



## **Mark Scheme (Results)**

Summer 2018

Pearson Edexcel International GCSE  
In Biology (4BI0) Paper 1B

Pearson Edexcel International GCSE  
in Science Double Award (4SC0) Paper 1B

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Summer 2018

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## General Marking Guidance

- All candidates must receive the same treatment. Examiners must mark the first candidate in exactly the same way as they mark the last.
- Mark schemes should be applied positively. Candidates must be rewarded for what they have shown they can do rather than penalised for omissions.
- Examiners should mark according to the mark scheme not according to their perception of where the grade boundaries may lie.
- There is no ceiling on achievement. All marks on the mark scheme should be used appropriately.
- All the marks on the mark scheme are designed to be awarded. Examiners should always award full marks if deserved, i.e. if the answer matches the mark scheme. Examiners should also be prepared to award zero marks if the candidate's response is not worthy of credit according to the mark scheme.
- Where some judgement is required, mark schemes will provide the principles by which marks will be awarded and exemplification may be limited.
- When examiners are in doubt regarding the application of the mark scheme to a candidate's response, the team leader must be consulted.
- Crossed out work should be marked UNLESS the candidate has replaced it with an alternative response.

Question number	Answer	Notes	Marks										
1 (a)	<table border="1" data-bbox="430 352 1258 539"> <thead> <tr> <th data-bbox="430 352 920 392">Description</th> <th data-bbox="922 352 1258 392">Part</th> </tr> </thead> <tbody> <tr> <td data-bbox="430 394 920 432">used to chew food</td> <td data-bbox="922 394 1258 432">teeth</td> </tr> <tr> <td data-bbox="430 434 920 472">has most villi for absorption</td> <td data-bbox="922 434 1258 472"><b>small intestine;</b></td> </tr> <tr> <td data-bbox="430 474 920 512">produces hydrochloric acid</td> <td data-bbox="922 474 1258 512"><b>stomach;</b></td> </tr> <tr> <td data-bbox="430 513 920 539">stores faeces</td> <td data-bbox="922 513 1258 539"><b>rectum;</b></td> </tr> </tbody> </table>	Description	Part	used to chew food	teeth	has most villi for absorption	<b>small intestine;</b>	produces hydrochloric acid	<b>stomach;</b>	stores faeces	<b>rectum;</b>		3
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has most villi for absorption	<b>small intestine;</b>												
produces hydrochloric acid	<b>stomach;</b>												
stores faeces	<b>rectum;</b>												
(b)	<ol style="list-style-type: none"> <li>1. bile;</li> <li>2. <u>emulsification</u>;</li> <li>3. increase surface area (to volume ratio) / (large drops to) small drops;</li> <li>4. <u>lipase</u>;</li> <li>5. neutralise acid / <u>optimum</u> pH;</li> </ol>	3. Reject molecules	max 3										

(c)	<ol style="list-style-type: none"> <li>1. cell membrane (ONCE);</li> <li>2. vacuole;</li> <li>3. cytoplasm;</li> <li>4. nucleus;</li> <li>5. chloroplast;</li> </ol>	<ol style="list-style-type: none"> <li>1. Allow if label line touches inside of cell wall</li> <li>Ignore ribosomes / mitochondria / chlorophyll</li> <li>1 or 2 = 1</li> <li>3 or 4 = 2</li> <li>5 = 3</li> </ol>	max 3
(d)(i)	<ol style="list-style-type: none"> <li>1. plasmid;</li> <li>2. cell wall made of murein / peptidoglycan / not made of cellulose;</li> <li>3. no nucleus / nucleoid / <u>circular</u> chromosome;</li> <li>4. flagellum / pili;</li> <li>5. no <u>chloroplasts</u> / no <u>mitochondria</u>;</li> <li>6. slime capsule / slime layer;</li> </ol>	<p>List rule applies (mark first two)</p> <p>Allow converse for each Mp</p> <p>Ignore reference to unnamed organelles</p> <p>Ignore vacuole</p>	max 2
(ii)	<ol style="list-style-type: none"> <li>1. Benedict's;</li> <li>2. heat / water bath;</li> <li>3. green / yellow / orange / red / brick red;</li> </ol>		3

