GCSE
COMBINED SCIENCE: TRILOGY

8464/B/2F – BIOLOGY PAPER 2 FOUNDATION TIER

Mark scheme

8464

June 2018

Version/Stage: 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 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 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	food mates		1 1	AO1 4.7.1.1
01.2	any **one** from: (early arrivals) • get more food • get the healthiest mates • more space / material for nests • chicks will hatch earlier and have more time to mature • less competition • more resources	allow converse for late arrivals allow more likely to get a mate	1	AO3 4.7.1.4 4.7.1.1 4.7.1.3
01.3	any **one** from: • carbon dioxide • methane	allow correct chemical formulae allow water vapour, nitrogen oxides, CFCs, ozone ignore water	1	AO1 4.7.3.5
01.4	any **one** from: • rising sea levels • examples of climate change • extinction of some species • habitat loss	 eg flooding, drought, desertification, melting ice caps, storms / hurricanes ignore references to temperature	1	AO1 4.7.3.5
01.5	burning fossil fuels farming cows		1 1	AO2 4.7.3.5
01.6	sulfur dioxide		1	AO2 4.7.3.2
Total			**8**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	a double helix a polymer		1 1	AO1 4.6.1.3
02.2	gene genome	in this order only	1 1	AO1 4.6.1.3
02.3	sperm **and** egg(s) / ova / ovum	in either order	1	AO1 4.6.1.1
02.4	fertilisation		1	AO1 4.6.1.2
02.5	the cell divides twice the new cells have half the number of chromosomes		1 1	AO2 4.6.1.2
Total			**8**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	A		1	AO1 4.5.2 4.1.1.3
03.2	D		1	AO2 4.5.2 4.1.1.3
03.3	A = synapse B = motor (neurone)	in this order only	1 1	AO1 4.5.2
03.4	a reflex action		1	AO1 4.5.2
03.5	 12 (ms) 0.012 (s)	an answer of 0.012 (s) scores **2** marks	 1 1	AO2 4.5.2
03.6	A		1	AO1 4.5.3.1
03.7	controls the release of an egg		1	AO1 4.5.3.3
03.8	in the blood(stream)	allow in the plasma / blood vessels do **not** accept in blood cells / platelets	1	AO1 4.5.3.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.9	(person) C	no marks if A or B given	1	AO3 4.5.3.3
	any **one** from: • the testosterone level is high(er) • the oestrogen **and / or** progesterone levels are low • the oestrogen and progesterone levels do not rise and fall as they do in a menstrual cycle	allow testosterone is the main male (sex) hormone allow there is no menstrual cycle	1	
Total			**12**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	any **two** from: • (same) number of scoops / sweeps each time • scoop / sweep (at same) distance from the edge of pond • scoop (at same) depth • (same) size of net • (same) gauge / mesh size of net	allow any idea of controlling sweeps eg for same time allow scoop / sweep at the same place	2	AO2 4.7.2.1
04.2	64		1	AO2 4.7.2.1
04.3	19 to 122	allow 122 to19 **or** 103	1	AO2 4.7.2.1
04.4	water fleas were not evenly spread (around the edge of the pond)	allow any description of this such as more water fleas near the vegetation	1	AO3 4.7.2.1
04.5	more water fleas live near the edge of the pond	allow more water fleas live where there is vegetation allow converse if student's calculated answer to question **04.2** was less than 12	1	AO3 4.7.2.1
04.6	35		1	AO2 4.7.2.1
04.7	37.5 (%)	allow 38 (%)	1	AO2 4.7.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.8	there was a high(er) level of pollution (in the pond in 2016)	allow converse for 2014	1	AO3 4.7.2.1
	because there are no / fewer mayfly nymphs **or** because there are fewer freshwater shrimps	data must be comparative	1	
04.9	any **two** from: • famine / food insecurity • water shortage • landfill sites filling up • acid rain • deforestation / habitat destruction • extinction of species **or** reducing biodiversity • natural resources running out	ignore global warming and any water pollution references such as sewage or eutrophication	2	AO3 4.7.3.2 4.7.3.3 4.7.3.4 4.7.3.5 4.7.3.1
Total			**12**	

<table>
<tr><th>Question</th><th>Answers</th><th>Extra information</th><th>Mark</th><th>AO / Spec. Ref.</th></tr>
<tr><td>05.1</td><td><table><tr><td></td><td>Genes</td><td>Environment</td><td>Both</td></tr><tr><td>Brown...</td><td>✓</td><td></td><td></td></tr><tr><td>Light...</td><td></td><td></td><td>✓</td></tr><tr><td>Short hair</td><td></td><td>✓</td><td></td></tr></table></td><td></td><td>1
1
1</td><td>AO2
4.6.2.1</td></tr>
<tr><td>05.2</td><td>bb</td><td></td><td>1</td><td>AO2
4.6.1.4</td></tr>
<tr><td>05.3</td><td>brown</td><td>allow light brown or dark brown</td><td>1</td><td>AO2
4.6.1.4</td></tr>
<tr><td>05.4</td><td>(using bb for mother’s gametes)

