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"> • moves up / increases (1) • water enters / water passes through membrane (1) • sucrose is a concentrated solution / sucrose has a low(er) water potential / high water potential to low water potential / down a water potential gradient / dilute to concentrated (1) 	Mp3 Allow high conc. to low conc. of <u>water</u> / down water conc gradient	3

Question Number	Answer	Mark
4(b)	<p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"> • use water bath / use Bunsen (1) • use scale / measurements (on tube)/ ruler / (use pen to) mark tube (1) • use clock / timer / stopwatch (1) 	3

Total 6 marks

Question Number	Answer	Mark
5(a)	<p>The only correct answer is</p> <p>D starch</p> <p><i>A is not correct as glucose is not the large insoluble molecule</i></p> <p><i>B is not correct as lipid is not the large insoluble molecule</i></p> <p><i>C is not correct as protein is not the large insoluble molecule</i></p>	1

Question Number	Answer	Mark
5(b)(i)	<p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • reset (the coloured water) / eq (1) • repeat readings / reliable results / more results (1) • allow <u>oxygen</u> in / (aerobic) respiration / prevent anaerobic respiration (1) 	2

Question Number	Answer	Mark
5(b)(ii)	<p>The only correct answer is</p> <p>A absorbs carbon dioxide</p> <p><i>B is not correct as it does not absorb oxygen</i></p> <p><i>C is not correct as it does not release carbon dioxide</i></p> <p><i>D is not correct as it does not release oxygen</i></p>	1

Question Number	Answer	Additional guidance	Mark
5(b)(iii)	<ul style="list-style-type: none"> • multiply by length • determine volume • correct answer $\frac{0.0047(13)}{4.7(13) \times 10^{-3}} (3)$	<p>Award full marks for correct numerical answer without working</p> $3.142 \times 0.05 \times 0.05 = 0.007855$ $\times 0.6 = \frac{0.0047(13)}{4.7(13) \times 10^{-3}}$ <p>Allow one mark for $\times 6.0 / \times 0.6$ in working</p> <p>Allow two marks for 4.7 / 47 / 0.47 in working</p> <p>Allow three marks for 4.7 <u>mm</u>³</p>	3

Question Number	Answer	Additional guidance	Mark
5(c)(i)	<ul style="list-style-type: none"> • oxygen absorbed at 22 and 12 • calculation of percentage increase 100 (2)	<p>Award full marks for correct numerical answer without working</p> <p>rate at 22 = $1.6 \div 20 = 0.08$ and rate at 12 = $0.8 \div 20 = 0.04$</p> <p>percentage increase = $(0.08 - 0.04) \div 0.04 \times 100 = 100(\%)$</p> <p>Or</p> $1.6 - 0.8 \div 0.8 \times 100 = 100(\%)$ <p>One mark for 0.08 and 0.04 or 1.6 and 0.8 in working</p>	2

Question Number	Answer	Additional guidance	Mark
5(c)(ii)	<p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • (more) respiration (1) • enzymes (1) • (more)(kinetic) energy / collisions / enzyme substrate complexes / move faster / eq (1) 	Allow converse	2

Total 11 marks

Question Number	Answer	Mark
6(b)(ii)	<p>An explanation that makes reference to five of the following points:</p> <p><u>Arguments for:</u></p> <ul style="list-style-type: none"> • nicotine reduces normal/undamaged cells / nicotine increases damaged cells (1) • less (chance of) fertilisation / eq (1) • rats are similar to humans / rats are mammals / eq (1) <p><u>Arguments against:</u></p> <ul style="list-style-type: none"> • there are normal/undamaged sperm cells in nicotine samples / there are damaged cells with no nicotine (1) • investigation on rats (not humans) / eq (1) • rats were not smoking / small range(of concentrations) / no idea of nicotine concentration in cigarettes / eq (1) • not repeated / no idea of number of rats / not reliable (1) 	5

Total 12 marks

Question Number	Answer	Additional guidance	Mark
7 (a) (i)	An answer that makes reference to two of the following: <ul style="list-style-type: none"> • volume / 5cm³ of fruit juice (1) • volume / 5cm³ of Benedict's (1) • temperature / use 70°C (1) • time / for 3 minutes (1) 	Ignore amount / concentration / mass	2

Question Number	Answer	Additional guidance	Mark
7 (a) (ii)	B C D A (2)	B D C A = 1	2

Question Number	Answer	Additional guidance	Mark
7 (a) (iii)	An explanation that makes reference to three of the following: <ul style="list-style-type: none"> • use 5cm³ / same volume of each (sugar) solution and use 5cm³ / same volume of Benedict's (1) • heat at same temperature and for 3 minutes / heat at 70°C and for 3 minutes (1) • match / compare <u>colour</u> of sugar solutions with fruit juices / eq (1) 	use the original/ same method alone = 1 only if mp1 or mp2 are not awarded	3

Question Number	Answer	Additional guidance	Mark
7 (b) (i)	An answer that makes reference to two of the following: <ul style="list-style-type: none"> • (sugar) provides energy (1) • respiration (in bacteria) (1) • produce acid / low(ers) pH (1) 	Mp1 Ignore food	2

Question Number	Answer	Additional guidance	Mark
7 (b) (ii)	<p>An explanation that makes reference to two of the following:</p> <ul style="list-style-type: none"> • develop obesity / overweight (1) • sugar provides energy / joules / calories (1) <p>or</p> <ul style="list-style-type: none"> • (type 2) diabetes (1) • increase in <u>blood</u> glucose/sugar / insulin no longer works (1) <p>or</p> <ul style="list-style-type: none"> • CVD / heart disease / stroke (1) • sugar converted to fat / fat deposits in arteries (1) 	<p>Only credit 1 health risk</p> <p>Can only earn 2 marks if risk and explanation are linked (from same pair)</p> <p>Mp4 Ignore not enough insulin</p>	2

