



A-level BIOLOGY 7402/1

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 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. Is a polypeptide (chain) OR (Has a) primary structure; 2. 8 peptide bonds; 3. Disulfide bridge; 4. (Has a) tertiary structure; 5. Amine/amino (group) and carboxyl/carboxylic acid/group at ends;	2 max (1 x AO1, 1 x AO2)	Accept for two marks, disulfide bridge in tertiary structure 3. Accept description of disulfide bridge, eg sulfur-sulfur OR disulfide bond 3. Ignore “S – S” bond 3. Accept sulphide for sulfide 3. Accept reference to cysteine for disulfide bridge 3. Reject cytosine 3. Ignore plural references eg bonds Ignore references to other types of bonding in tertiary structure Ignore reference to secondary structure
Question	Marking Guidance	Mark	Comments
01.2	1. Biuret (test); 2. Purple/lilac/violet/mauve (colour);	2 (2 x AO1)	Phonetic spellings of biuret 1. Reject burette 2. Reject precipitate Reject if incorrect colour change, eg black to purple
Question	Marking Guidance	Mark	Comments
01.3	Correct answer for 1 mark, 93;	1 (AO2)	Accept any correct rounding of 93.065830721

Question	Marking Guidance	Mark	Comments
01.4	1. Active site is <u>complementary</u> ; 2. At same (sequence of) amino acid(s) OR At same peptide bond(s) OR At specific/same locations/sites/ positions/points/places;	2 (1 x AO1, 1 x AO2)	1. and 2. Reject once only if incorrect reference to substrate, eg complementary to ADH

Question	Marking Guidance	Mark	Comments
02.1	Universal 1. The same triplet/codon codes for the same amino acid (in all organisms); Degenerate 2. More than one triplet/codon codes for an/the same amino acid;	2 (2 x AO1)	1. and 2. Accept three bases for “triplet” 1. and 2. Reject reference to producing amino acids only once

Question	Marking Guidance	Mark	Comments
02.2	Correct answer for 3 marks = 2370 to 2372 OR 2400 (correct answer rounded to 2 significant figures);;; Accept for 2 marks, 47434164 to 47434165 (correct use of logs, correct $\times 0.015$) OR Evidence of correct $\times 0.015/1.5\%$ and $\div 20\ 000$ OR 158113.883 (correct use of logs and $\div 20\ 000$) OR Evidence of correct use of logs and $\div 20\ 000$ in working OR 155740 to 155742 (correct use of logs, incorrect 0.985/98.5% in calculation, correct $\div 20000$) OR $0.000007125/7.125 \times 10^{-6}$ (incorrect use of logs/9.5, correct $\times 0.015$, correct $\div 20000$) OR Shows figures in correct range but incorrect decimal place, eg 23717.08245 Accept for 1 mark, 3162277660 (correct use of logs) OR 3114843495 (correct use of logs, incorrect $\times 0.985$) OR 0.1425 (incorrect use of logs/9.5, correct $\times 0.015$)	3 (3 x AO2)	Accept answers in standard form Accept for 3 marks, 2000 (correct answer rounded to 1 significant figure) OR 2500 (4743164 rounded to 1 significant figure $\div 20000$) OR 5000 (using 3 significant figures and standard form);;; Accept correct rounding of numbers for answers achieving 2 or 1 marks

	OR Evidence of $10^{9.5}$ (correct use of logs) OR Evidence of 0.015/1.5% (correct exon proportion) OR $\div 20\,000$ (correct reference to 1 polypeptide)		
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Question	Marking Guidance	Mark	Comments
02.3	Intron(s);	1 (AO1)	Ignore non-coding bases/DNA Ignore stop codon Reject exon(s)

Question	Marking Guidance	Mark	Comments
02.4	3.8×10^{-9} mg;	1 (AO2)	

Question	Marking Guidance	Mark	Comments
03.1	1. <u>DNA</u> helicase separates/unwinds strands/helix OR <u>DNA</u> helicase breaks hydrogen bonds; 2. Both/each strand act(s) as (a)template(s); 3. (Free) nucleotides attach/attracted to/align with complementary/specific base; 4. <u>DNA</u> polymerase joins nucleotides (on new strand); 5. Phosphodiester bonds form (between nucleotides) OR Nucleotides join in condensation (reactions); 6. DNA (molecules) formed has one original/old strand and one new strand;	6 (6 x AO1)	1. Reject hydrolysis 1. Accept H bonds 2. Accept description of template (e.g. exposed bases on single (polynucleotide) strand 3. Accept adenine with thymine and guanine with cytosine for “complementary pairs” 3. Ignore A, T, G and C 3. Reject adenosine/ cysteine/thyamine 4. Reject if DNA polymerase forms hydrogen bonds OR joins complementary bases 4. and 5. Penalise reference to bases rather than nucleotides once only If context is transcription, not DNA replication, can only accept 3. and 5.
Question	Marking Guidance	Mark	Comments
03.2	Enzyme 1. (ATP) hydrolase; Description 2. <u>Energy</u> for DNA replication OR <u>Energy</u> to form phosphodiester bond(s)	2 (1 x AO1, 1 x AO2)	1. Accept ATPase 1. Accept phonetic spelling, eg hydrolayse 2. Reject energy is produced

