

OXFORD

INTERNATIONAL
AQA EXAMINATIONS

INTERNATIONAL A-LEVEL BIOLOGY

BL05 (9610)

Unit 5 Synoptic paper

Mark scheme

January 2023

Version: 1.0 Final



Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers. This mark scheme includes any amendments made at the standardisation events which all associates participate in and is the scheme which was used by them in this examination. The standardisation process ensures that the mark scheme covers the students' responses to questions and that every associate understands and applies it in the same correct way. As preparation for standardisation each associate analyses a number of students' scripts. Alternative answers not already covered by the mark scheme are discussed and legislated for. If, after the standardisation process, associates encounter unusual answers which have not been raised they are required to refer these to the Lead Examiner.

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Question	Marking guidance	Mark	Comments
01.1	<p>Large, clear drawing with smooth lines;</p> <p>Correct shape of leaf and tissues;</p> <p>Only tissues drawn – no individual cells;</p>	3	<p>Not sketchy</p> <p>Ignore labels</p>

Question	Marking guidance	Mark	Comments
01.2	(x) 8;;;	3	<p>3 marks for correct answer</p> <p>2 marks if not correct to the nearest whole number – eg $\times 8.3$</p> <p>1 mark for $\frac{40 \times 25}{2 \times 60}$ OR $\frac{40 \times 12.5}{60}$</p> <p>Allow calculation from measurements on leaf – eg (for palisade): $\frac{40 \times 13}{65} = 8$</p>

Question	Marking guidance	Mark	Comments
01.3	<p>Exchange gases efficiently:</p> <ol style="list-style-type: none"> 1. Leaf is thin / short distance - for diffusion of gases; 2. Many large air spaces – rapid diffusion (in gaseous state); 3. Cells have large exposed surface area – greater exchange of gases; 4. (Many) stomata – allow entry and exit of gases; <p>Reduce water loss:</p> <ol style="list-style-type: none"> 5. Waxy cuticle – reduces water loss / is waterproof; 6. Stomata are small / can close – to reduce water loss; <p>OR</p> <p>Stomata on lower surface (only) – shaded so cooler to reduce water loss</p>	6	<ol style="list-style-type: none"> 1. Allow mesophyll/palisade have thin cell walls 1. & 2. Diffusion must be mentioned at least once

Question	Marking guidance	Mark	Comments
02.1	1. Variation between seeds OR some may be diseased/dead OR more representative / typical OR allow for anomalies; 2. To obtain sufficient oxygen absorption / volume change to be registered by apparatus;	2	Allow to be able to calculate a mean

Question	Marking guidance	Mark	Comments
02.2	1. Temperature change causes change in rate of respiration; 2. Temperature change causes change in volume/pressure of air in tubes;	2	Allow description – eg temperature increase increases rate (ignore just ‘more’ respiration) Allow description – eg temperature increase increases volume

Question	Marking guidance	Mark	Comments
02.3	1. CO ₂ is released in respiration; 2. (So) there would not be a decrease in volume/pressure OR would give the net effect of oxygen _{in} – CO ₂ out;	2	Allow the liquid would not move

Question	Marking guidance	Mark	Comments
02.4	1. Any change in temperature/pressure in A = that in B ; 2. (So) same effect on both sides of U-tube and no effect on fluid movement;	2	2. Allow no effect on syringe reading

Question	Marking guidance	Mark	Comments																																								
02.5	Suitable table with units in headings only ; All data correct; <table border="1" data-bbox="264 403 736 1129" style="margin-left: 20px;"> <thead> <tr> <th>Time / mins</th> <th>Syringe reading / cm³</th> </tr> </thead> <tbody> <tr><td>0</td><td>0.92</td></tr> <tr><td>1</td><td>0.84</td></tr> <tr><td>2</td><td>0.78</td></tr> <tr><td>3</td><td>0.68</td></tr> <tr><td>4</td><td>0.63</td></tr> <tr><td>5</td><td>0.57</td></tr> <tr><td>6</td><td>0.47</td></tr> <tr><td>7</td><td>0.38</td></tr> <tr><td>8</td><td>0.30</td></tr> </tbody> </table>	Time / mins	Syringe reading / cm ³	0	0.92	1	0.84	2	0.78	3	0.68	4	0.63	5	0.57	6	0.47	7	0.38	8	0.30	2	Allow changes in volume – ie all values subtracted from 0.92: <table border="1" data-bbox="1321 387 1794 1114" style="margin-left: 20px;"> <thead> <tr> <th>Time / mins</th> <th>OR Volume O₂ used / cm³</th> </tr> </thead> <tbody> <tr><td>0</td><td>0.00</td></tr> <tr><td>1</td><td>0.08</td></tr> <tr><td>2</td><td>0.14</td></tr> <tr><td>3</td><td>0.24</td></tr> <tr><td>4</td><td>0.29</td></tr> <tr><td>5</td><td>0.35</td></tr> <tr><td>6</td><td>0.45</td></tr> <tr><td>7</td><td>0.54</td></tr> <tr><td>8</td><td>0.62</td></tr> </tbody> </table> <p style="margin-left: 20px;"> Accept units formatted in other appropriate conventions Allow horizontal table Allow Volume for Syringe reading </p>	Time / mins	OR Volume O ₂ used / cm ³	0	0.00	1	0.08	2	0.14	3	0.24	4	0.29	5	0.35	6	0.45	7	0.54	8	0.62
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Question	Marking guidance	Mark	Comments
02.6	Graph: 1. Orientation and scales; 2. Axes labelled including units; 3. Points from results table in question 02.5 plotted correctly; 4. Line – ruled straight line of best fit;	4	y = volume and x = time Data covering > ½ of each axis Allow '/units' OR '(units)' OR 'in units' Allow ± ½-square Ignore extrapolation

