AS
BIOLOGY
7401/1

Paper 1

Mark scheme

June 2026

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.

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.

No student should be disadvantaged on the basis of their gender identity and/or how they refer to the gender identity of others in their exam responses.

A consistent use of 'they/them' as a singular and pronouns beyond 'she/her' or 'he/him' will be credited in exam responses in line with existing mark scheme criteria.

Further copies of this mark scheme are available from aqa.org.uk

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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 total marks available for 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 or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded.

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 <u>not</u> 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.

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Question	Marking Guidance	Mark	Comments
01.1	Any **two** from: 1. Absorbs/uses light (energy); 2. For photosynthesis; 3. Produces carbohydrates/sugars/glucose/lipids/ protein;	2 max (2 x AO1)	3. Accept any suitable named organic molecule.

Question	Marking Guidance	Mark	Comments
01.2	A – Granum; B – Stroma;	2 (2 x AO1)	Accept A – grana OR thylakoid(s). Reject stoma for B.

Question	Marking Guidance	Mark	Comments
01.3	Correct answer of 12.5 (%) = **2 marks**;; Incorrect but shows: answer but **not** to one decimal place (e.g. 12.51) **= 1 mark** **OR** 65.416667 / 65.449847 = **1 mark** **OR** Student's incorrect volume divided by 523 then multiplied by 100 = **1 mark**;	2 (2 x AO2)	

Question	Marking Guidance	Mark	Comments
02.1	1. **Heat** with Benedict's (solution); 2. Red/orange/yellow/green (precipitate/colour);	2 (2 x AO1)	1. Accept boil for heat. 1. Accept Fehling's for Benedict's. 1. Ignore water bath unqualified. 1. Ignore warm. 1. Reject if heat with acid. 2. Accept brown for red. 2. Ignore emulsion.

Question	Marking Guidance	Mark	Comments
02.2	1. Box drawn around **either** OH group on **each** β-glucose molecule; 2. Glycosidic (bond);	2 (2 x AO1)	1. Accept any shape for a box. 1. Accept a box drawn around any OH and H from another OH on different β-glucose molecules. 2. Ignore numbering of carbon atoms eg 1–4.

Question	Marking Guidance	Mark	Comments
02.3	1. (Long) linear/straight/unbranched (chains of β-glucose); 2. (Which are) joined by (many) hydrogen bonds; 3. To form (micro/macro) fibrils **which provide** strength/rigidity;	3 (3 x AO1)	2. Accept H-bonds 2. Reject references to '**strong** hydrogen bonds'. 3. Ignore 'support'.

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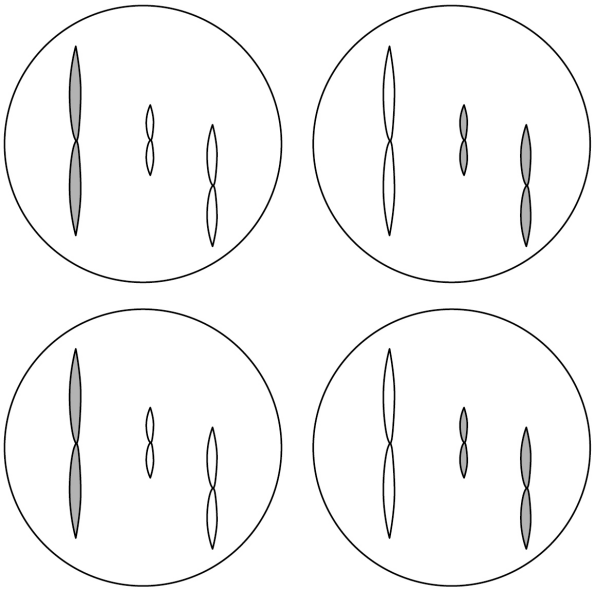
Question	Marking Guidance	Mark	Comments
03.1	(Scalpel) 1. Cut away from body/fingers/self **OR** Cut onto hard surface **OR** Use sharp blade; (Methylene blue) 2. Wear safety glasses **OR** Wear gloves **OR** Wash skin immediately (if stain in contact with skin);	2 (2 x AO1)	Ignore general statements such as 'taking care'. 1. Accept for 'hard surface' an example such as board or tile. 1. Ignore 'flat surface' unqualified. 2. Accept goggles/eye protection for 'safety glasses'.