	OR <u>Energy</u> for DNA polymerase/DNA helicase (activity) OR <u>Energy</u> for (m/t/ribosomal) RNA synthesis/ribosome synthesis OR <u>Energy</u> for intron removal/DNA splicing OR <u>Energy</u> for transcription;		
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Question	Marking Guidance	Mark	Comments
03.3	Correct answer for 2 marks, 0.1 OR 0.14(44444);; Evidence of, for 1 mark 2.6 (net change) OR 0.16(1111) ($2.9 \div 18$) (correct rate of ATP increase in cytoplasm only) OR Evidence of $\div 18$ (correct conversion to rate per hour)	2 (2 x AO2)	

Question	Marking Guidance	Mark	Comments												
04.1	<table><tr><th colspan="3">Cell types</th></tr><tr><th>Phagocytes</th><th>B cells</th><th>Body cells infected with virus</th></tr><tr><td>✓</td><td>✓</td><td></td></tr><tr><td>✓</td><td></td><td></td></tr></table>	Cell types			Phagocytes	B cells	Body cells infected with virus	✓	✓		✓			2 (2 x AO1)	
	Cell types														
	Phagocytes	B cells	Body cells infected with virus												
	✓	✓													
	✓														
1 mark for each correct row;;															

Question	Marking Guidance	Mark	Comments
04.2	1. Already exposed to harmless (myco)bacteria/ species OR Already exposed to (mycobacteria) antigens; 2. (So) fast(er) production of antibodies OR (So) more antibodies produced OR (So) memory cells (already) present;	2 (2 x AO2)	1. Accept had OR infected by OR in contact with, for “exposed”

Question	Marking Guidance	Mark	Comments						
04.3	<table><tr><th>Location 1</th><th>Location 2</th></tr><tr><td></td><td>11</td></tr><tr><td>14</td><td>12</td></tr></table>	Location 1	Location 2		11	14	12	2 (2 x AO2)	Max one mark if answers not rounded or incorrectly rounded to nearest whole number
	Location 1	Location 2							
		11							
	14	12							
	1 mark for each correct row;;								

Question	Marking Guidance	Mark	Comments
04.4	1. Results are inconclusive and negative (supporting the conclusion) OR No deer is positive (supporting the conclusion); 2. (But) deer 3/4 may have TB/be positive OR (But) inconclusive deer may have TB/be positive OR (But) tests on deer 3/4/those with inconclusive results need repeating; 3. (Should) test more deer OR (Only) 3 deer/small sample (size);	3 (3 x AO3)	

Question	Marking Guidance	Mark	Comments
05.1	Hydrophilic heads/phosphate attracted/point to water and hydrophobic tails/fatty acids repel/point away from water;	1 (AO1)	Accept annotated diagram Accept polar/charged for hydrophilic Accept non-polar/not charged for hydrophobic Ignore micelles

Question	Marking Guidance	Mark	Comments
05.2	1. (Test) is qualitative OR (Test) is not quantitative; 2. (Only) shows (lipid) presence/absence OR (All) results (would be) positive/give milky/white (emulsion);	2 (1 x AO1, 1 x AO2)	1 Accept description of quantitative, eg no figures obtained 2. Ignore cloudy 2. Reject precipitate

Question	Marking Guidance	Mark	Comments
05.3	1. Hydrolysis of lipid/triglyceride; 2. Produces fatty acids (increasing acidity/decreasing pH);	2 (2 x AO2)	1. Accept ester bond for lipid

Question	Marking Guidance	Mark	Comments
05.4	1. W is protein/polypeptide; 2. (Because mass of) W decreased in B/with protease; 3. W is not lipid; 4. (Because mass of) W does not change in A/with lipase 5. W is an inhibitor OR W reduces/stops lipase (activity); 6. (Because) no (lipase) activity in A OR (Because) no change/increase in acidity in A; 7. (Because) lipase is less active in B OR (Because) small(er) increase in acidity in B;	5 max (1 x AO1, 4 x AO3)	2. Accept hydrolysed / digested / breaks down for decreased 4. Accept not hydrolysed/digested/broken down for “no change” 5. Ignore reference to competitive/non-competitive 6. 7. Accept a description of lipase activity. 6. and 7. Accept correct reference to pH rather than acidity