correct combination in all four boxes, eg
<table><tr><td></td><td>(b)</td><td>(b)</td></tr><tr><td>(B)</td><td>Bb</td><td>Bb</td></tr><tr><td>(b)</td><td>bb</td><td>bb</td></tr></table></td><td>allow any combination of mother’s gametes as mark is for filling in boxes correctly</td><td>1</td><td>AO2
4.6.1.4</td></tr>
<tr><td>05.5</td><td>50%, 0.5, ½</td><td>the award of this mark is consequential to the answer in question 05.4

ignore ratios</td><td>1</td><td>AO2
4.6.1.4</td></tr>
<tr><td>05.6</td><td>phenotype</td><td></td><td>1</td><td>AO2
4.6.1.4</td></tr>
<tr><td>05.7</td><td>almost certainly have no effect</td><td></td><td>1</td><td>AO1
4.6.2.1</td></tr>
<tr><td>Total</td><td></td><td></td><td>9</td><td></td></tr>
</table>

<table>
<tr><th>Question</th><th>Answers</th><th>Extra information</th><th>Mark</th><th>AO / Spec. Ref.</th></tr>
<tr><td>06.1</td><td><table><tr><th>Factor</th><th>Biotic</th><th>Abiotic</th></tr><tr><td>Diseases</td><td>✓</td><td></td></tr><tr><td>Herbivores</td><td>✓</td><td></td></tr><tr><td>Temp</td><td></td><td>✓</td></tr><tr><td>Water</td><td></td><td>✓</td></tr></table></td><td>allow 1 mark for 2 or 3 correct</td><td>2</td><td>AO1
4.7.1.3
4.7.1.2</td></tr>
<tr><td>06.2</td><td>(leaves block light near tree so) more light (as you move outwards)

for photosynthesis

(which) produces (more) glucose / proteins (for growth)</td><td>allow low light intensity under tree
ignore Sun

allow less photosynthesis under the tree

ignore growth
ignore food

allow molecules, cell components or other correct substances instead of proteins

if no other mark awarded allow less water / ions / minerals / nutrients under the tree</td><td>1

1

1</td><td>AO2
4.7.2.1

AO1
4.7.2.1
4.4.1.1
4.4.1.3

AO1
4.7.2.1
4.4.1.1
4.4.1.3</td></tr>
<tr><td>06.3</td><td>
quadrat

light meter</td><td>in this order

correct spelling only

allow lux meter
allow light intensity meter
allow light data logger</td><td>
1

1</td><td>AO1
4.7.2.1</td></tr>
<tr><td>06.4</td><td>1.5(0) (m^2)</td><td>allow 15 000 cm^2</td><td>1</td><td>AO2
4.7.2.1</td></tr>
</table>

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.5	to keep light (intensity) as similar as possible	allow the light (intensity) might change ignore references to temperature ignore weather ignore Sun	1	AO3 4.7.2.1
06.6	any **one** from: • repeat (investigation) around the tree • repeat (investigation) for other trees / areas • sample every one metre • count the number of each species present (rather than percentage cover)	allow repeat in different directions ignore repeats unqualified ignore repeat at different times / days / seasons ignore different size quadrat ignore random sampling	1	AO3 4.7.2.1
06.7	daisy		1	AO3 4.7.2.1
06.8	as light (intensity) increased so did the percentage / cover of plants up to 100% / maximum at 175 (arbitrary units)	ignore directly proportional ignore positive correlation unqualified ignore distance	1 1	AO3 4.7.2.1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.9	any pair from: • (lack of) water / rain (1) because the leaves are stopping the rain **or** because the roots of the tree are absorbing it (1) • (lack of) minerals / ions (1) because the tree (roots) have absorbed them (1) • temperature (1) because less thermal energy from the sun is reaching under the tree canopy (1)	ignore carbon dioxide do **not** accept oxygen allow soil moisture allow magnesium / nitrate / nutrients allow too cold / cooler allow ‘heat’ for thermal energy allow pH / acidity (1) because (some) fallen leaves are acidic (1)	2	AO2 4.7.2.1
Total			**15**	

Question	Answers	Mark	AO / Spec. Ref.
07	**Level 3:** Relevant points (advice / reasons) are identified, given in detail and logically linked to form a clear account.	5–6	AO2
	Level 2: Relevant points (advice / reasons) are identified, and there are attempts at logical linking. The resulting account is not fully clear.	3–4	AO2 AO1
	Level 1: Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.	1–2	AO1
	No relevant content	0	
	Indicative content **precautions with reasons** • do not prescribe fluroquinolone / antibiotics for mild infections • because they will get better due to the body's normal immune system • do not prescribe fluroquinolone / antibiotics for viral infections / colds / flu • because antibiotics do not kill viruses • if you do prescribe fluroquinolone / antibiotics make sure the patient finishes the course • because any bacteria left may develop resistance, survive and reproduce rapidly (due to lack of competition) • only prescribe fluroquinolone if the patient has the new strain • because routine use would lead to an increase in resistant bacteria **other relevant content** • doctors and nurses in the practice / hospital should be using antibacterial / alcohol hand wash between each patient **and / or** disinfectant to clean wards • to kill (resistant) bacteria • doctors should isolate patients with this strain of bacteria • to prevent other patients getting the resistant infection		4.6.3.4 4.3.1.8
Total		**6**	