Question	Marking Guidance	Mark	Comments
03.2	**Name:** Spiracles; **Disadvantage:** Water loss **OR** Evaporation (of water);	2 (2 x AO1)	

Question	Marking Guidance	Mark	Comments
03.3	1. More oxygen can <u>diffuse</u> in; 2. More (aerobic) respiration; 3. To supply ATP/energy **for** (wing) muscle contraction;	3 (2 x AO1, 1 x AO2)	1 and 2 Idea of 'more' required only once. 3. Reject make/ produce energy.

Question	Marking Guidance	Mark	Comments
04.1	1. Independent segregation; 2. Crossing over;	2 (2 x AO1)	Accept answers in any order. 1. Accept independent assortment. 2. Accept exchange of alleles. 2. Accept (genetic) recombination. 2. Accept chiasmata.

Question	Marking Guidance	Mark	Comments
04.2	1. Two/sister chromatids joined by centromere; 2. (Due to) DNA replication;	2 (2 x AO1)	

Question	Marking Guidance	Mark	Comments
04.3	1. One long, one medium and one short chromosome in each cell; 2. Correct shading; 	2 (2 x AO2)	1 and 2 allow cells drawn either way around, as long as correct. 1. Reject if each chromosome consists of two sister chromatids. 2. The medium and short chromosomes are unshaded and the large one is shaded and vice versa. 2. Allow diagrams that show recombination.

Question	Marking Guidance	Mark	Comments
04.4	**X** is mitosis, **Y** is meiosis, **Z** is mitosis (second box);	1 (1 x AO2)	

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Question	Marking Guidance	Mark	Comments
05.1	1. Large surface area **OR** (Highly) folded <u>membrane</u> **OR** Microvilli; 2. Large number of channel/carrier/co-transporter proteins; 3. Large number of mitochondria;	2 max (2 x AO1)	1. Ignore references to volume ratios. 1. Accept brush border for microvilli. 1. Reject villi 2. Accept symporters.

Question	Marking Guidance	Mark	Comments
05.2	**Oxygen molecules** 1. Diffuse **because** oxygen is small/non-polar/lipid soluble/hydrophobic; **Chloride ions** 2. Facilitated diffusion via channel/carrier proteins **OR** Facilitated diffusion because chloride is charged/hydrophilic/not lipid soluble; 3. Active transport via <u>carrier</u> proteins **OR** Active transport uses ATP;	3 (3 x AO1)	2. Ignore chloride is polar.

Question	Marking Guidance	Mark	Comments
05.3	**Concentration** Correct answer of 1.49 (g dm^{-3}) = **1 mark**; **Mass** Correct answer of 7.53 / 7.52 × $10^{-}4$ (ng) **OR** 0.000752955 = **2 marks**;; If incorrect, evidence of 752955 or 7.5245, with decimal place in any position (error in volume conversion) = **1 mark** **OR** If incorrect, evidence of 1.49(1) × 10^{9} (correct unit conversion, no volume conversion) = **1 mark** **OR** ECF if concentration is incorrect, allow their answer multiplied by 5.05 × 10^{-13} (no unit conversion) = **1 mark** **OR** ECF if concentration is incorrect, allow their answer multiplied by 10^{9} (no volume conversion) = **1 mark**;	3 (3 x AO2)	Accept 1.5 / 1.491 for concentration of Cl^{-}. Accept 7.52955 x 10^{-4} for mass of Cl^{-} or any correct rounding. Accept any correct rounding of 0.000752955.

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Question	Marking Guidance	Mark	Comments
06.1	1. More/different/new habitats/niches; 2. More/greater variety/types/sources of food;	2 (1 x AO1)	1. Ignore shelter/homes/ environments. 2. Ignore more food unqualified. Ignore references to predation.