Question	Marking Guidance	Mark	Comments
06.1	1. Flattened cells so reduced/short diffusion pathway/distance OR One cell thick so reduced/short diffusion pathway/distance; 2. Large surface area for rapid/more diffusion (of gases); 3. Permeable (cell) membranes allow rapid diffusion of oxygen/carbon dioxide;	2 max (2 x AO1)	1. Accept 'thin' for "flattened" 1. Accept epithelium for "cells" 1. Accept "it is flattened" OR "it is one cell thick" Reject thin cell wall/membrane 2. Ignore reference to "volume ratio" 2. Ignore folds, but reject "cells are folded" and reject microvilli 2. Ignore SA

Question	Marking Guidance	Mark	Comments
06.2	1. TTFC/smoking is not linked to changes in lung capacity/FVC, and reduces FEV ₁ ; 2. FVC difference (in means) is not significant/due to chance OR FEV ₁ difference/reduction (in means) is significant/not due to chance;	2 (2 x AO3)	Accept descriptions of FVC and FEV ₁ 1. Accept does not affect for "not linked" 2. Accept correct reference to probability 2. Ignore reference to results being significant/not significant

Question	Marking Guidance	Mark	Comments
06.3	1. Quantity of tobacco/cigarettes (smoked) per day; 2. Age when (regular) smoking started OR Length of time/years of smoking; 3. Type/brand of tobacco/cigarette (smoked); 4. Non-smokers who have never smoked; 5. Have not vaped;	2 max (2 x AO3)	1 Accept in this instance, "amount" 1. Accept frequency of smoking 1. Accept other time intervals, eg per month/year

Question	Marking Guidance	Mark	Comments
06.4	1. Less oxygen diffuses/enters/in blood/body OR Reduced oxygen concentration gradient (to blood) OR More carbon dioxide in blood/body; Mark as pairs: MP2 and MP3 OR MP4 and MP5. 2. Less <u>aerobic</u> respiration; 3. (So) less energy/ATP (for exercise); _____ 4. More anaerobic respiration OR Anaerobic respiration occurs quickly; 5. (So) less energy/ATP (for exercise) OR (So) lactic acid/lactate (produced);	3 max (3 x AO2)	Accept converse statements 3. and 5. Reject energy production

Question	Marking Guidance	Mark	Comments
07.1	(D) Thylakoid (membrane)/grana/granum and (E) Stroma;	1 (AO1)	Both labels identified correctly for one mark Reject stoma Accept phonetic spelling

Question	Marking Guidance	Mark	Comments
07.2	1. Temperature; 2. Volume of glucose/water/solution(s) OR Peel/banana covered (by water/solution) OR Volume of air (in bag); 3. Bag type/size OR Bags sealed/unsealed; 4. Size/(surface) area/mass of peel/banana/squares; 5. Light;	3 max (3 x AO2)	Ignore pH 2. Ignore amount

Question	Marking Guidance	Mark	Comments
07.3	Mass/micro grams (of chlorophyll) per gram (of peel) OR Concentration (of chlorophyll) OR Relative mass (of chlorophyll);	1 (AO2)	

Question	Marking Guidance	Mark	Comments
07.4	(Peel/banana) is green(er) in glucose (solution) as it has more chlorophyll OR (Peel/banana) is yellow in water as it has less chlorophyll;	1 (AO3)	Accept colour chart score as a reference to colour, eg 9 for “green” Reject no chlorophyll in water

Question	Marking Guidance	Mark	Comments
07.5	1. Glucose is lost from cells/tissue; 2. (So) less/no enzyme/chlorophyllase inhibition; 3. More chlorophyll breakdown; 4. Colour from green to yellow/less green;	4 (4 x AO2)	1. Ignore lost from chloroplasts If no marks awarded, accept for 1 mark Less/no chlorophyll breakdown so no colour change/(peel) stays/is green;

Question	Marking Guidance	Mark	Comments
08.1	1. <u>Sucrose</u> actively transported into phloem/sieve tube (element); 2. (Via) transfer/companion cells; 3. Lowers water potential so water moves in by <u>osmosis</u> (from xylem);	3 (3 x AO1)	1. Accept co-transport for active transport 3. Accept Ψ for water potential