Question number	Answer	Notes	Marks
2 (a)	1. iron; 2. for haemoglobin;		2
(b)	1. <u>more</u> red blood cells; 2. (more) oxygen; 3. <u>aerobic</u> respiration; 4. (less) lactic acid / (less) <u>anaerobic</u> respiration;		max 2
(c)	1. (increase) risk of <u>disease</u> / <u>infection</u> ; 2. pathogen / named pathogen; 3. (fewer) lymphocytes; 4. (fewer) <u>antibodies</u> ; 5. (fewer) phagocytes; 6. (less) ingestion / engulfing / surrounding;	Fewer lymphocytes so less ingestion = 1  Fewer phagocytes so fewer antibodies = 1  Less phagocytosis = 2	max 4

Total 8 marks

Question number	Answer	Notes	Marks
3 (a)(i)	1. <u>variation</u> (in beak length / width); 2. mutation; 3. those with long(er) / narrower / thinner beak <u>survive</u> ; 4. reproduce / breed / mate / offspring; 5. pass on allele / gene / DNA (to offspring);	1. Ignore size  3. Ignore smaller / bigger 3. Allow converse	max 4
(ii)  (b)(i)  (ii)	1. lacks <u>cacti / cactus</u> flowers; 2. (has plants that produce) <u>big / hard / large</u> seeds;  (75% of 200 = 150 and 28% of 200 = 56) 150 – 56 = 94;;  1. live mice move / run / escape / leave woodland / not static / eq; 2. live mice are eaten / removed (by predators) ; 3. live mice hide / shelter / burrow;	Allow one mark for 75 <u>and</u> 28   Allow converse eg models do not move	2   2   max 2

Question number	Answer	Notes	Marks
4(a) (i)	1. increase in farmed fish / more from farms; 2. wild fish increase <u>and</u> then decrease / levels / plateaus;		2
(ii)	(220 (221) – 160 = 60 (61) ÷ 33) 1.818 to 1.85 (million);; Allow 1.81 with 2 dots above 8 and 1 indicates recurring	Allow one mark for ÷ 33	2



<p>(b)</p>	<p>1. M keep adults from young / keep sizes apart / eq;  E control intraspecific competition / large fish eat small fish / prevent young being eaten / eq;  OR  2. M keep different species apart / use nets / use cages / eq;  E prevent fish being eaten / control predation / control interspecific competition / eq;  OR  3. M antibiotics / vaccination / prevent overcrowding;  E control <u>disease</u> / <u>infection</u>;  OR  4. M selective breeding / use growth hormones / use GM fish;  E for named desired quality such as mass / yield;  OR  5. M use wrasse / insecticide / pesticide / biological control / eq;  E to prevent / remove / kill <u>parasites</u>;</p>	<p>Methods only = 3 max  Explanations only = 3 max    if M and E do not match award 1 only      for E3 ignore prevent disease if linked to feeding and water quality</p>	<p>max 6</p>
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Total 10 marks

Question number	Answer	Notes	Marks
5(a)	area / (type of) soil / with and without trees / number of trees / deforestation;		1
(b)	1. leaves / trees; 2. food / to eat / nutrients / energy / more food chains; 3. shelter / camouflage / somewhere to hide / protection from predators / eq;	Allow converse	max 2
(c)	1. several quadrats / repeated the experiment / calculated mean; 2. random / method of randomisation; 3. <u>same</u> quadrat / area of quadrat / same size of quadrat; 4. sampled at same time (of day / of year); 5. sampled same depth of soil;	Ignore same forest / same oak trees / same area of forest / same area of land	max 3

<p>(d)</p>	<p>Advantages:</p> <ol style="list-style-type: none"> <li>1. employment / jobs / income / eq;</li> <li>2. (wood) for building / furniture / paper / eq;</li> <li>3. fuel;</li> <li>4. land / space for farming / land / space for building homes;</li> <li>5. access by roads;</li> </ol> <p>Disadvantages:</p> <ol style="list-style-type: none"> <li>6. loss of medicinal plants / loss of habitat;</li> <li>7. affects <u>food chains</u> / <u>food webs</u> / <u>extinction</u> / <u>migration</u> / <u>biodiversity</u>;</li> <li>8. soil erosion / leaching / minerals washed out of soil;</li> <li>9. affects water cycle / transpiration / rain / flooding;</li> <li>10. affects carbon dioxide levels / global warming / greenhouse effect;</li> </ol>	<p>10. Ignore less photosynthesis / climate change / weather</p>	<p>max 6</p>
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Total 12 marks