Question	Marking Guidance	Mark	Comments
06.2	1. Count number of different <u>species</u> (of butterfly); 2. Add together **and** divide by number of samples/visits/19;	2 (2 x AO1)	

Question	Marking Guidance	Mark	Comments
06.3	Correct answer of 1.55 : 1 = **2 marks**;; Answer of 1.55 = **1 mark** **OR** Correct answer not to 3 significant figures = **1 mark** **OR** 0.645 : 1 (ratio wrong way) = **1 mark**;	2 (2 x AO2)	Allow 1.56:1 = 1 mark 1.56 on its own = 0 marks

Question	Marking Guidance	Mark	Comments
06.4	**Supporting** 1. High**er** (butterfly) species richness **and** (butterfly) index of diversity when cut; 2. High**est** (butterfly) species richness **and** (butterfly) index of diversity when cut to 1.2 m; 3. Higher mean number of butterflies when cut; **Against** 4. Only hawthorn **OR** One species of plant/hedge; 5. Only butterflies (sampled) **OR** No data for other insects; 6. Difficult to tell which butterflies are present in which section;	4 max (4 x AO3)	For MP1, MP2 and MP3: Accept correct descriptions of treatments. E.g. treatments 2 and 3 are 'cut'; treatment 1 is 'uncut'. MP1 and 2 are different. MP1 compares cut and uncut, but MP2 identifies the best cut. 2. Accept shortest for 'to 1.2m'. 3. Accept more butterflies when cut. 6. Accept idea of the same butterfly counted in different sections.

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Question	Marking Guidance	Mark	Comments
07.1	Answers must be a comparison. Any **three** from: 1. mRNA is linear, tRNA is 'clover (leaf) shape'; 2. mRNA does not have hydrogen bonds, tRNA does; 3. mRNA does not have an amino acid binding site, tRNA does; 4. mRNA has codon(s), tRNA has anticodon; 5. mRNA is long/many nucleotides/bases, tRNA is short/few nucleotides/bases;	3 max (3 x AO1)	1. Accept tRNA is folded for tRNA is 'clover (leaf) shaped'. 2. Accept H bonds for 'hydrogen bonds'. 2. Accept base pairing for 'hydrogen bonds'. 3. Accept 'CCA end' for amino acid binding site.

Question	Marking Guidance	Mark	Comments
07.2	1. As a <u>control</u> (experiment); 2. To allow comparison with other conditions **OR** To provide a baseline/standard/reference for comparison;	2 (2 x AO2)	1. Reject 'control **variable**'. 2. Allow 'with B and C' for other conditions. 2. Allow 'with current and new treatments/ antibiotics' for other conditions. 2. Do not accept unqualified reference to 'compare results'.

Question	Marking Guidance	Mark	Comments
07.3	**MC4 is more effective** 1. Decrease in protein with B **and** no decrease in protein with C; 2. Less rRNA/larger decrease in rRNA with B than with C; **MC4 does not target DNA replication** 3. No difference in DNA; **How MC4 acts against MRSA** 4. Less rRNA/protein means fewer ribosomes (can be made); 5. (So) less protein synthesis;	5 (5 x AO3)	A = control B = new antibiotic C = current antibiotic 2. Accept RNA for rRNA. Accept for B and C correct descriptions of conditions. 5. Allow less translation.

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<table>
<tr><th>Question</th><th>Marking Guidance</th><th>Mark</th><th>Comments</th></tr>
<tr><td>08.1</td><td>1. Both correct units = 1 mark;

2. Both correct volumes = 1 mark;

<table>
<tr><td>Concentration of lipase solution / mol dm^{-3}</td><td>Volume of 2.0 mol dm^{-3} lipase / cm^3</td><td>Volume of distilled water / cm^3</td></tr>
<tr><td>1.8</td><td>22.5</td><td>2.5</td></tr>
</table>
</td><td>2
(2 x AO2)</td><td>Max 1 if values do not match given unit.

