

# AS

# Biology

Paper 1

Mark scheme

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7401/1  
Specimen Paper (set 2)

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Version 1.0

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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 Assessment Writer.

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.

Further copies of this mark scheme are available from [aqa.org.uk](http://aqa.org.uk)

**Important - please note**

This mark scheme has not been through the full standardisation process. As such, many of the phases described above have not been completed. The Instructions for examiners are also included as a guide to how the mark scheme will function as an operational document. The layout has been kept consistent so that future operational mark schemes do not appear different to the specimen materials.

## 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. Boldening

In a list of acceptable answers where more than one mark is available 'any **two** from' is used, with the number of marks boldened. Each of the following bullet points is a potential mark.

A bold **and** is used to indicate that both parts of the answer are required to award the mark.

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.

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### 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. Degenerate: more than one (base) triplet for each amino acid; 2. Non-overlapping: each base is part of only one triplet;	2	Accept codon (as would be applicable to mRNA code)
01.2	A = adenine C = cytosine G = guanine U = uracil	2 max	All four correct = 2 One error = 1 Two or more errors = 0
01.3	<u>AGT</u> ;	1	

Question	Marking Guidance	Mark	Comments
02.1	1. Many lamellae/filaments so large surface area; 2. Thin (surface) so short diffusion pathway;	2	1 & 2 must each have a feature and a consequence
02.2	1. Water and blood flow in opposite directions; 2. Blood always passing water with a higher oxygen concentration; 3. Diffusion gradient maintained throughout length (of gill) <b>OR</b> Diffusion occurs throughout length of gill <b>OR</b> If water and blood flowed in same direction equilibrium would be reached;	3	1. Allow diagram showing counter-flow

Question	Marking Guidance	Mark	Comments														
03.1	1. Same genus; 2. Same evolutionary origin/common ancestor;	2															
03.2	<table><tr><th>Taxon</th><th>Name of Taxon</th></tr><tr><td>Domain</td><td>Eukarya</td></tr><tr><td>Kingdom</td><td>Animalia</td></tr><tr><td>Phylum</td><td>Chordata</td></tr><tr><td>Class</td><td>Mammalia</td></tr><tr><td>Order</td><td>Rodentia</td></tr><tr><td>Family</td><td>Muridae</td></tr></table>	Taxon	Name of Taxon	Domain	Eukarya	Kingdom	Animalia	Phylum	Chordata	Class	Mammalia	Order	Rodentia	Family	Muridae	2	3 correct = 2 marks 2 correct = 1 mark 1 or 0 correct = 0 marks
Taxon	Name of Taxon																
Domain	Eukarya																
Kingdom	Animalia																
Phylum	Chordata																
Class	Mammalia																
Order	Rodentia																
Family	Muridae																
03.3	1. (No) SDs of means of body sizes/sizes of parts of bodies overlap; 2. Calculation of correct head and body: tail ratios; 3. Almost identical, so same body shape/proportions;	3															
03.4	1. Breed the two mice together; 2. (Same species) produce fertile offspring;	2															

Question	Marking Guidance	Mark	Comments															
04.1	<div>1. Sodium ions actively transported from ileum cell to blood;</div> <div>2. Maintains/forms diffusion gradient for sodium to enter cells from gut (and with it, glucose);</div> <div>3. Glucose enters by facilitated diffusion with sodium ions;</div>	3																
04.2	<table><tr><th>Biochemical test</th><th>Liquid from beaker</th><th>Liquid inside Visking tubing</th></tr><tr><td>Biuret reagent</td><td></td><td>✓</td></tr><tr><td>I<sub>2</sub>/KI</td><td></td><td>✓ or blank</td></tr><tr><td>Benedict's</td><td>✓</td><td>✓</td></tr><tr><td>...</td><td></td><td></td></tr></table>	Biochemical test	Liquid from beaker	Liquid inside Visking tubing	Biuret reagent		✓	I <sub>2</sub> /KI		✓ or blank	Benedict's	✓	✓	...			3	1 mark for each correct row
Biochemical test	Liquid from beaker	Liquid inside Visking tubing																
Biuret reagent		✓																
I <sub>2</sub> /KI		✓ or blank																
Benedict's	✓	✓																
...																		
04.3	<div>1. Biuret: protein molecules too large to pass through tubing;</div> <div>2. Iodine in potassium iodide solution: starch molecules too large to pass through tubing;</div> <div>3. Benedict's: starch hydrolysed to maltose, which is able to pass through tubing</div>	3	<div>1. Neutral: enzyme molecules</div> <div>2. If no tick in 04.2, allow no starch hydrolysed</div> <div>3. Reject: glucose</div>															