Question number	Answer	Notes	Marks
6(a)	5.6 to 5.8;;	Allow one mark for dividing by 0.01 / multiply x 100	2
(b)	1. less cooling / less heat loss / overheat /heat up ; 2. small <u>surface area to volume</u> ratio; 3. temperature difference is reduced;	1. Ignore references to sweating / panting	max 2
(c)	1. <u>disease</u> / <u>infection</u> / virus / bacteria; 2. habitat loss / loss of food source / lack of food / food supply / deforestation; 3. natural disaster / flood / tsunami / meteor / earthquake / eq; 4. hunting / predation / killed by humans;	Ignore weather / lack of shelter / lack of prey / lack of water  4. Allow poaching	max 2

Total 6 marks

Question number	Answer	Notes	Marks															
7(a)	1. catalyse / speed up / increase rate / lower activation energy / eq;  2. (chemical) reactions / (metabolic) reactions;	allows reactions at lower temperature = 2  2. Ignore examples e.g, respiration / breakdown of large molecules into small molecules	2															
(b)	<table border="1"> <thead> <tr> <th data-bbox="353 890 712 927">Enzyme</th> <th data-bbox="712 890 1081 927">Where produced</th> <th data-bbox="1081 890 1451 927">Function</th> </tr> </thead> <tbody> <tr> <td data-bbox="353 927 712 1002">amylase</td> <td data-bbox="712 927 1081 1002">salivary gland</td> <td data-bbox="1081 927 1451 1002"><b>digest / breakdown starch;</b></td> </tr> <tr> <td data-bbox="353 1002 712 1193">protease</td> <td data-bbox="712 1002 1081 1193"><b>stomach / pancreas;</b> allow small intestine</td> <td data-bbox="1081 1002 1451 1193"><b>digest / breakdown proteins / peptides;</b></td> </tr> <tr> <td data-bbox="353 1193 712 1268"><b>restriction;</b></td> <td data-bbox="712 1193 1081 1268">bacteria</td> <td data-bbox="1081 1193 1451 1268">cutting DNA at certain points</td> </tr> <tr> <td data-bbox="353 1268 712 1343">ligase</td> <td data-bbox="712 1268 1081 1343">cell nucleus</td> <td data-bbox="1081 1268 1451 1343"><b>joining DNA / genes /eq;</b></td> </tr> </tbody> </table>	Enzyme	Where produced	Function	amylase	salivary gland	<b>digest / breakdown starch;</b>	protease	<b>stomach / pancreas;</b> allow small intestine	<b>digest / breakdown proteins / peptides;</b>	<b>restriction;</b>	bacteria	cutting DNA at certain points	ligase	cell nucleus	<b>joining DNA / genes /eq;</b>	Turns starch into maltose = 0	5
Enzyme	Where produced	Function																
amylase	salivary gland	<b>digest / breakdown starch;</b>																
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(c)	<ol style="list-style-type: none"> <li>1. less (kinetic) energy at low temperatures;</li> <li>2. fewer collisions / less movement at low temperatures / eq;</li> <li>3. enzyme <u>denatures</u>;</li> <li>4. changes <u>active site</u> / <u>eq</u>;</li> <li>5. substrate can no longer bind / eq;</li> </ol>	<p>Allow converse for Mps 1 and 2</p> <p>3. Reject denature if enzyme dies or killed</p> <p>3. Ignore if linked to low temperature</p>	<p>max 4</p>
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Total 11 marks

Question number	Answer	Notes	Marks
8 (a)	7 / seven;		1
(b) (i)	(9 ÷ 119 = 0.0756 × 100) = 7.56 / 7.563;;	Allow one mark for dividing by 119 or for 7.6	2
(ii)	1. <u>miscount</u> cells / difficult to <u>count</u> cells / mistake made in <u>counting</u> / there are so many cells to <u>count</u> ; 2. difficult to see <u>chromosomes</u> / <u>chromosomes</u> are small; 3. may not be squashed flat / may be layers of cells; 4. microscope has poor resolution;		max 2

<p>(c)(i)</p>	<ol style="list-style-type: none"> <li>1. mitosis occurs with no plant hormone / eq;</li> <li>2. most mitosis is at 0.005ppm / mitosis increases from 0.0 to 0.005 / up to 0.005;</li> <li>3. mitosis decreases above 0.005 / mitosis decreases from 0.005 to 0.5;</li> <li>4. least mitosis is at 0.5;</li> </ol>	<p>Ignore mitosis decreases as plant hormone increases alone</p> <p>must refer to more mitosis or mitotic index not just higher/lower</p>	<p>max 2</p>
<p>(ii)</p>	<ol style="list-style-type: none"> <li>1. time;</li> <li>2. temperature;</li> <li>3. mineral ions / ions / minerals / salts / named mineral / eq;</li> <li>4. light;</li> <li>5. <u>volume</u> of solution;</li> <li>6. oxygen;</li> </ol>	<p>Ignore pH / / glucose conc. in solution / carbon dioxide / humidity / type of plant / type of hormone / water level / wind</p>	<p>max 3</p>

