

OXFORD AQA

INTERNATIONAL QUALIFICATIONS

**INTERNATIONAL A-LEVEL
BIOLOGY (9610)**

BL05

Unit 5 Synoptic paper

Mark scheme

June 2025

Version: 1.0 Final



2 5 6 X B L 0 5 / M S

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.

It must be stressed that a mark scheme is a working document, in many cases further developed and expanded on the basis of students' reactions to a particular paper. Assumptions about future mark schemes on the basis of one year's document should be avoided; whilst the guiding principles of assessment remain constant, details will change, depending on the content of a particular examination paper.

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Mark scheme instructions to examiners

1. General

The mark scheme for each question shows:

- the marks available for each part of the question
- the typical answer or answers which are expected
- extra information to help the examiner make his or her judgement and help to delineate what is acceptable or not worthy of credit.

The extra information in the 'Comments' column is aligned to the appropriate answer in the left-hand part of the mark scheme and should only be applied to that item in the mark scheme. At the beginning of a part of a question a reminder may be given, for example: where consequential marking needs to be considered in a calculation; or the answer may be on the diagram or at a different place on the script.

In general the right-hand side of the mark scheme is there to provide those extra details which confuse the main part of the mark scheme yet may be helpful in ensuring that marking is straightforward and consistent.

2. Emboldening

- 2.1** In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks emboldened. Each of the following bullet points is a potential mark.
- 2.2** A bold **and** is used to indicate that both parts of the answer are required to award the mark.
- 2.3** Alternative answers acceptable for the same mark are indicated by the use of **OR**. Different terms in the mark scheme are shown by a/; eg allow smooth/free movement.

3. Marking points

3.1 Marking of lists

This applies to questions requiring a set number of responses, but for which students have provided extra responses. The general principle to be followed in such a situation is that 'right + wrong = wrong'.

Each error/contradiction negates each correct response. So, if the number of errors/contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (often prefaced by 'Ignore' in the 'Comments' column of the mark scheme) are not penalised.

3.2 Marking procedure for calculations

Full marks can be given for a correct numerical answer, without any working shown.

However, if the answer is incorrect, mark(s) can usually be gained by correct substitution/working and this is shown in the 'Comments' column or by each stage of a longer calculation.

3.3 Interpretation of 'it'

Answers using the word 'it' should be given credit only if it is clear that the 'it' refers to the correct subject.

3.4 Errors carried forward, consequential marking and arithmetic errors

Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation ECF or consequential in the mark scheme.

An arithmetic error should be penalised for one mark only unless otherwise amplified in the mark scheme. Arithmetic errors may arise from a slip in a calculation or from an incorrect transfer of a numerical value from data given in a question.

3.5 Phonetic spelling

The phonetic spelling of correct scientific terminology should be credited **unless** there is a possible confusion with another technical term.

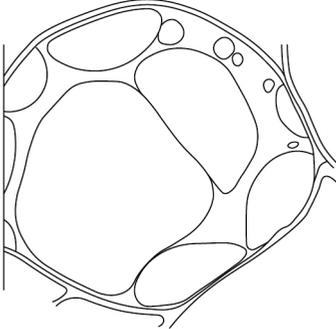
3.6 Brackets

(.....) are used to indicate information which is not essential for the mark to be awarded but is included to help the examiner identify the sense of the answer required.

3.7 Ignore/Insufficient/Do not allow

Ignore or insufficient is used when the information given is irrelevant to the question or not enough to gain the marking point. Any further correct amplification could gain the marking point.

Do **not** allow means that this is a wrong answer which, even if the correct answer is given, will still mean that the mark is not awarded.

Question	Marking guidance	Mark	Comments
01.1	1. Large, clear drawing; 2. Correct shape; 3. Correct internal details;	3	1. Not sketchy For example  3. 7 chloroplasts, 1 nucleus, 1 vacuole, 3 – 6 vesicles

Question	Marking guidance	Mark	Comments
01.2	1. $\frac{\text{Candidate's scale bar length in mm} \times 1000}{4}$ 2. = Correct answer from mp1 – eg 6250	2	1. eg $\frac{25 \times 1000}{4}$ Allow tolerance of $\pm 1\text{mm}$, giving 6000 to 6500 for 2 marks 2. Allow max one mark for correct digits but wrong order of magnitude – eg 625

Question	Marking guidance	Mark	Comments
01.3	1. (Thin) section cut; 2. Not all chloroplasts within plane of section;	2	2. Allow chloroplasts in different part of cell or are unevenly distributed 2. Allow this cell is from lower side of leaf or does not receive much light

Question	Marking guidance	Mark	Comments
01.4	1. (Solution of) 2,4-D falls off (vertical) leaves of cereal OR stays on (horizontal) leaves of weeds OR Cereal leaves have smaller surface area 2. Less 2,4-D enters leaves of cereal;	2	Allow 2 marks for smaller surface area for absorption of 2,4-D in leaves of cereal OR Allow 2 marks for larger surface area for absorption of 2,4-D in leaves of weeds