Total 11 marks

Question Number	Answer	Additional guidance	Mark
8(a)(i)	<p>A graph that makes reference to the following points:</p> <ul style="list-style-type: none"> • S scales linear and at least half page (1) • L straight lines joining points (1) • A1 axes the correct way around (time on x axis) (1) • A2 axis labelled 'minutes' and 'breaths per minute' / 'BPM' (1) • P points plotted correctly within one square (1) • K indicates (person) P and (person) Q (1) 	<p>Allow truncated y axis</p> <p>Bar graph loses S and L</p>	6

Question Number	Answer	Mark
8(a)(ii)	<p>An explanation that makes reference to three of the following points:</p> <ul style="list-style-type: none"> • increases (1) • oxygen for respiration / <u>aerobic</u> respiration (1) • <u>muscle</u> (1) • remove carbon dioxide (1) 	3

Question Number	Answer	Mark
8(a)(iii)	<p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • (remove) lactic acid (1) • anaerobic respiration (1) • <u>oxygen debt</u> / <u>EPOC</u> / <u>excess post-exercise oxygen consumption</u> (1) 	2

Question Number	Answer	Mark
8(b)	<p>An answer that makes reference to four of the following points:</p> <p>(P may be fitter):</p> <ul style="list-style-type: none"> • P has lower breathing rate at rest / Q has higher breathing rate at rest (1) • P drops more (after exercise) / Q drops less (after exercise) / P recovers faster (after exercise) / Q recovers slower (after exercise) (1) <p>(P may not be fitter):</p> <ul style="list-style-type: none"> • both return to normal in same time / both return to normal by 30 minutes (1) • P breathing rate higher / Q breathing rate lower / P increase more than Q / Q increase less than P (1) <p>(Design):</p> <ul style="list-style-type: none"> • no data on age / sex / mass / lung size (1) • may have lung disease / asthma / smoke / drugs / medication / altitude training / nervousness / adrenaline / eq (1) • no data on exercise intensity / type / amount / hardness / only one measure of fitness / no information on heart rate (1) • not repeated / only tested once / eq (1) 	4

Total 15 marks

Question Number	Answer	Additional guidance	Mark
9(a)	<p>A description that makes reference to three of the following points:</p> <ul style="list-style-type: none"> • binds with haemoglobin / forms carboxyhaemoglobin (1) • (less) oxygen (1) • (less) respiration (1) • fatal / death / less growth / suffocation (1) 	Less oxyhaemoglobin = 2	3

Question Number	Answer	Mark
9(b)	<p>An explanation that makes reference to six of the following points:</p> <ul style="list-style-type: none"> • pathogenic bacteria / cause disease (1) • urea / urine / nitrogenous waste / nitrate / phosphate (1) • <u>decomposition</u> / <u>decomposed</u> / <u>decomposers</u> (ONCE) (1) • eutrophication / plant growth / algae growth (1) • (plants) block light / prevents photosynthesis (1) • respiration (ONCE) (1) • (less) oxygen (1) • death of organisms (ONCE) / reduce biodiversity / eq (1) 	6

Total 9 marks

Question Number	Answer	Mark
10(a)(i)	<p>The only correct answer is</p> <p>B oestrogen</p> <p><i>A is not correct as it is not adrenaline</i></p> <p><i>C is not correct as it is not progesterone</i></p> <p><i>D is not correct as it is not testosterone</i></p>	1

Question Number	Answer	Mark
10(a)(ii)	<p>The only correct answer is</p> <p>A adrenaline</p> <p><i>B is not correct as it is not insulin</i></p> <p><i>C is not correct as it is not progesterone</i></p> <p><i>D is not correct as it is not testosterone</i></p>	1

Question Number	Answer	Mark
10(a)(iii)	<p>The only correct answer is</p> <p>C they are transported in the plasma</p> <p><i>A is not correct as they do not always produce short term changes</i></p> <p><i>B is not correct as they are not carried by neurones</i></p> <p><i>D is not correct as they do not always produce a rapid response</i></p>	1

Question Number	Answer	Mark
10(b)	<p>An answer that makes reference to two of the following points:</p> <ul style="list-style-type: none"> • auxin transported in xylem / phloem / auxin not transported in blood / plasma (1) • auxin produced in tips / eq auxin not from endocrine / glands / organs (1) • auxin has different effect on roots and shoots / eq (1) 	<p>2</p> <p>Allow converse for Mp1 and Mp2</p>

Question Number	Answer	Additional guidance	Mark
10(c)	<p>A description that makes reference to six of the following points:</p> <ul style="list-style-type: none"> • C change / different concentrations of growth substances (1) • O same species / same plant / same type of plant/ named plant / same age / same size / eq (1) • R repeat (1) • M1 count number of roots / length of roots / measure roots with ruler / eq (1) • M2 stated time period of one day plus (1) • S1 same (control) temperature / oxygen / light / carbon dioxide (1) • S2 same compost / water / humidity / soil / mineral ions / named mineral ion / same <u>volume</u> of plant growth substance (1) 	<p>Auxin and no auxin = 0</p> <p>M1 Ignore mass</p> <p>S2 Ignore nutrients</p>	6

Total 11 marks