GCSE
COMBINED SCIENCE: TRILOGY
8464/B/2F

Biology Paper 2F

Mark scheme

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 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

Information 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
- the Assessment Objectives, level of demand and specification content that each question is intended to cover.

The extra information 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 and underlining

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 a mark are indicated by the use of **or**. Different terms in the mark scheme are shown by a / ; eg allow smooth / free movement.

2.4 Any wording that is underlined is essential for the marking point to be awarded.

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 error / contradictions equals or exceeds the number of marks available for the question, no marks can be awarded.

However, responses considered to be neutral (indicated as * in example 1) are not penalised.

Example 1: What is the pH of an acidic solution?

[1 mark]

Student	Response	Marks awarded
1	green, 5	0
2	red*, 5	1
3	red*, 8	0

Example 2: Name two planets in the solar system.

[2 marks]

Student	Response	Marks awarded
1	Neptune, Mars, Moon	1
2	Neptune, Sun, Mars, Moon	0

3.2 Use of chemical symbols / formulae

If a student writes a chemical symbol / formula instead of a required chemical name, full credit can be given if the symbol / formula is correct and if, in the context of the question, such action is appropriate.

3.3 Marking procedure for calculations

Marks should be awarded for each stage of the calculation completed correctly, as students are instructed to show their working. Full marks can, however, be given for a correct numerical answer, without any working shown.

3.4 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.

3.5 Errors carried forward

Any error in the answers to a structured question should be penalised once only.

Papers should be constructed in such a way that the number of times errors can be carried forward is kept to a minimum. Allowances for errors carried forward are most likely to be restricted to calculation questions and should be shown by the abbreviation ecf in the marking scheme.

3.6 Phonetic spelling

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

3.7 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.

3.8 Allow

In the mark scheme additional information, 'allow' is used to indicate creditworthy alternative answers.

3.9 Ignore

Ignore 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.

3.10 Do <u>not</u> accept

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

4. Level of response marking instructions

Extended response questions are marked on level of response mark schemes.

- Level of response mark schemes are broken down into levels, each of which has a descriptor.
- The descriptor for the level shows the average performance for the level.
- There are two or three marks in each level.

Before you apply the mark scheme to a student's answer, read through the answer and annotate it (as instructed) to show the qualities that are being looked for. You can then apply the mark scheme.

Step 1: Determine a level

Start at the lowest level of the mark scheme and use it as a ladder to see whether the answer meets the descriptor for that level. The descriptor for the level indicates the different qualities that might be seen in the student's answer for that level. If it meets the lowest level then go to the next one and decide if it meets this level, and so on, until you have a match between the level descriptor and the answer.

When assigning a level you should look at the overall quality of the answer. Do **not** look to penalise small and specific parts of the answer where the student has not performed quite as well as the rest. If the answer covers different aspects of different levels of the mark scheme you should use a best fit approach for defining the level.

Use the variability of the response to help decide the mark within the level, ie if the response is predominantly level 2 with a small amount of level 3 material it would be placed in level 2 but be awarded a mark near the top of the level because of the level 3 content.

Step 2: Determine a mark

Once you have assigned a level you need to decide on the mark. The descriptors on how to allocate marks can help with this.

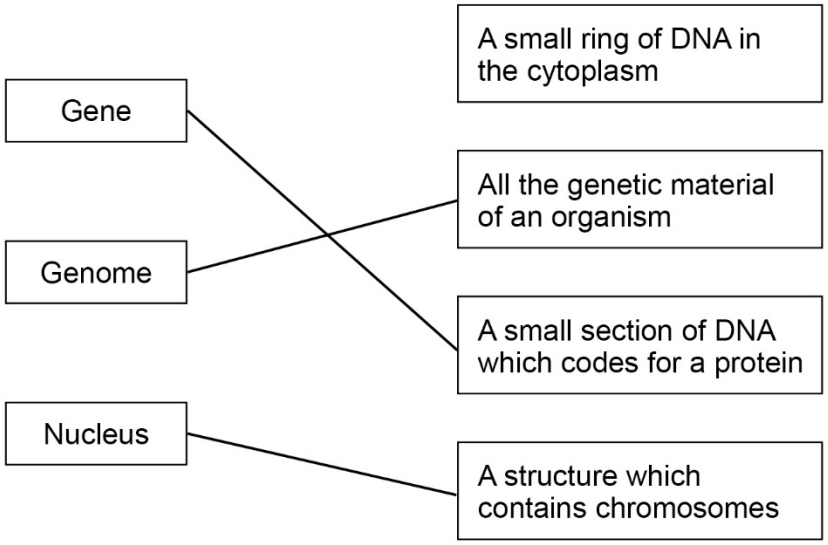
The exemplar materials used during standardisation will help. There will be an answer in the standardising materials which will correspond with each level of the mark scheme. This answer will have been awarded a mark by the Lead Examiner. You can compare the student's answer with the example to determine if it is the same standard, better or worse than the example. You can then use this to allocate a mark for the answer based on the Lead Examiner's mark on the example.