Question	Marking guidance	Mark	Comments
02.7	540;;;	3	3 marks for correct answer Allow correct answer from student's graph 2 marks if not correct to 3 sf – eg 539.63... 2 marks for $\frac{(\text{Volume change}) \times 10^3 \times 60}{(\text{Time in min}) \times 8.2}$ 2 marks for incorrect order of magnitude – eg 54.0 / 0.540 2 marks if per minute – eg 8.99 1 mark for correct slope from graph in 02.6 – eg 0.07375 or $\frac{0.59}{8}$

Question	Marking guidance	Mark	Comments
02.8	(Straight) line with steeper slope ;	1	Allow description – eg takes less time for volume to decrease Allow rate increases / faster oxygen consumption

Question	Marking guidance	Mark	Comments
02.9	1. (Repeat method of previous experiment) with <u>same</u> batch of seeds (but with water instead of KOH); 2. (With water) results show (Vol O _{2 in} – Vol CO _{2 out}); 3. Definition of RQ = $\frac{\text{Volume CO}_2}{\text{Volume O}_2}$; 4. Substitute value for Volume O ₂ from previous experiment in mp2 and mp3;	4	2. New vol change – previous vol change = vol CO ₂

Question	Marking guidance	Mark	Comments
03.1	DNA replication; So both daughter cells receive all the genetic information / the same genetic information / the same genes/chromosomes / all of the chromosomes / all the DNA;	2	Allow DNA synthesis Ignore 'DNA doubles'

Question	Marking guidance	Mark	Comments
03.2	G ₁ ;	1	

Question	Marking guidance	Mark	Comments
03.3	To replace cells damaged by digestion / by (digestive) enzymes;	1	Allow abrasion by food

Question	Marking guidance	Mark	Comments
04.1	1. Overcome bias / expectation of doctors / patients OR prevent doctors treating patients differently; 2. To see 'real' effect of drug OR to give valid results	2	Allow not just psychosomatic effect; Reject reference to 'accuracy' Ignore more representative / more reliable / other factors unqualified

Question	Marking guidance	Mark	Comments
04.2	Some patients not treated / not helped OR may cause harm to those given placebo OR patients on new drug may suffer side effects OR new drug may not be safe;	1	

Question	Marking guidance	Mark	Comments
04.3	1. Calculate SD/SE of each mean and compare with placebo; 2. Calculate 95% confidence limits / do t-test;	2	

Question	Marking guidance	Mark	Comments
04.4	1. HbA1c is a long-term measure OR so shows more typical mean/average for the patient; 2. Blood plasma glucose may be atypical due to eating/fasting/exercise;	2	

Question	Marking guidance	Mark	Comments												
05.1	<table border="1"> <thead> <tr> <th colspan="4">Expected total number of dogs of each colour</th> </tr> <tr> <th>Black</th> <th>Blue</th> <th>Brown</th> <th>Lilac</th> </tr> </thead> <tbody> <tr> <td>9</td> <td>3</td> <td>9</td> <td>3</td> </tr> </tbody> </table>	Expected total number of dogs of each colour				Black	Blue	Brown	Lilac	9	3	9	3	1	
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Question	Marking guidance	Mark	Comments																				
05.2	<p>P genotypes: BbNn and bbNn;</p> <table border="1"> <tr> <td>Male gametes</td> <td>BN</td> <td>Bn</td> <td>bN</td> <td>bn</td> </tr> <tr> <td>Female gametes</td> <td>bN</td> <td>bN</td> <td>bN</td> <td>bN</td> </tr> <tr> <td></td> <td>BbNN</td> <td>BbNn</td> <td>bbNN</td> <td>bbNn</td> </tr> <tr> <td></td> <td>BbNn</td> <td>Bbnn</td> <td>bbNn</td> <td>bbnn</td> </tr> </table> <p>;;</p> <p>Genotypes correctly assigned to phenotypes: Black: BbNN + (2)BbNn Blue: Bbnn Brown: bbNN + (2)bbNn Lilac: bbnn;</p>	Male gametes	BN	Bn	bN	bn	Female gametes	bN	bN	bN	bN		BbNN	BbNn	bbNN	bbNn		BbNn	Bbnn	bbNn	bbnn	4	<p>All 6 gametes correct from stated parental dihybrid genotypes = 1 mark</p> <p>All 8 genotypes correctly derived from stated gametes = 1 mark</p>
Male gametes	BN	Bn	bN	bn																			
Female gametes	bN	bN	bN	bN																			
	BbNN	BbNn	bbNN	bbNn																			
	BbNn	Bbnn	bbNn	bbnn																			