Total 10 marks



Question number	Answer	Notes	Marks
9 (a)	1. carbohydrate / glucose / starch / sugar; 2. respiration; 3. (energy) for growth;	1. Ignore food 2. more oxygen for respiration = 1	max 2
(b)(i)	S biomass scale is linear and at least half grid; L bars drawn with straight lines; A one axis labelled with <u>lamp/light</u> and other axis labelled with <u>biomass</u> ; P bar heights correct; U $g / m^2 / gm^{-2}$ ;	Ignore rate of psyn. bars if both plotted  If rate of psyn. only plotted on psyn. axes only allow S and L  If rate of psyn. plotted on biomass axes only lose P  If scatter graph or line graph no L and no A	5
(b)(ii)	1. not all carbohydrate / glucose / starch / sugar + used for <u>growth</u> or <u>biomass</u> ; 2. (some carbohydrate) used for respiration; 3. (provide energy) for active transport;	Ignore food / energy for mp 1  allow energy /food used in respiration  Ignore critique of experimental design	max 2

(c)	<ol style="list-style-type: none"> <li>1. LED 690;</li> <li>2. most <u>biomass</u>;</li> </ol>	wrong lamp and most biomass =1	2
(d)	<ol style="list-style-type: none"> <li>1. temperature;</li> <li>2. carbon dioxide;</li> <li>3. water;</li> <li>4. mineral ions / ions / minerals / salts / named mineral / eq;</li> </ol>	Ignore wind / humidity / rain / nutrients / biotic factors	max 3
(e)	<ol style="list-style-type: none"> <li>1. source of food / source of nutrients / diet (in space);</li> <li>2. produce oxygen;</li> <li>3. absorb carbon dioxide;</li> </ol>	Ignore sustain life / stay in space longer	max 1

Total 15 marks

Question number	Answer	Notes	Marks
10(a)	A collecting duct; B loop of Henle; C glomerulus; D Bowman's capsule / renal capsule;		4
(b)	1. high <u>blood</u> concentration / low water potential of <u>blood</u> ; 2. osmoreceptors / hypothalamus; 3. pituitary gland; 4. (more) ADH; 5. collecting duct; 6. (more) permeable; 7. (more) water (re)absorbed (into blood); 8. less water in urine / urine more concentrated / less urine;	Allow Mps 2, 3 and 5 if describing too much water in blood	max 6

Total 10 marks

Question number	Answer	Notes	Marks
11(a)	1. <u>alveoli</u> + increase surface area; 2. (alveoli) thin / one cell thick + short <u>diffusion</u> distance; 3. capillary (wall) is thin / one cell thick + short <u>diffusion</u> distance; 4. capillary / blood + maintains concentration gradient / <u>diffusion</u> gradient; 5. moist + allows gases to dissolve;	2. Ignore cell wall 2. Allow not far to diffuse 3. Allow not far to diffuse no credit for blood and alveolus close together	max 4
(b)	1. (leaf has) large surface area; 2. thin + short <u>diffusion</u> distance; 3. <u>stomata</u> + allows gases in/out / diffusion; 4. <u>spongy mesophyll</u> + increase surface area / gas diffusion / gas movement / air movement; 5. moist + allows gases to dissolve;		max 4

Total 8 marks

Question number	Answer	Notes	Marks
12	<p>C use yeast A and yeast B / use (both) varieties of yeast;</p> <p>O same concentration of yeast / same number of yeast (cells) / same mass of yeast / same volume of yeast / eq;</p> <p>R repeat (for each species);</p> <p>M1 measure / determine/ test concentration / percentage / content (of alcohol in beer);</p> <p>M2 stated time;</p> <p>S1 add same mass / volume / concentration of starch / grains / barley/ sugar / carbohydrate / glucose / maltose / malt / wort / substrate;</p> <p>S2 control temperature / pH / oxygen / allow not far to diffuse ref to anaerobic respiration;</p>	<p>O Ignore amount</p> <p>M1 ignore <b>see</b> which has highest conc</p> <p>S1 Ignore amount / water</p>	max

Total 6 marks

