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## Mark Scheme (Results)

Summer 2021

Pearson Edexcel International 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)</b>	A nucleus (1)	2
	B mitochondrion / a (1)	

Question Number	Answer	Mark
<b>1(b)(i)</b>	<p>An answer that includes two of the following points:</p> <ul style="list-style-type: none"> <li>• chloroplast (1)</li> <li>• cell wall (1)</li> <li>• starch grain (1)</li> </ul>	<b>2</b>

Question Number	Answer	Mark
<b>1(b)(ii)</b>	<ul style="list-style-type: none"> <li>• not multicellular / are single-celled / can move from one place to another / has flagella (1)</li> </ul>	<b>1</b>

Question Number	Answer	Mark
<b>1(c)</b>	<p>An explanation that makes reference to two of the following points</p> <ul style="list-style-type: none"> <li>• light captured / absorbed by chloroplast / chlorophyll (1)</li> <li>• in photosynthesis (1)</li> </ul>	<b>2</b>

Question Number	Answer	Mark
<b>1(d)</b>	<ul style="list-style-type: none"> <li>• move / propel / swim / eq (1)</li> </ul>	<b>1</b>

Question Number	Answer	Additional guidance	Mark
<b>1(e)</b>	<p>measure size of line on diagram (= 44 mm 43-45) (1)</p> <p>×1000      convert mm into μm (1)</p> <p>Magnification = size of line in μm ÷ 15 μm</p> <p>44000 ÷ 15 = 2933</p> <p>allow 2 marks for any mag <b>between 2667 and 3000</b></p>	<p>40-45mm</p> <p>1 mark for ×1000</p> <p>if measured in cm allow 1 for × 10000</p>	<b>2</b>

**total 10 marks**

Question Number	Answer	Mark
<b>2(a)</b>	The only correct answer is D oxygen  A is not correct as carbon dioxide is not given off B is not correct as carbon monoxide is not given off C is not correct as methane is not given off	1

Question Number	Answer	Mark
<b>2(b)(i)</b>	<ul style="list-style-type: none"> <li>light intensity / distance / eq (1)</li> </ul>	<b>1</b>

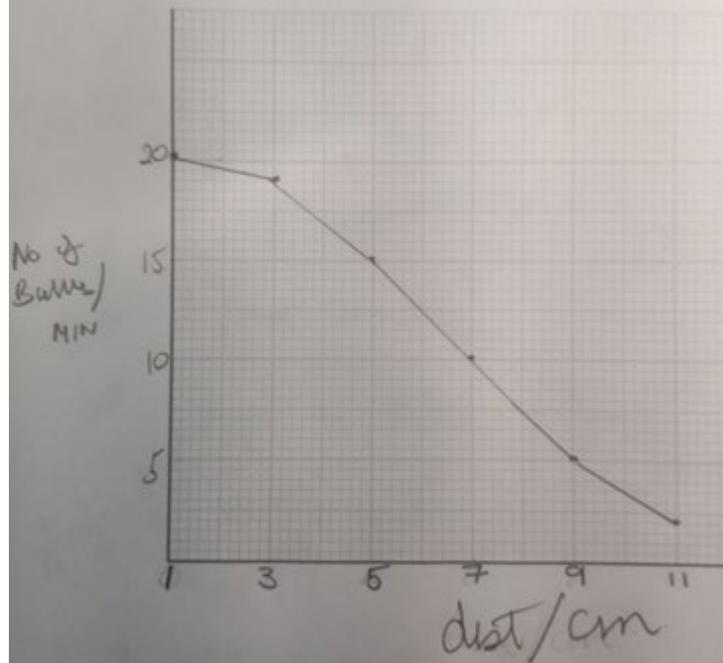
Question Number	Answer	additional guidance	Mark
<b>2(b)(ii)</b>	<ul style="list-style-type: none"> <li>temperature / concentration of carbon dioxide (1)</li> </ul>	allow colour / wavelength of light  allow pH/eq	<b>1</b>

Question Number	Answer	Mark
<b>2(c)(i)</b>	<ul style="list-style-type: none"> <li>15/ 15.3 / 15.33 (1) <b>Clip with 2 (c) (ii) and with table</b></li> </ul>	<b>1</b>

Question Number	Answer	additional guidance	Mark
<b>2(c)(ii)</b>	<ul style="list-style-type: none"> <li>An answer that includes : <b>Clip with 2 (c) (i) and table</b></li> <li>S scales linear and half of page (1)</li> <li>L straight lines joining points (1)</li> <li>A1 axes correct way around (1)</li> <li>A2 labelled (number of) bubbles per minute and distance in cm (1)</li> <li>P points correctly plotted within 1 small square (1)</li> </ul>	bar chart loses L	<b>5</b>

(ii) Plot a line graph to show the relationship between distance of lamp from beaker and mean number of bubbles released.