Accept dm^3 / mm^3 for volume unit.
Ignore units in 2nd row.
Do not accept $mm^{-3}/cm^{-3}/dm^{-3}$

Accept 0.0225/2.25 × 10^{-2} dm^3 and 0.0025/2.5 × 10^{-3} dm^3
OR
22 500 mm^3 and 2500 mm^3
Reject if the final volume does not equal 25 cm^3.</td></tr>
</table>

<table>
<tr><th>Question</th><th>Marking Guidance</th><th>Mark</th><th>Comments</th></tr>
<tr><td>08.2</td><td>1. pH decreases (in first 3 minutes) as fatty acids are produced;

2. pH stops decreasing because all substrate/lipid has been hydrolysed

OR

pH stops decreasing because all the product/ fatty acids have been produced

OR

pH stops decreasing as low pH denatures enzyme/lipase;</td><td>2
(2 x AO2)</td><td>2. Accept digested/broken down for ‘hydrolysed’.</td></tr>
</table>

Question	Marking Guidance	Mark	Comments
08.3	**Similarity**: 1. Same (end) pH reached; **Differences**: 2. Slower decrease in pH (than with 1.8 mol dm^{-3}) **OR** Slower rate of reaction/breakdown/hydrolysis; 3. Longer time before pH stops decreasing **OR** Takes longer to reach the same pH **OR** Does not reach final pH/5.4/end point (in 5 minutes);	3 (3 x AO2)	1. Accept pH 5.4 reached in both.

Question	Marking Guidance	Mark	Comments
08.4	**1 mark** for **two** of: 1. Temperature; 2. Volume of lipase; 3. Volume of milk; 4. Type/source of milk **OR** Concentration of lipid (in milk);	1 (1 x AO2)	Ignore amount for volume.

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Question	Marking Guidance	Mark	Comments
08.5	Any **two** from: Numerical/quantitative data; Not subjective/it is objective; Continuous data; Not subjective/it is objective; Greater accuracy; More precise;	2 (2 x AO1)	

Question	Marking Guidance	Mark	Comments
09.1	**One** from: Genetic material **OR** Capsid **OR** Attachment protein;	1 (1 x AO1)	List rule applies. Accept RNA/DNA/nucleic acid for genetic material.

Question	Marking Guidance	Mark	Comments
09.2	1. Weaker/less developed immune system **so** fewer antibodies; 2. Weaker/less developed immune system **so** fewer T-cells; 3. Weaker/less developed immune system **so** fewer phagocytes; 4. Less developed lungs/airways **so** less oxygen (when inflamed/increased mucus) **OR** Smaller/narrower airways **so** less oxygen (when inflamed/increased mucus); 5. Less developed lungs/airways **so** virus can enter cells more easily; 6. (Maybe) in hospitals **so** infection is more likely;	2 max (2 x AO2)	Mark as a whole. If MP1, MP2 or MP3 not awarded, allow 1 mark for: Weaker/less developed immune system to destroy RSV/virus. 1. Accept cannot produce antibodies quickly for 'fewer antibodies'.

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Question	Marking Guidance	Mark	Comments
09.3	(Risk of severe bronchiolitis is reduced) 1. Passive immunity **OR** Antibodies from mother; (Risk reduced for **only** the first six months) 2. No memory/plasma cells; 3. So baby cannot produce antibodies (from secondary response) **OR** Antibody production (from baby's primary response) is slower/too slow **OR** Antibodies (from mother) destroyed;	3 (3 x AO2)	3. Ignore antigenic variability.

Question	Marking Guidance	Mark	Comments
09.4	**Supporting (MAX 3)** 1. Fewer deaths (from RSV) **OR** Less **severe** illness/bronchiolitis (from RSV); 2. Muscle pain / headache / swelling not serious/ /mild **OR** Side effects mild; 3. (Helps create) herd immunity; 4. Those aged ≥75 are higher risk (from RSV than under 75 years); **Against** 5. (Risk of) nervous system condition/weakness; 6. (Possible) increased risk of premature birth; 7. Unethical not to vaccinate over 80s **OR** Unethical not to vaccinate those aged 60–74;	4 max (4 x AO3)	5. Accept allergic reaction to vaccine. 6. Accept increased risk of giving birth early. Ignore references to cost. Ignore references to religion. Ignore general vaccine hesitancy ideas.

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