

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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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.

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>1 (a)

(b)</td><td>
<table>
<tr><th>Description</th><th>Part</th></tr>
<tr><td>used to chew food</td><td>teeth</td></tr>
<tr><td>has most villi for absorption</td><td>small intestine;</td></tr>
<tr><td>produces hydrochloric acid</td><td>stomach;</td></tr>
<tr><td>stores faeces</td><td>rectum;</td></tr>
</table>
1. bile;

2. <u>emulsification</u>;

3. increase surface area (to volume ratio) /
(large drops to) small drops;

4. <u>lipase</u>;

5. neutralise acid / <u>optimum</u> pH;
</td><td>

3. Reject molecules</td><td>3

max 3</td></tr>
</table>

(c)	1. cell membrane (ONCE); 2. vacuole; 3. cytoplasm; 4. nucleus; 5. chloroplast;	1. Allow if label line touches inside of cell wall Ignore ribosomes / mitochondria / chlorophyll 1 or 2 = 1 3 or 4 = 2 5 = 3	max 3
(d)(i)	1. plasmid; 2. cell wall made of murein / peptidoglycan / not made of cellulose; 3. no nucleus / nucleoid / <u>circular</u> chromosome; 4. flagellum / pili; 5. no <u>chloroplasts</u> / no <u>mitochondria</u>; 6. slime capsule / slime layer;	List rule applies (mark first two) Allow converse for each Mp Ignore reference to unnamed organelles Ignore vacuole	max 2
(ii)	1. Benedict's; 2. heat / water bath; 3. green / yellow / orange / red / brick red;		3

Total 14 marks

Question number	Answer	Notes	Marks
2 (a)	1. iron; 2. for haemoglobin;		2
(b)	1. more red blood cells; 2. (more) oxygen; 3. aerobic respiration; 4. (less) lactic acid / (less) anaerobic respiration;		max 2
(c)	1. (increase) risk of disease / infection; 2. pathogen / named pathogen; 3. (fewer) lymphocytes; 4. (fewer) antibodies; 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)	1. lacks <u>cacti / cactus</u> flowers; 2. (has plants that produce) <u>big / hard / large</u> seeds;		2
(b)(i)	(75% of 200 = 150 and 28% of 200 = 56) 150 – 56 = 94;;	Allow one mark for 75 <u>and</u> 28	2
(ii)	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 converse eg models do not move	max 2

Total 10 marks

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

(b)	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>;	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	max 6

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

(d)	Advantages: 1. employment / jobs / income / eq; 2. (wood) for building / furniture / paper / eq; 3. fuel; 4. land / space for farming / land / space for building homes; 5. access by roads; Disadvantages: 6. loss of medicinal plants / loss of habitat; 7. affects <u>food chains</u> / <u>food webs</u> / <u>extinction</u> / <u>migration</u> / <u>biodiversity;</u> 8. soil erosion / leaching / minerals washed out of soil; 9. affects water cycle / transpiration / rain / flooding; 10. affects carbon dioxide levels / global warming / greenhouse effect;	10. Ignore less photosynthesis / climate change / weather	max 6

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 surface area to volume ratio; 3. temperature difference is reduced;	1. Ignore references to sweating / panting	max 2
(c)	1. disease / infection / 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

<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>7(a)</td><td>1. catalyse / speed up / increase rate / lower activation energy / eq;

2. (chemical) reactions / (metabolic) reactions;</td><td>allows reactions at lower temperature = 2

2. Ignore examples e.g, respiration / breakdown of large molecules into small molecules</td><td>2</td></tr>
<tr><td>(b)</td><td>
<table>
<tr><th>Enzyme</th><th>Where produced</th><th>Function</th></tr>
<tr><td>amylase</td><td>salivary gland</td><td>digest / breakdown <u>starch</u>;</td></tr>
<tr><td>protease</td><td>stomach / pancreas;
allow small intestine</td><td>digest / breakdown <u>proteins</u> / <u>peptides</u>;</td></tr>
<tr><td>restriction;</td><td>bacteria</td><td>cutting DNA at certain points</td></tr>
<tr><td>ligase</td><td>cell nucleus</td><td>joining DNA / genes /eq;</td></tr>
</table>
</td><td>Turns starch into maltose = 0</td><td>5</td></tr>
</table>

(c)	1. less (kinetic) energy at low temperatures; 2. fewer collisions / less movement at low temperatures / eq; 3. enzyme <u>denatures</u>; 4. changes <u>active site</u> / <u>eq</u>; 5. substrate can no longer bind / eq;	Allow converse for Mps 1 and 2 3. Reject denature if enzyme dies or killed 3.Ignore if linked to low temperature	max 4

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. miscount cells / difficult to count cells / mistake made in counting / there are so many cells to count; 2. difficult to see chromosomes / chromosomes are small; 3. may not be squashed flat / may be layers of cells; 4. microscope has poor resolution;		max 2

(c)(i)	1. mitosis occurs with no plant hormone / eq; 2. most mitosis is at 0.005ppm / mitosis increases from 0.0 to 0.005 / up to 0.005; 3. mitosis decreases above 0.005 / mitosis decreases from 0.005 to 0.5; 4. least mitosis is at 0.5;	Ignore mitosis decreases as plant hormone increases alone must refer to more mitosis or mitotic index not just higher/lower	max 2
(ii)	1. time; 2. temperature; 3. mineral ions / ions / minerals / salts / named mineral / eq; 4. light; 5. <u>volume</u> of solution; 6. oxygen;	Ignore pH / / glucose conc. in solution / carbon dioxide / humidity / type of plant / type of hormone / water level / wind	max 3

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)	1. LED 690; 2. most biomass;	wrong lamp and most biomass =1	2
(d)	1. temperature; 2. carbon dioxide; 3. water; 4. mineral ions / ions / minerals / salts / named mineral / eq;	Ignore wind / humidity / rain / nutrients / biotic factors	max 3
(e)	1. source of food / source of nutrients / diet (in space); 2. produce oxygen; 3. absorb carbon dioxide;	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. alveoli + increase surface area; 2. (alveoli) thin / one cell thick + short diffusion distance; 3. capillary (wall) is thin / one cell thick + short diffusion distance; 4. capillary / blood + maintains concentration gradient / diffusion 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 diffusion distance; 3. stomata + allows gases in/out / diffusion; 4. spongy mesophyll + 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	C use yeast A and yeast B / use (both) varieties of yeast; O same concentration of yeast / same number of yeast (cells) / same mass of yeast / same volume of yeast / eq; R repeat (for each species); M1 measure / determine/ test concentration / percentage / content (of alcohol in beer); M2 stated time; S1 add same mass / volume / concentration of starch / grains / barley/ sugar / carbohydrate / glucose / maltose / malt / wort / substrate; S2 control temperature / pH / oxygen / allow not far to diffuse ref to anaerobic respiration;	O Ignore amount M1 ignore **see** which has highest conc S1 Ignore amount / water	max

Total 6 marks

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