GCSE
COMBINED SCIENCE: TRILOGY
8464/B/2F

Biology Paper 2F

Mark scheme

June 2019

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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.

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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.

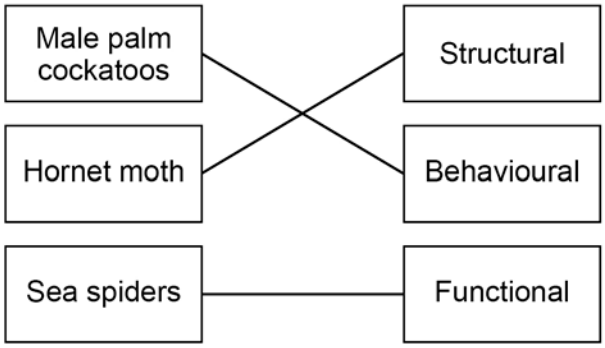
Indicative content in the mark scheme is provided as a guide for examiners. It is not intended to be exhaustive and you must credit other valid points. Students do **not** have to cover all of the points mentioned in the indicative content to reach the highest level of the mark scheme.

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	homeostasis		1	AO1 4.5.1
01.2	by hormones by nerve impulses		1 1	AO1 4.5.1 4.5.3.1
01.3	any **one** from: • temperature • (blood) glucose / sugar (concentration)	ignore water allow pH / ions / salts allow oxygen **or** carbon dioxide	1	AO1 4.5.1
01.4	 2000 – 1400 600 (cm^3)	an answer of 600 (cm^3) scores **2** marks allow 800 – 200 if no mark awarded allow (600 + 1000 + 400 =) 2000 for **1** mark	 1 1	AO2 4.5.1
01.5	more sweat (on hot day) cools the body		1 1	AO3 AO2 4.5.1
01.6	 $\frac{750}{3000} \times 100$ 25 (%)	an answer of 25 (%) scores **2** marks	 1 1	AO2 4.5.1
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**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	 additional lines from a box on the left negates the mark for that box 3 lines correct for **2** marks 1 **or** 2 lines correct for **1** mark		2	AO2 4.7.1.4
03.2	brightly coloured flowers large quantities of pollen		1 1	AO2 4.6.2.2 4.7.1.1 4.7.1.4
03.3	biodiversity		1	AO1 4.7.3.1
03.4	any **one** from: • to grow crops • to raise cows • to build	 allow farming / biofuels or named crop allow houses **or** building materials allow mining allow paper / fuel	1	AO1 4.7.3.4
03.5	any **one** from: • (new) disease • (new) herbivore • climate change **or** global warming **or** ice age • volcano / earthquake / tsunami / meteor • lack of pollinators • (new) competitor	 ignore (new) predator allow drought / flooding allow plant collectors	1	AO1 4.6.3.3
03.6	DNA	allow deoxyribonucleic acid	1	AO1 4.6.1.3
03.7	genome		1	AO1 4.6.1.3
Total			**9**	

<table>
<tr><th>Question</th><th>Answers</th><th>Extra information</th><th>Mark</th><th>AO / Spec. Ref.</th></tr>
<tr><td>04.1</td><td>mutation</td><td></td><td>1</td><td>AO1
4.6.2.1</td></tr>
<tr><td>04.2</td><td>any three from:
• choose the cats with the blue tail
• breed these cats together
• choose offspring with blue tails and breed these together
• repeat until all cats have blue tails</td><td>allow choose the cats with the desired characteristic

allow breed for several generations</td><td>3</td><td>AO1
AO2
4.6.2.3</td></tr>
<tr><td>04.3</td><td>they are rare / beautiful / expensive</td><td>allow description e.g. the breeder will make (more) profit</td><td>1</td><td>AO3
4.6.2.3</td></tr>
<tr><td>04.4</td><td>they are produced by inbreeding</td><td></td><td>1</td><td>AO2
4.6.2.3</td></tr>
<tr><td>04.5</td><td>(male cat) XY or YX
(female cat) XX</td><td>both required for the mark