Question	Marking guidance	Mark	Comments
01.5	1. Spray drifts to other areas; 2. 2,4-D may kill OR be harmful/toxic to OR accumulate in other species; 3. May be toxic/harmful to humans (by contact or by eating contaminated crops OR other species); 4. May select for resistance to 2,4-D in weeds;	3 max	1. Allow washed into waterways 2. Ignore pollution 2. Allow decrease in biodiversity 3. Allow may be carcinogenic or cause allergies Ignore cost

Question	Marking guidance	Mark	Comments
<p>01.6</p>	<p>For:</p> <ol style="list-style-type: none"> 1. Si+ has significantly larger prickle cells; 2. (Prickle cells are responsible rather than) Not macrohairs because increase in macrohairs is not significant; 3. (Prickle cells are responsible rather than) Not leaf thickness because increase in leaf thickness is not significant; 4. Si+ has significantly greater reduction in growth than Si– for (both) insect species 1 or 2; <p>Against:</p> <ol style="list-style-type: none"> 5. Number of prickle cells (per mm²) significantly reduced in Si+ (although this may be because they are larger); 6. Only 24 grass plants in each treatment so may not be representative/valid/reliable; 7. Only one species of plant so may not be representative/valid/reliable; 8. Number of insects not specified so may not be representative/valid/reliable; 9. Only investigated for 48 hours so do not know long term effect; 10. Only two species of insects so may not apply to other species; 11. Insect species 2 showed less reduction in growth than insect species 1 so cannot generalise for all (herbivorous) insects; 12. No data about the degree of damage to the plants; 	<p>5 max</p>	<p>Must have points for and against for full marks</p> <p>Must have points from both the results (mp 1, 2, 3, 4, 5 and 10, 11) and the method (mp 6, 7, 8 and 9) for full marks</p> <p>Max three marks if significance is not mentioned</p> <p>6. Allow plant sample size is small so may not be representative/valid/reliable</p> <p>9. Allow too short a time so do not know long term effect</p>

MARK SCHEME – INTERNATIONAL A-LEVEL BIOLOGY – BL05 – JUNE 2025

Question	Marking guidance	Mark	Comments
02.1	1. Prevent photosynthesis; 2. In the light/photosynthesis uses CO ₂ and produces O ₂ ; 3. So cannot measure O ₂ uptake or volume changes due to respiration;	3	2. Allow in the dark (so just) respiration which uses O ₂ and produces CO ₂

Question	Marking guidance	Mark	Comments
02.2	1. O ₂ consumed; 2. CO ₂ produced; 3. CO ₂ absorbed by NaOH;	3	

Question	Marking guidance	Mark	Comments
02.3	1. Orientation and scale and axes correctly labelled including units; 2. Points; 3. Line of best fit ruled;	3	1. y-axis = volume and x-axis = time. Scales such that data covers > ½ of each axis and scales not based on 3 units 2. Allow ± ½ small square

Question	Marking guidance	Mark	Comments
02.4	$\frac{\Delta y \times 1000}{\Delta x \times 3.5} \text{ eg } \frac{(100.7 - 83.1) \times 1000}{(50 \times 3.5)} = 100.57;$ = 101;	2	Allow one mark if not to the nearest mm ³ Allow one mark for 0.101 (ie in cm ³) or wrong order of magnitude Allow answer in range 94 to 106

Question	Marking guidance	Mark	Comments
02.5	1. $RQ = \frac{CO_2 \text{ out}}{O_2 \text{ in}}$; 2. No change in volume OR volume remains at 90 (cm ³); 3. So CO ₂ = O ₂ ;	3	3. Allow volume of gas produced = volume consumed

Question	Marking guidance	Mark	Comments
02.6	Aerobic (respiration); Using carbohydrate OR sugar OR glucose OR starch;	2	

Question	Marking guidance	Mark	Comments
03.1	Pacinian (corpuscle);	1	

Question	Marking guidance	Mark	Comments
03.2	<ol style="list-style-type: none"> 1. Apply pin points separated (by different distances) to the person's skin in each region; 2. Touch sometimes with one point and sometimes with two (with the person not looking); 3. Find the minimum distance consistently detectable as two points and compare for the two regions; 4. Further relevant detail – eg apply same pressure OR repetitions and calculate mean for each area (and apply stats. test) 	3	4. Must be at least 2 repetitions (total ≥ 3)

MARK SCHEME – INTERNATIONAL A-LEVEL BIOLOGY – BL05 – JUNE 2025

Question	Marking guidance	Mark	Comments									
04.1	<table border="1"> <thead> <tr> <th>Dark green</th> <th>Light green</th> <th>White</th> </tr> </thead> <tbody> <tr> <td>22</td> <td>45</td> <td>19</td> </tr> <tr> <td>1.00</td> <td>: 2.05</td> <td>: 0.86</td> </tr> </tbody> </table>	Dark green	Light green	White	22	45	19	1.00	: 2.05	: 0.86	2	One mark for each row Allow ratio correctly derived from numbers in 1 st line
	Dark green	Light green	White									
	22	45	19									
1.00	: 2.05	: 0.86										

