



Mark Scheme (Results)

Summer 2019

Pearson Edexcel GCSE

In Science Single Award (4SS0) 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.

Question Number	Answer	Mark
<b>1(a)(i)</b>	The only correct answer is C      11  A is not correct as it does not contain 1 B is not correct as it does not contain 6 D is not correct as it does not contain 12	<b>1</b>

Question Number	Answer	Mark
<b>1(a)(ii)</b>	<ul style="list-style-type: none"> <li>mitochondrion / mitochondria</li> </ul>	<b>1</b>

Question Number	Answer	Mark
<b>1(b)</b>	The only correct answer is  D $\times 600$  A is not correct as it is not $\times 0.06$ B is not correct as it is not $\times 0.6$ C is not correct as it is not $\times 6$	<b>1</b>

Question Number	Answer	Mark
<b>1(c)(i)</b>	<ul style="list-style-type: none"> <li>chloroplast / (sap) vacuole</li> </ul>	<b>1</b>

Question Number	Answer	Mark
<b>1(c)(ii)</b>	An answer that makes reference to one of the following points: <ul style="list-style-type: none"> <li>nucleoid / circular chromosome / cytoplasm (1)</li> <li>plasmid(s) (1)</li> </ul>	<b>1</b>

**Total 5**

Question Number	Answer	Mark												
<b>2(a)</b>	<table border="1"> <thead> <tr> <th>Enzyme</th> <th>Function</th> <th>Name of process</th> </tr> </thead> <tbody> <tr> <td><b>protease / pepsin</b> /eq (1)</td> <td>breaks down protein into amino acids</td> <td><b>digestion</b> (1)</td> </tr> <tr> <td>maltase</td> <td><b>maltose to glucose</b> (1)</td> <td>digestion</td> </tr> <tr> <td><b>restriction /endonuclease</b> (1) Ignore helicase</td> <td>cut DNA</td> <td>genetic modification</td> </tr> </tbody> </table>	Enzyme	Function	Name of process	<b>protease / pepsin</b> /eq (1)	breaks down protein into amino acids	<b>digestion</b> (1)	maltase	<b>maltose to glucose</b> (1)	digestion	<b>restriction /endonuclease</b> (1) Ignore helicase	cut DNA	genetic modification	<b>4</b>
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<b>restriction /endonuclease</b> (1) Ignore helicase	cut DNA	genetic modification												

Question Number	Answer	Mark
<b>2(b)(i)</b>	<p>The only correct answer is C 6.2 A is not correct as it is not 1.0 B is not correct as it is not 2.5 D is not correct as it is not 10.0</p>	<b>1</b>

Question Number	Answer	Additional guidance	Mark
<b>2(b)(ii)</b>	<p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> <li>• lower / slower at pH 1.0 / lower pH (1)</li> <li>• enzyme is denatured / active site is altered / change in shape of active site (1)</li> <li>• substrate no longer fits / binds / forms enzyme - substrate complexes /eq(1)</li> </ul>	<p>allow pH 2.5 is optimum</p> <p>allow converse for 2.5</p>	<b>2</b>

**Total 7**

Question Number	Answer	Additional guidance	Mark
<b>3(a)</b>	<p>A description that makes reference to the following points:</p> <ul style="list-style-type: none"> <li>• no nucleus (1)</li> <li>• (bi)concave shape / indented / dip in middle / eq (1)</li> <li>• small(er) (1)</li> </ul>	<p>Allow converse for mp 1 and 3 wbc</p> <p>Allow for mp 2 wbc is irregular shape /can change shape</p>	<b>3</b>

Question Number	Answer	Mark
<b>3(b)(i)</b>	<p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> <li>• cells burst / explode (1)</li> <li>• water enters / absorbed /eq (1)</li> <li>• osmosis (1)</li> </ul>	<b>2</b>

Question Number	Answer	Mark
<b>3(b)(ii)</b>	<ul style="list-style-type: none"> <li>• cell showing crumpled appearance</li> </ul>	<b>1</b>