Question	Marking Guidance	Mark	Comments
08.2	1. Low sucrose (concentration) in root as not transported/moved through damaged/absent phloem OR Low sucrose (concentration) in root as not transported/moved through (intact) xylem OR High sucrose (concentration) in shoot as builds up/increases at/above damaged/absent phloem; 2. Reduced potassium (ion) uptake as less sucrose; 3. (So) less respiration OR (So) less energy released OR (So) less ATP produced OR (So) less active transport;	3 (1 x AO1, 2 x AO2)	1. Accept ring for damaged/absent phloem 1 Accept decrease for 'low' 1. Accept increase for 'high' 3. Reject less energy is produced

Question	Marking Guidance	Mark	Comments
09.1	1. Anti-PD-1/antibody <u>complementary</u> to PD-1 so binds (to PD-1 on Tc cells) OR Anti-PD-1/antibody <u>complementary</u> to PD-1 so stops PD-1/T_C cell binding (to X); 2. T cell destroys (tumour) cell;	2 (2 x AO2)	1. Accept receptor OR binding site for PD-1 1. Accept covers OR blocks OR attaches for binds 1. Reject if reference to active site/substrate/antigen

Question	Marking Guidance	Mark	Comments
09.2	1. 200 (mg); 2. (Because) same/similar number (PD-1 receptors) occupied as 400 (mg) OR (Because) more (PD-1 receptors) occupied than 60 (mg) OR (Because relatively) constant number of (PD-1 receptors) occupied OR (Likely to produce) fewer side effects (than using 400);	2 (2 x AO3)	Accept for one mark, 400 (mg) because most/highest number of receptors occupied 2. Ignore no side effects

Question	Marking Guidance	Mark	Comments
09.3	Effective - Slows/decreases (tumour) growth (compared to not treated) OR Slows/decreases (the increase in tumour) volume/size (compared to not treated); - All doses occupy PD-1/ receptors; Not effective - Does not stop tumour growth OR Does not stop increase in (tumour) volume/size OR Does not destroy/remove/not a cure for tumour; - Number of occupied receptors decreases; 200/400 not tested on tumour (volume/growth); - Only tested over 20 days OR Only tested in a short period (of time); - Unknown sample size (in investigation); - No statistical tests/standard deviations so do not know if differences are significant; - Only effective on tumours with (protein) X OR Not tested on other (types of) tumour; - Can cause diarrhoea/ vomiting;	4 max (4 x AO3)	At least one mark for MP1 or MP2 to achieve 4 marks 7. Ignore small sample size 8. Reject results for “differences” 10. Ignore reference to general side effects

Question	Marking Guidance	Mark	Comments
10.1	1. Contraction reduces volume and raises pressure; 2. Atrioventricular valve opens when atrium pressure is greater than ventricle; 3. Higher pressure in ventricle than atrium closes atrioventricular valve; 4. Higher pressure in (left) ventricle than aorta opens semilunar/aortic valve; 5. Higher pressure in aorta than (left) ventricle closes semilunar/aortic valve;	5 (5 x AO1)	Ignore AV once Ignore SL once Accept systole for contract Accept diastole for relax 2. and 3 Accept bicuspid 2. and 3 Reject tricuspid once 3. and 5. Accept 'stops blood (flow)' as meaning 'valve closes' Ignore 'prevent backflow'

Question	Marking Guidance	Mark	Comments
10.2	1. Use single/continuous/joined lines OR No sketching OR No overlapping lines OR No crossing/hanging lines; 2. No shading/hatching; 3. Draw (only) the outline of tissues; 4. Draw parts to the same scale/relative size; 5. Show labels/annotations/title; 6. Show scale/magnification;	4 max (4 x AO1)	3. Accept do not draw cells

Question	Marking Guidance	Mark	Comments
10.3	Formation at arterial end 1. High hydrostatic/blood pressure; 2. (This effect is) greater than (effect of) water potential gradient (retaining fluid/water); 3. Water/ions/glucose/amino acids/fatty acids/small molecules leave (plasma); 4. (Plasma/large) proteins remain in blood/capillary; Return at venous end 5. Low(er) hydrostatic/blood pressure; 6. (Plasma) protein lowers water potential (in blood) OR (Plasma) protein creates water potential gradient; 7. <u>Water</u> returns/moves by osmosis; 8. (Excess tissue) fluid returns (to blood) in lymph vessels/lymph capillaries/lacteal/lymphatic system;	6 max (6 x AO1)	2. Accept osmotic effect for water potential 2. and 6. Accept Ψ for water potential 3. Ignore references to tissue fluid 3. Reject blood/plasma leaves capillary 8. Ignore lymph nodes