Use a ruler to join your points with straight lines.



(iii) Explain the relationship between distance and mean number of bubbles released.

Question Number	Answer	additional guidance	Mark
<b>2(c)(iii)</b>	<p>An explanation that makes reference to three of the following points:</p> <ul style="list-style-type: none"> <li>• as distance increases production of bubbles decreases / eq (1)</li> <li>• as less light / energy (1)</li> <li>• for photosynthesis (1)</li> </ul>	allow converse for mp1-3	<b>3</b>

Question Number	Answer	additional guidance	Mark
<b>2(d)</b>	<p>An explanation that makes reference to two of the following points:</p> <ul style="list-style-type: none"> <li>• temperature (1)</li> <li>• enzymes have more KE / move faster / more collisions / eq (1)</li> </ul> <p>Or</p> <ul style="list-style-type: none"> <li>• carbon dioxide (1)</li> <li>• increases rate as a reactant /required for/ raw material / substrate for photosynthesis (1)</li> </ul> <p>Or</p> <ul style="list-style-type: none"> <li>• colour of / wavelength of light (1)</li> <li>• not all colours/ wavelengths absorbed /eq (1)</li> </ul>	<p>allow converse</p> <p>lower temp less KE etc</p> <p>allow temp increase above optimum (1)</p> <p>enzymes denature(1)</p> <p>more to combine / react with enzyme</p> <ul style="list-style-type: none"> <li>• allow pH / eq / (1)</li> <li>• enzyme action (1)</li> </ul> <p>allow only red / blue light absorbed = 2 marks</p>	<b>2</b>

**Total 14 marks**

Question Number	Answer	Mark
<b>3 (a)(i)</b>	<p>The only correct answer is A plasma</p> <p>B is not correct as it is not platelets</p> <p>C is not correct as it is not red cells</p> <p>D is not correct as it is not white cells</p>	<b>1</b>

Question Number	Answer	Mark
<b>3(a)(ii)</b>	<p>The only correct answer is C P 55% Q 5% R 40%</p> <p>A is not correct as it is not P 5% Q 40% R 55%</p> <p>B is not correct as it is not P 40% Q 55% R 5%</p> <p>D is not correct as it is not P 55% Q 40% R 5%</p>	<b>1</b>

Question Number	Answer	Mark
<b>3(a)(iii)</b>	<p>An answer that makes reference to one of the following points</p> <ul style="list-style-type: none"> <li>• fewer red blood cells / eq (1)</li> <li>• smaller or lower percentage of layer R / less of layer R /eq (1)</li> </ul>	<b>1</b>

Question Number	Answer	additional guidance	Mark
<b>3(b)</b>	<p>An explanation that makes reference to four of the following points:</p> <ul style="list-style-type: none"> <li>• <u>phagocytes</u> (1)</li> <li>• (phagocytes) engulf bacteria / viruses / pathogens /eq (1)</li> <li>• <u>lymphocytes</u> (1)</li> <li>• (lymphocytes) produce antibodies (1)</li> <li>• (antibodies) specific to the pathogen (1)</li> </ul>	<p>phagoctyes produce antibodies scores mp 1 but not mp 4</p> <p>allow wbc engulf = 1 mark</p> <p>allow wbc produce antibodies =1 mark</p> <p><b>if no other mp credited</b> allow 1 mark for wbc destroy / kill pathogens/ bacteria/ virus /eq</p>	<b>4</b>

Question Number	Answer	Mark
<b>3(c)</b>	An answer that includes two of the following: <ul style="list-style-type: none"><li>• antibodies (1)</li><li>• hormone /named hormone (1)</li><li>• ion / named ion / mineral / eq (1)</li><li>• digested / food (1)</li><li>• protein / named protein (1)</li><li>• amino acid / named amino acid (1)</li><li>• glucose (1)</li><li>• carbon dioxide / CO<sub>2</sub> (1)</li><li>• vitamin /named vitamin (1)</li><li>• urea (1)</li><li>• cholesterol / fatty acids / glycerol / eq (1)</li></ul>	<b>2</b>

**Total 9 marks**

Question Number	Answer	Mark
<b>4(a)</b>	The only correct answer is B anther to stigma  A is not correct as it is not anther to petal  C is not correct as it is not filament to ovary  D is not correct as it is not stigma to the style	<b>1</b>

Question Number	Answer	Mark
<b>4(b)(i)</b>	<ul style="list-style-type: none"> <li>enclose stamens and stigma in bag / cut off anthers and pollinate by hand / eq (1)</li> </ul>	<b>1</b>