Question	Marking guidance	Mark	Comments
04.2	$C^G C^W / C^W C^G$;	1	Allow $C^G C^W$ $C^G C^W$ Do not allow $C^G C^W C^G C^W$

Question	Marking guidance	Mark	Comments
04.3	1. Gametes correct: $C^G + C^W$ and $C^G + C^W$; 2. Offspring genotypes: $C^G C^G$ $C^G C^W$ $C^G C^W$ $C^W C^W$; 3. Offspring phenotypes: Dark green Light green White and Ratio: 1 : 2 : 1;	3	

Question	Marking guidance	Mark	Comments
04.4	Yes, because: 1. With 2 degrees of freedom; 2. Closest to $\chi^2 = 0.396$ is χ^2 between 0.103 and 4.61 OR P between 0.95 and 0.10 / $P > 0.05$ OR $\chi^2 <$ critical value of 5.99; 3. So expect this <u>difference</u> from expected result due to chance OR So this <u>difference</u> from expected result is not significant OR So accept null hypothesis;	3	1. Allow 2 implied by subsequent use of data from table If incorrect number of degrees of freedom, still allow mp2 and mp3 with appropriate values 3. Do not allow 'results' are due to chance 3. Do not allow the 'results' are not significant

Question	Marking guidance	Mark	Comments
04.5	White seedlings: 1. Lack chlorophyll/chloroplasts; 2. Cannot photosynthesise OR cannot trap light (energy); 3. Cannot make organic substances; 4. (So) (after 14 days) no food (left) for respiration OR for making cell structures;	4	3. Allow named example – eg glucose/starch/lipid/protein 4. Allow converse point for 7 days

Question	Marking guidance	Mark	Comments
05.1	(Metaphase) 1; (Interphase) 4;	2	

Question	Marking guidance	Mark	Comments
05.2	1. Place (end) section of root in (hot) acid (and wash end section of root in water); 2. Cut tip from root section (and place onto microscope slide) and add stain; 3. Cover with a coverslip and squash/apply pressure (and blot off excess stain from outside of coverslip);	3	1. Allow fixing in hydrochloric acid OR ethanoic acid – ethanol mixture 2. Allow end 2 to 5 mm 2. Allow appropriate named stain – eg toluidine blue OR aceto-orcein 3. Ignore maceration with needle

Question	Marking guidance	Mark	Comments
06.1	1. (Act as catalysts by) lowering of activation energy; 2. So reactions occur quickly enough at moderate temperatures; 3. Enzymes (are proteins) – specific (3-D) shape of <u>active site</u> ; 4. Each enzyme is specific due to complementarity OR fit OR forming specific enzyme-substrate complex or ES complex; 5. Named reaction 1 – condensation reactions – eg protein synthesis / RNA synthesis / CO ₂ fixation or conversion of named substrate to named product and correct named example of enzyme; 6. Named reaction 2 – hydrolysis reactions – eg digestion of named substrate to named product and correct named example of enzyme;	6	1. Allow putting strain on bonds in substrate 2. Allow reactions would be too slow without enzymes 4. Use of coenzymes – eg NAD(P) / FAD / coenzyme A; 4. Allow induced fit to permit binding of substrate 5. Named example – eg RNA polymerase / RuBisCO / ATP synthase / glucose phosphorylase 5. and 6. examples of a named type of reaction eg oxidation / reduction / isomerisation 5. and 6. Named example – eg amylase / protease / lipase / ribonuclease / ATP-ase / choline esterase

Question	Marking guidance	Mark	Comments
06.2	1. Grind equal masses of potato and sweet potato; 2. Suspend in equal volumes of buffer solution (at set pH); 3. At constant temperature in a water bath; 4. Add same volume OR same concentration of H ₂ O ₂ to each; 5. Collect oxygen gas for same time for each (in measuring cylinder or (gas) syringe); 6. Repetition (at least twice more) and calculation of mean for each; 7. Compare means and do stats. test to see if significantly different;	6 max	1. Allow discs/cubes of same size and number (eg cut with cork borer) 2. Allow pH in range pH6–9, if specified 3. Allow in range 20–40 °C 5. Allow measure time for collecting specific volume of oxygen

Question	Marking guidance	Mark	Comments
06.3	<ol style="list-style-type: none"> 1. Heat DNA to 95 °C which denatures the DNA or produces separated 1-stranded DNA; 2. Cool to 55 °C so primers can bind to DNA by complementary base-pairing; 3. (At 55 °C) primers bind to (one end of each) single strand and the 2 DNA strands remain separated; 4. Nucleotides bind to single-stranded DNA by complementary base pairing or by H-bonding; 5. Heat to 72 °C which is the optimum temperature for polymerase; 6. (Polymerase) joins nucleotides (onto the primers) (→ 2-stranded DNA); 7. Repeat cycle several/many times → many copies of DNA; 	6 max	2. and 4. only need to mention complementary pairing once

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 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 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 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