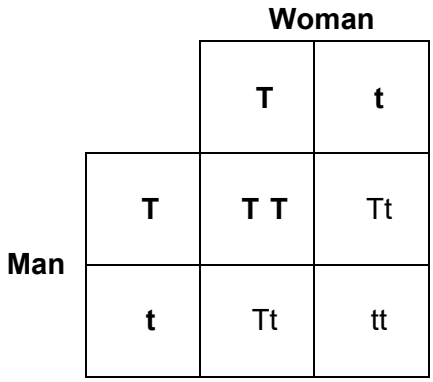
You may well need to read back through the answer as you apply the mark scheme to clarify points and assure yourself that the level and the mark are appropriate.

Indicative content in the mark scheme is provided as a guide for examiners. It is not intended to be exhaustive and you must credit other valid points. Students do **not** have to cover all of the points mentioned in the indicative content to reach the highest level of the mark scheme.

You should ignore any irrelevant points made. However, full marks can be awarded only if there are no incorrect statements that contradict a correct response.

An answer which contains nothing of relevance to the question must be awarded no marks.

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	23		1	AO1 4.6.1.2
01.2	 additional line from a box on the left negates the mark for that box		1 1 1	AO1 4.6.1.4 4.6.1.3
01.3	any **one** from: • to survive • so you do not eat the plants • to stop you being harmed / poisoned	allow to protect them allow stop you getting ill / dying	1	AO2 4.7.1.4
01.4	heterozygous		1	AO2 4.6.1.4
01.5	tt	allow homozygous recessive	1	AO2 4.6.1.4

01.6		allow 1 or 2 genotypes correct for **1** mark	2	AO2 4.6.1.4
01.7	75%	allow **only** a probability consistent with student's derivation if no answer to question **01.6** allow 75%	1	AO3 4.6.1.4
Total			**10**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	description of any correct method to achieve randomness e.g. random number generator	ignore throwing quadrat / frame	1	AO3 4.7.2.1 10.2.7
02.2	frame / square	allow rectangle ignore internal squares / grid	1	AO1 4.7.2.1 10.2.7
02.3 mark with **2.4** and **2.5**	9(.0)		1	AO2 4.7.2.1 10.2.7
02.4 mark with **2.3** and **2.5**	15 000 (m^2)		1	AO2 4.7.2.1 10.2.7
02.5 mark with **2.3** and **2.4**	9.0 × 15 000 135 000	answer must be consistent with answers in questions **02.3** and **02.4**	1 1	AO2 4.7.2.1 10.2.7
02.6	any **two** from: • herbivores / animals • competing (with other plants) • (human) trampling / playing • (plant) disease / pathogen • mowing	allow being eaten	2	AO1 4.7.1.2 4.7.1.3
02.7	less light / water for photosynthesis **or** fewer ions / nitrates / minerals (1) so fewer proteins (1)	ignore Sun allow fewer magnesium (ions) allow less nutrients idea of fewer only needed once to gain both marks allow fewer ions / nitrates / minerals / nutrients so less growth for **2** marks	1 1	AO3 AO2 4.7.1.3 4.7.1.2
Total			**10**	

2.8 **Level 3:** Relevant points (reasons / causes) are identified, given in detail and logically linked to form a clear account.

5–6

Level 2: Relevant points (reasons / causes) are identified, and there are attempts at logical linking. The resulting account is not fully clear.

3–4

Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.

1–2

No relevant content

0

Indicative content

- trees over / in field
- (which) reduce light for photosynthesis
- (so) fewer daisies there

- trees over / in field
- (which) take water / nitrates / ions from the soil
- (so) fewer daisies there

- trampling on sports pitches
- (will) kill plants
- (so) fewer daisies there

- competition from plants / grasses on field
- (will) use up water / nitrates / ions / space
- (so) fewer daisies there

- gardener may water / fertilise / mow field
- (which provides) more water / nitrates / ions
- (so) more / fewer daises grow there

- more insects / disease / animals in some areas
- (may) eat / kill plants
- (so) fewer daisies there

- school buildings
- (which) reduce light for photosynthesis
- (so) fewer daisies near school

- pollution / toxins from vehicles on roads
- (which will) reduce growth
- (so) fewer daisies near roads

