AQA

AS BIOLOGY (7401/1)

Paper 1

Mark scheme

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

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. How to break open cells and remove debris; 2. Solution is cold/isotonic/buffered; 3. Second pellet is chloroplast;	3	
01.2	1. **A** stroma; 2. **B** granum;	2	2. Accept thylakoid
01.3	$\left(\frac{length\ of\ chloroplast}{length\ of\ bar}\right)$ µm;	1	
01.4	**Two** of the following for **one** mark; Mitochondrion/ribosome/endoplasmic reticulum/lysosome/cell-surface membrane	1 max	

Question	Marking Guidance	Mark	Comments
02.1	Concentration of substrate solution / of enzyme solution / pH;	1	
02.2	1. 2.5/0.04; 2. g dm^{-3} $minute^{-1}$ / g dm^{-3} s^{-1};	2	1 mark for correct value 1 mark for related unit
02.3	1. Initial rate of reaction faster at 37 °C; 2. Because more kinetic energy; 3. So more E–S collisions/more E–S complexes formed; 4. Graph reaches plateau at 37 °C; 5. Because all substrate used up;	5	Allow converse for correct descriptions and explanations for curve at 25 °C

Question	Marking Guidance	Mark	Comments
03.1	1. Chromosome is formed of two chromatids; 2. (Because) DNA replication (has occurred); 3. (Sister) chromatids held together by centromere;	3	
03.2	1. Chromosomes in homologous pair; 2. One of each into daughter cells / haploid number;	2	
03.3	Separation of (sister) chromatids / division of centromere;	1	
03.4	1. Independent segregation (of homologous chromosomes); 2. Crossing over / formation of chiasmata;	2	1. Accept random assortment

Question	Marking Guidance	Mark	Comments
04.1	Deoxyribose;	1	
04.2	1. Thymine 18(%); 2. Guanine 32(%);	2	
04.3	DNA polymerase;	1	
04.4	1. (**Figure 4** shows) DNA has antiparallel strands/described; 2. (**Figure 4** shows) shape of the nucleotides is different/nucleotides aligned differently; 3. Enzymes have active sites with specific shape; 4. Only substrates with complementary shape/only the phosphate end (of the developing strand) can bind with active site of enzyme/active site of DNA polymerase;	4	4. Allow 3' end (of developing strand)

Question	Marking Guidance	Mark	Comments
05.1	PKNJ;	1	
05.2	*Lutra lutra*;	1	
05.3	Bone/skin/preserved remains / museums;	1	
05.4	1. (Hunting) reduced population size(s), so (much) only few alleles left; 2. Otters today from one/few surviving population(s); 3. Inbreeding;	2 max	Allow any **two** 1. Accept bottleneck 2. Accept founder effect
05.5	1. Population might have been very small/genetic bottleneck; 2. Population might have started with small number of individuals / by one pregnant female / founder effect; 3. Inbreeding;	2 max	Allow any **two**

Question	Marking Guidance	Mark	Comments
06.1	1. (Overall) outward pressure of 3.2 kPa; 2. Forces small molecules out of capillary;	2	
06.2	Loss of water/loss of fluid/friction (against capillary lining);	1	
06.3	1. High blood pressure = high hydrostatic pressure; 2. Increases outward pressure from (arterial) end of capillary/reduces inward pressure at (venule) end of capillary; 3. (So) more tissue fluid formed /less tissue fluid is reabsorbed;	3	3. Allow lymph system not able to drain tissues fast enough
06.4	1. Water has left the capillary; 2. Proteins (in blood) too large to leave capillary; 3. Increasing/giving higher concentration of blood proteins (and thus wp);	3	

Question	Marking Guidance	Mark	Comments
07.1	1. Dissolve in alcohol, then add water; 2. White emulsion shows presence of lipid;	2	
07.2	Glycerol;	1	
07.3	Ester;	1	
07.4	**Y** (no mark) Contains double bond between (adjacent) carbon atoms in hydrocarbon chain;	1	
07.5	1. Divide mass of each lipid by total mass of all lipids (in that type of cell); 2. Multiply answer by 100;	2	
07.6	Red blood cells free in blood/not supported by other cells so cholesterol helps to maintain shape;	1	Allow converse for cell from ileum – cell supported by others in endothelium so cholesterol has less effect on maintaining shape
07.7	1. Cell unable to change shape; 2. (Because) cell has a cell wall; 3. (Wall is) rigid/made of peptidoglycan/murein;	2 max	

Question	Marking Guidance	Mark	Comments
08.1	Calculations made (from raw data)/raw data would have recorded initial and final masses;	1	
08.2	Add 4.5 cm^3 of (1.0 mol dm^{-3}) solution to 25.5 cm^3 (distilled) water;	2	If incorrect, allow 1 mark for solution to water in a proportion of 0.15:0.85
08.3	1. Water potential of solution is less than/more negative than that of potato tissue; 2. Tissue loses water by osmosis;	2	1. Allow Ψ as equivalent to water potential
08.4	1. Plot a graph with concentration on the *x*-axis and percentage change in mass on the *y*-axis; 2. Find concentration where curve crosses the *x*-axis/where percentage change is zero; 3. Use (another) resource to find water potential of sucrose concentration (where curve crosses *x*-axis);	3	

Question	Marking Guidance	Mark	Comments
09.1	1. Outside of virus has antigens/proteins; 2. With complementary shape to receptor/protein in membrane of cells; 3. (Receptor/protein) found only on membrane of nerve cells;	3	Accept converse argument
09.2	1. No more (nerve) cells infected/no more cold sores form; 2. (Because) virus is not replicating;	2	
09.3	Prevents replication of virus;	1	
09.4	MicroRNA binds to cell's mRNA (no mark) 1. (Binds) by specific base pairing; 2. (So) prevents mRNA being read by ribosomes; 3. (So) prevents translation/production of proteins; 4. (Proteins) that cause cell death;	4	



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