Question	Marking Guidance	Mark	Comments
05.1	<b>B</b> Golgi (body/apparatus); <b>C</b> Mitochondria/mitochondrion;	2	
05.2	1. Chloroplasts/plastids 2. Cell wall 3. Cell vacuole 4. Starch grains/amyloplasts;	1 max	Any <b>2</b> for <b>1</b> mark
05.3	1. Ice-cold – Slows/stops enzyme activity to prevent digestion of organelles/mitochondria; 2. Buffered – Maintains pH so that enzymes/proteins are not denatured; 3. Same water potential – Prevents <u>osmosis</u> so no lysis/shrinkage of organelles/mitochondria/ <b>C</b> ;	3	For each mark must link reason to relevant property  2. Reject reference to cells 3. Ignore damage
05.4	1. Break open cells/homogenise/produce homogenate; 2. Remove unbroken cells/larger debris;	2	
05.5	Nucleus/nuclei;	1	
05.6	Mitochondria/organelle <b>C</b> less dense than nucleus/organelle in first pellet;	1	Accept 'lighter' for less dense

Question	Marking Guidance	Mark	Comments
06.1	1. Polar molecule; 2. Acts as a (universal) solvent; <b>OR</b> 3. (Universal) solvent; 4. (Metabolic) reactions occur faster in solution; <b>OR</b> 5. Reactive; 6. Takes place in hydrolysis/condensation/named reaction;	4	Polar molecule so acts as (universal) solvent so (metabolic) reactions are faster = 3 marks
06.2	Name of ion; Correct function within cell;	2	Ions other than sodium in specification are $H^+$ , $Fe^{2+}$ and $PO_4^{3-}$ but accept any correct ion (other than sodium) plus relevant function = 2.  Allow ion to be named in words but not as element, eg, iron ion but not iron.
06.3	1. Comparison: both move down concentration gradient; 2. Comparison: both move through (protein) channels in membrane; 3. Contrast: ions can move against a concentration gradient by active transport;	3	2. Accept aquaporins (for water) and ion channels

Question	Marking Guidance	Mark	Comments
07.1	1. Foreign protein; 2. (that) stimulates an immune response/production of antibody;	2	1. Accept glycoprotein/glycolipid/polysaccharide
07.2	1. A protein/immunoglobulin specific to an antigen; 2. Produced by B cells <b>OR</b> Secreted by plasma cells;	2	
07.3	1750(%)	1	
07.4	1. Sample 1/before vaccination no antibody released because patients not yet encountered vaccine/antigen/virus; 2. (Sample 2/primary response/after first dose) activation/clonal selection/expansion of <u>B cells</u> into plasma cells; 3. Plasma cells <u>release</u> antibodies; 4. (Sample 3/secondary response/after second dose) <u>memory cells</u> produce more antibodies/produce antibodies more quickly;	4	1. Accept 'produced' for 'released'

Question	Marking Guidance	Mark	Comments
08.1	<ol style="list-style-type: none"> <li>IV on x axis and DV on y axis <b>and</b> both axes on linear scales;</li> <li>Axes labelled clearly and with correct units separated from variable by solidus or in brackets;</li> <li>All rates calculated correctly;</li> <li>Points plotted correctly <b>and</b> joined by ruled lines and no extrapolation;</li> </ol>	4	
08.2	<p>Yes:</p> <ol style="list-style-type: none"> <li>Expect optimum temperature of enzyme to be same <b>OR</b> Similar to temperature where bacterium lives;</li> <li>Optimum temperature for enzyme (appears to be around) 15 °C;</li> </ol> <p>No:</p> <ol style="list-style-type: none"> <li>Need data from more temperatures (between 10 °C and 20 °C);</li> <li>Data for only isolated enzyme <b>OR</b> Isolation may affect activity;</li> </ol>	4	
08.3	<ol style="list-style-type: none"> <li>Initial/starting substrate concentration</li> <li>Enzyme concentration</li> <li>pH;</li> </ol>	1 max	Any <b>2</b> for <b>1</b> mark

Question	Marking Guidance	Mark	Comments
09.1	<ol style="list-style-type: none"> <li>Contents of phloem vessel pushed into insect's mouth by high pressure;</li> <li>(High pressure in phloem vessel) caused by loading of sugars into phloem in leaf;</li> <li>And (resulting) entry of water by osmosis;</li> </ol>	3	
09.2	<ol style="list-style-type: none"> <li>Polysaccharides are insoluble;</li> <li>So do not affect water potential of gut;</li> </ol>	2	
09.3	<ol style="list-style-type: none"> <li>(Only few bacteria passed from parent, so) only a few (copies of) genes passed on (in bacteria);</li> <li>May not/does not include all alleles (of genes, so diversity reduced)</li> </ol> <p><b>OR</b></p> <p>Small number of bacteria transmitted means unrepresentative sample;</p>	2	
09.4	<ol style="list-style-type: none"> <li>Number/mass/density of insects per plant;</li> <li>Stage of development/size of plants/insects;</li> </ol>	2	Ignore any abiotic factor
09.5	Draw around leaf on graph paper <b>and</b> count squares;	1	