Question Number	Answer	Additional guidance	Mark
<b>3(c)</b>	<ul style="list-style-type: none"> <li>• 1000 mm<sup>3</sup> in each cm<sup>3</sup> so × 1000 = 5 × 10<sup>9</sup> / 5 000 000 000</li> <li>• 1000 cm<sup>3</sup> in one dm<sup>3</sup> so × 1000 = 5 × 10<sup>12</sup> / 5 000 000 000 000</li> <li>• ×4 = <b>20 × 10<sup>12</sup></b> or <b>2 × 10<sup>13</sup></b> or <b>20 000 000 000 000</b></li> </ul>	<p>award full marks for correct answer without working</p> <p>allow 1 mark for 20 or 2 etc</p>	<b>2</b>

**Total 8**

Question Number	Answer	Additional guidance	Mark
<b>4(a)</b>	<p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"> <li>• (boiled to) remove oxygen / kill any other organisms / bacteria /eq(1)</li> <li>• (cooled so) enzymes not denatured / destroyed / yeast not killed (1)</li> </ul>	<p>Ignore germs Ignore (to ensure it is) anaerobic</p> <p>Reject enzymes killed</p>	<b>2</b>

Question Number	Answer	Additional guidance	Mark
<b>4(b)</b>	<p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"> <li>• measuring cylinder / syringe / eq (1)</li> <li>• (therefore) measure <u>volume</u> / <u>cm<sup>3</sup></u> (1)</li> </ul>	Ignore amount	<b>2</b>

Question Number	Answer	Mark
<b>4(c)(i)</b>	<p>The only correct answer is A removal of oil to allow oxygen diffusion</p> <p>B is not correct as remove liquid oil to allow carbon dioxide diffusion would not affect aerobic respiration</p> <p>C is not correct as add more liquid oil to prevent oxygen diffusion would reduce aerobic respiration</p> <p>D is not correct as add more liquid oil to prevent carbon dioxide diffusion would not affect aerobic respiration</p>	<b>1</b>

Question Number	Answer	Mark
<b>4(c)(ii)</b>	<p>An answer that makes reference to the following points:</p> <ul style="list-style-type: none"> <li>• <i>y-axis</i> labelled number / amount / number of bubbles / bubbles produced / rate of respiration <b>and</b> <i>x-axis</i> labelling anaerobic and aerobic (bars) (1)</li> <li>• two bars drawn <b>and</b> bar for aerobic respiration is higher (1)</li> </ul>	<b>2</b>

**Total 7**

Question Number	Answer	Additional guidance	Mark
<b>5(a)(i)</b>	An answer that makes reference two the following points: <ul style="list-style-type: none"> <li>• (male parent) Bb / heterozygous (1)</li> <li>• (female parent) Bb / heterozygous (1)</li> <li>• (because one of the) offspring is bb / homozygous recessive (1)</li> </ul>	Both parents Bb =2	<b>2</b>

Question Number	Answer	Mark
<b>5(a)(ii)</b>	<ul style="list-style-type: none"> <li>• 4 / four</li> </ul>	<b>1</b>

Question Number	Answer	Additional guidance	Mark
<b>5(b)</b>	<ul style="list-style-type: none"> <li>• 0.125 / 1/8 / 12.5% / 1 out of 8 (1)</li> </ul>	Reject 1:8	<b>1</b>

Question Number	Answer	Additional guidance	Mark
<b>5(c)</b>	An explanation that makes reference to the following points: <ul style="list-style-type: none"> <li>• (natural) selection (1)</li> <li>• white giraffes easily seen / not camouflaged / hunted eq (1)</li> <li>• die / killed / don't survive (1)</li> <li>• fewer reproduce / don't reproduce / no offspring (1)</li> <li>• allele for white not passed on (1)</li> </ul>	Allow converse for brown for mp 2-5	<b>4</b>