Question	Marking guidance	Mark	Comments
05.3	Method step 1: Cross male & female blue; Results step 1: blue and lilac offspring; Method step 2: Test cross: blue offspring x lilac; Results step 2: If purebred: all blue offspring AND If not purebred: some lilac offspring; Method step 3: If result in step 2 is all blue then repeat several times & if always get only blue offspring, then breed from these dogs;	5	

Question	Marking guidance	Mark	Comments
<p>06.1</p>	<p>1. Description of negative feedback as departure from norm / set point triggering mechanisms to restore the norm;</p> <p>2. Via the blood (and tissue fluid);</p> <p>3. Role of receptors, effectors and a coordination system;</p> <p>+ Any three examples from:</p> <p>4. Blood glucose concentration – role of insulin to lower;</p> <p>5. Blood glucose concentration – role of glucagon / adrenaline to raise;</p> <p>6. Blood carbon dioxide concentration – via heart rate and breathing rate;</p> <p>7. Any other valid example</p>	<p>6 max</p>	<p>3. Accept endocrine / nervous coordination</p> <p>6. Accept via gas exchange / kidney</p> <p>7. Accept Temperature regulation: description of vasodilation / vasoconstriction / sweating Accept blood pH - via kidneys / lungs Accept blood water potential - via kidney Accept blood pressure – via carotid (sinus) / aorta</p>

Question	Marking guidance	Mark	Comments
06.2	1. Use set volumes/concentrations of H ₂ O ₂ and catalase solution; 2. Suitable range of pH values (with different buffers); 3. At constant temperature in a water bath; 4. Equilibration (in water bath) before mixing catalase and H ₂ O ₂ ; 5. Method of collecting oxygen; 6. Measure volume of oxygen released in a set time OR Measure time taken for release of a set volume of oxygen; 7. Repetitions and calculation of mean (for each pH); 8. Plot a line graph of (mean) rate / time taken / vol. oxygen vs pH; 9. To find optimum pH – repeat with intermediate pH values around the peak value;	7 max	1. Allow eg same number of potato cylinder slices 2. eg pH 3 – 10 3. Allow a temperature in the range 20 – 37 °C 5. eg displacement of water or use of gas syringe 7. At least 3 repeats 8. Accept a sketch graph

Question	Marking guidance	Mark	Comments
<p>06.3</p>	<p>1. Hydrolysis OR breakage of glycosidic bonds;</p> <p>2. In the mouth: salivary amylase;</p> <p>3. In the duodenum: pancreatic amylase;</p> <p>4. Starch → maltose;</p> <p>5. In the ileum: membrane-bound disaccharidase(s);</p> <p>6. Disaccharide → monosaccharide;</p>	<p>5 max</p>	<p>1. Allow description – breakdown by reaction with water</p> <p>2. Allow amylase in saliva</p> <p>3. Allow amylase from the pancreas (If unqualified, allow ‘amylase’ once only)</p> <p>5. Allow named example – eg maltase / sucrase / lactase</p> <p>6. Allow named example – eg maltose → glucose (by maltase) sucrose → glucose + fructose (by sucrase) lactose → glucose + galactose (by lactase)</p> <p>Allow small intestine for duodenum/ileum throughout</p>

Question	Marking guidance	Mark	Comments
06	<p><u>Quality of written communication</u></p> <p>These are awarded for correct use of scientific terms and the ability to present a clear, logical account. They are not awarded for spelling, punctuation and grammar.</p> <p><u>2 marks</u> for</p> <p>an answer in which technical terms are used correctly throughout and the accounts are presented clearly and logically.</p> <p><u>1 mark</u> for</p> <p>an answer in which most technical terms are used correctly and most of the accounts are presented clearly and logically.</p> <p><u>0 marks</u> for</p> <p>an answer in which few technical terms are used correctly or the accounts are seldom presented clearly and logically.</p>	2	Award mark for overall performance in 06.1, 06.2 and 06.3