- wrong pH **or** lack of ions **or** poor drainage **or** poor / wet / dry soil in some areas
- (which will) slow growth
- (so) fewer daisies there

Level 3 answers must refer to several factors in accurate detail

[6]

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	root (hairs)		1	AO1 4.7.2.2 4.2.3.2
03.2	carbon water	in either order allow carbon dioxide if no other mark awarded allow oxygen for 1 mark	1 1	AO1 4.7.2.2
03.3	**Level 2:** Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.		4–6	AO1 4.7.2.2 4.4.1.1 4.4.2.1
	Level 1: Facts, events or processes are identified and simply stated but their relevance is not clear.		1–3	
	No relevant content		0	
	Indicative content • microorganisms decay (the dead plant) • microorganisms respire • using carbon compounds / glucose • releasing carbon dioxide • into the atmosphere • new plants take in carbon dioxide • (carbon dioxide) for photosynthesis • making glucose • converted into correctly named cell materials (when plants are decayed) Nitrate / mineral ions • are released into soil • to be taken up by new growing plants Water • plants dehydrate or water evaporates when they die • recycled as rain needed by growing plants			
Total			**9**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	Ourasphaira		1	AO2 4.6.4
04.2	decay		1	AO2 4.6.3.2
04.3	8.9×10^8 years old		1	AO2 4.6.3.2
04.4	Carl Linnaeus		1	AO1 4.6.4
04.5	eukaryota		1	AO1 4.6.4
04.6	electron microscopes allow more detail to be seen inside cells		1	AO1 4.6.4

TOTAL 6 MARKS

Question	Answers	Extra information	Mark	AO / Spec. Ref.
5.1	controlling water output in urine keeping cool on a hot day		1 1	AO2 4.5.1
5.2	pituitary		1	AO1 4.5.3.1
5.3	(8.4 – 5.2 =) 3.2 (mmol/dm^3)		1	AO2 4.5.3.2
5.4	diabetes	ignore type of diabetes	1	AO3 4.5.3.2
5.6	the pancreas is not releasing insulin		1	AO3 4.5.3.2
5.7	change diet take more exercise	allow description of suitable diet change e.g. use sweetener in hot chocolate, eat less sugary / starchy food or stop eating sugar-coated cereal allow description e.g. go to gym instead of reading and TV, walk / cycle to work allow change to an active job if no other marks awarded allow 1 mark for lose weight.	1 1	AO3 4.5.3.2
Total			**8**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1			1	AO2 4.6.1.3
06.2	any **one** from: • 2 strands / chains that are twisted / coiled / spiralled • double helix • (long) polymer	allow cross links between 2 strands / chains allow reference to nucleotides or sugars, phosphates and bases	1	AO1 4.6.1.3
06.3	amino acids protein	in this order only allow polypeptide	1 1	AO1 4.6.1.3
06.4	all the genetic material (of an organism)	allow DNA / genes for genetic material ignore chromosomes	1	AO1 4.6.1.3
06.5	tracing how aboriginal people spread across Australia		1	AO2 4.6.1.3

TOTAL 6 MARKS

Q7. (A) (i) any **two** from:

answers must be comparative

- more meat (per cow)
  ignore bigger unqualified
- more milk each day
- can be milked for more time after giving birth / greater proportion of time
  *accept '(produce) more milk', for **1** mark, if neither more milk each day nor can be milked for more time after giving birth are given*

2

(B) (ii) (milk contains) more protein

answers must be comparative

1

less time before having a calf when no milk produced

1

(i) genes from one organism are transferred to a different organism

1

(ii) (possible) harm to babies' long term health

allow don't know long-term / side effects (on baby)

accept idea that there may be other things in (genetically engineered) cow's milk that might harm babies' health e.g. bacteria

ignore ethical / religious arguments

1

TOTAL 6MARKS

Question	Answers	Extra information	Mark	AO / Spec. Ref.
8.1	secondary consumer		1	AO2 4.7.2.1
8.2	increase		1	AO3 4.7.1.1
8.3	(because) the blackflies are not being eaten	allow idea of other predators (of blackflies) if 'stay the same' selected in question **5.2**	1	AO3 4.7.1.1
8.4	biomass decreases as you go up / along the food chain	allow converse	1	AO3 4.7.2.1
8.5	label biomass in g(rams) three bars plotted correctly	 allow ± half small square allow **1** mark for 2 bars correct ignore width and spacing of bars	1 2	AO2 4.7.2.1
8.6	organisms / species are always being added / removed so population sizes not (fairly) constant	allow example of an environmental change e.g. gardener did not water for a month	1 1	AO2 4.7.1.1
Total			**9**	