**Total 8**



Question Number	Answer	Additional guidance	Mark
<b>6(a)</b>	<p>An answer that makes reference to six of the following points:</p> <ul style="list-style-type: none"> <li>• C chickens kept indoors and outdoors (1)</li> <li>• O same age / size / mass / same breed / species/ sex (1)</li> <li>• R repeat / uses a large number (1)</li> <li>• M1 measure mass / length / weight (1)</li> <li>• M2 measure after stated time period (1)</li> <li>• S1 control food / diet /eq (1)</li> <li>• S2 control water / lighting / bedding / size of pen (1)</li> </ul>	<p>Not just use chickens</p> <p>Ignore size</p> <p>Ignore control temperature</p>	<b>6</b>

Question Number	Answer	Mark
<b>6(b)</b>	<p>The only correct answer is B biuret reagent</p> <p>A is not correct as Benedict's reagent is not used</p> <p>C is not correct as ethanol is not used</p> <p>D is not correct as iodine is not used</p>	<b>1</b>

Question Number	Answer	Additional guidance	Mark
<b>6(c)</b>	<p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"> <li>• large(r) surface area to volume ratio (1)</li> <li>• (more) heat energy / loss (1)</li> <li>• respiration produces heat / replaces heat / eq(1)</li> <li>• maintain body temperature / keep warm / prevent cooling /eq (1)</li> </ul>	<p>Allow smaller vol to sa ratio</p> <p>Allow converse for large chicken</p>	<b>4</b>

**Total 11**

Question Number	Answer	Mark
<b>7(a)(i)</b>	B	<b>1</b>

Question Number	Answer	Additional guidance	Mark
<b>7(a)(ii)</b>	An answer that makes reference to the following: <ul style="list-style-type: none"> <li>development of secondary sexual characteristics / named secondary sexual characteristic (1)</li> </ul>	<b>Allow</b> repair / thickens of uterus lining / stimulate release of LH / inhibits FSH	<b>1</b>

Question Number	Answer	Mark
<b>7(b)(i)</b>	<ul style="list-style-type: none"> <li>zygote</li> </ul>	<b>1</b>

Question Number	Answer	Additional guidance	Mark
<b>7(b)(ii)</b>	<ul style="list-style-type: none"> <li>14 cm = 140 mm</li> <li><math>140 \div 3.0 = 47</math> (46.67)</li> </ul> <p><b>2 marks for 46.67 - 47</b></p> <p><b>Allow 46.6 recurring =2</b></p>	<p>award full marks for correct numerical answer without working</p> <p>46 / 46.6 scores 1</p> <p>allow 1 mark for 467 to 470 or 4.67 to 4.7 /eq in answer right digits wrong power</p>	<b>2</b>

**Total 5**

Question Number	Answer	additional guidance	Mark
<b>8(a)</b>	An answer that makes reference to three of the following points: <ul style="list-style-type: none"> <li>• thin / one cell thick / eq (1)</li> <li>• large surface area (1)</li> <li>• blood (supply) / capillaries (1)</li> </ul>	ignore permeable	<b>3</b>

Question Number	Answer	Mark
<b>8(b)</b>	An answer that makes reference to five of the following points: <p>Argument for – (fish will live because)</p> <ul style="list-style-type: none"> <li>• window / light for photosynthesis (1)</li> <li>• photosynthesis / bubbles / aerator add oxygen to the water (1)</li> <li>• for respiration (1) (once in for OR against)</li> <li>• changing water removes waste / removes algae / less decomposition by bacteria / less chance of infection / disease (1)</li> <li>• food for energy / growth (1)</li> </ul> <p>Argument against – (fish may die because)</p> <ul style="list-style-type: none"> <li>• window / light causes algal growth / eq (1)</li> <li>• oxygen concentration falls (at night / after four days) (1)</li> <li>• large bubbles less diffusion (of oxygen / carbon dioxide) (1)</li> <li>• less carbon dioxide removal (1)</li> <li>• excess / waste food decomposed by bacteria (1)</li> </ul> <p><b>Plus opinion</b></p> <ul style="list-style-type: none"> <li>• not the best way to keep fish in an aquarium (1)</li> </ul>	<b>6</b>

**Total 9 marks**