Question Number	Answer	Additional guidance	Mark
<b>4(b)(ii)</b>	An answer that includes the following: <ul style="list-style-type: none"> <li>parents genotypes Rr and Rr (1)</li> <li>gametes R or r (1)</li> <li>Offspring genotypes 1 RR 2 Rr and 1 rr</li> <li>phenotype of offspring / ratio 3 round : 1 wrinkled.</li> </ul>	allow TE for <b>2 max</b> gametes and offspring genotypes / phenotypes	<b>4</b>

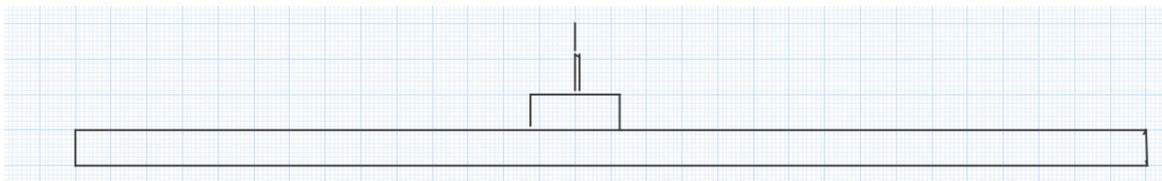
Question Number	Answer	additional guidance	Mark
<b>4(c)</b>	An answer that includes three of the following: <ul style="list-style-type: none"> <li>gametes / haploid cells / requires two cells (1)</li> <li>fertilisation/ fusion (1)</li> <li><u>genetic</u> variation (1)</li> <li>slower (1)</li> </ul>	allow converse for asexual  one parent cell / no gametes /eq  no fertilisation  no <u>genetic</u> variation  faster	<b>3</b>

**Total 9 marks**

Question Number	Answer	Mark
<b>5(a)(i)</b>	<ul style="list-style-type: none"> <li>oak / (oak) leaves / oak tree / eq (1)</li> </ul>	<b>1</b>

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

Question Number	Answer	additional guidance	Mark
<b>5(b)(i)</b>	<p>An answer that makes includes:</p> <ul style="list-style-type: none"> <li>pyramid shape / wider at bottom (1)</li> <li>order of oak caterpillar blue tits sparrowhawk (1)</li> <li><b>Relative</b> width (oak to caterpillar approx 10 to 1 caterpillar to blue tit thin <b>and</b> very thin at top ) (1)</li> </ul>	<p>ignore names</p> <p>ignore shape</p>	<b>3</b>



Question Number	Answer	Additional guidance	Mark
<b>5(b)(iii)</b>	<p>An answer that makes reference to five of the following points:</p> <p>yes because</p> <ul style="list-style-type: none"> <li>• fewer insects (1)</li> <li>• fewer tits and thus fewer sparrowhawks (1)</li> <li>• build-up / bioaccumulation/ greatest effect in sparrowhawks (50%) / less effect in caterpillars (33%) eq (1)</li> <li>• no decrease in oak leaves / change in caterpillars not due to less food / eq (1)</li> <li>• fewer caterpillars not due to having more predators (fewer bluetits) /eq (1)</li> </ul> <p>no because</p> <ul style="list-style-type: none"> <li>• not repeated / only one sample / not reliable / eq (1)</li> <li>• no information on time of year / season / temperature/eq (1)</li> <li>• no direct measurement of chemical in organisms / environment /eq (1)</li> <li>• no information on other sources of food /food chains / other consumers / eq(1)</li> <li>• no reference to species of oak / caterpillar / eq (1)</li> <li>• may be fewer moths / caterpillars in the area poorly camouflaged /disease / eq (1)</li> </ul>		<b>5</b>

**Total 10 marks**

Question Number	Answer	additional guidance	Mark
<b>6(a)</b>	<p>An explanation that makes reference to the following points:</p> <ul style="list-style-type: none"> <li>• restriction / endonuclease to cut DNA / gene/ plasmid (1)</li> <li>• ligase to join DNA / gene / plasmid (1)</li> </ul>	allow named restriction endonuclease	<b>2</b>

Question Number	Answer	Mark
<b>6(b)</b>	<p>An answer that makes reference to six of the following points:</p> <ul style="list-style-type: none"> <li>• C with and without GM (1)</li> <li>• O same species / type / plant / age /eq (1)</li> <li>• R repeat (1)</li> <li>• M1 number / count/ yield /mass / height / eq (1)</li> <li>• M2 after same stated time / eq (1)</li> <li>• S1 same temperature / light / CO<sub>2</sub> / humidity / eq (1)</li> <li>• S2 same water / mineral / fertiliser /soil / pH / eq (1)</li> </ul>	<b>6</b>

**Total 8 marks**