allow lower case letters</td><td>1</td><td>AO1
4.6.1.6</td></tr>
<tr><td>04.6</td><td><table><tr><td></td><td>(X)</td><td>(X)</td></tr><tr><td>(X)</td><td>XX</td><td>XX</td></tr><tr><td>(Y)</td><td>XY</td><td>XY</td></tr></table></td><td>allow 2 or 3 derivation squares correct for 1 mark</td><td>2</td><td>AO2
4.6.1.6</td></tr>
<tr><td>04.7</td><td>random (if X or Y goes into each sperm)</td><td>allow it is a chance event
allow it is only a probability</td><td>1</td><td>AO3
4.6.1.6</td></tr>
<tr><td>Total</td><td></td><td></td><td>10</td><td></td></tr>
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Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	secondary consumer		1	AO2 4.7.2.1
05.2	increase		1	AO3 4.7.1.1
05.3 view with **05.2**	(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
05.4	biomass decreases as you go up / along the food chain	allow converse	1	AO3 4.7.2.1
05.5	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
05.6	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**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	hold a ruler (just) above the (open) hand of the other student drop the ruler and other student catches it record where the ruler is caught	ignore near the hand do **not** accept give verbal signal ignore timing	1 1 1	AO1 4.5.2
06.2	193.5		1	AO2 4.5.2
06.3	to compare the effect of no caffeine	allow as a control (group) allow to show the effect of caffeine do **not** accept control variable	1	AO3 4.5.2
06.4	0.217 (s)	allow any value in the range 0.2150 to 0.2180	1	AO2 4.5.2
06.5	as mass of caffeine increases the decrease / change in reaction time increases	allow converse ignore caffeine decreases reaction time do **not** accept the greater the increase in reaction time the greater the mass of caffeine	1	AO3 4.5.2
06.6	their reaction time was greater (after the drink)	allow converse allow slower / longer for greater do **not** accept anomalous result	1	AO3 4.5.2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.7	0.01(0) to 0.18(0) **or** 0.18(0) to 0.01(0) **or** 0.17(0)	allow values in range 0.008 to 0.012 **and** 0.178 to 0.182 allow correct calculation from values in range if no values are given, allow answers in the range 0.166 to 0.174 allow 0.01 ≤ C ≤ 0.18 ignore units	1	AO2 4.5.2
06.8	any **two** from: • (same range of) age • (same) sex / gender • (same) height / weight / BMI • all had no caffeine / medication / drugs earlier that day • equally tired or (same) amount of sleep • practice of the ruler drop test • starting point of ruler / hand • same point to take measurement above / below the thumb / finger • using the same hand • (same) number of students in each group	allow height ruler dropped from do **not** accept volume / concentration of caffeine	2	AO3 4.5.2
06.9	not automatic (because) it involves the (conscious part of the) brain	allow it is a voluntary action allow because it involves thinking / decision **or** conscious action	1 1	AO2 4.5.2
Total			**13**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	methane	allow CH_4 **or** water (vapour) **or** H_2O allow correct example such as CFCs, nitrous oxide, ozone	1	AO1 4.7.3.5
07.2	any **two** from: • ice caps melting • rise in sea levels • desertification • extreme weather • change in species distribution • change in migration patterns • loss of biodiversity • coral bleaching • crop failure **or** food insecurity • loss of habitat qualified	ignore references to increased temperature and greenhouse gas / effect allow storms **or** droughts **or** flooding allow some species become extinct / endangered allow correct examples such as polar bears losing ice ignore forest fires	2	AO1 4.7.3.5

Question	Answers	Mark	AO/ Spec. Ref
07.3	**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
	Level 1: Facts, events or processes are identified and simply stated but their relevance is not clear.	1-3	4.4.1.3 4.4.2.1
	No relevant content	0	
	Indicative content Photosynthesis • (carbon dioxide is) taken in through stomata / leaves • (carbon dioxide is) used in photosynthesis • to make glucose / carbohydrate • (glucose used) to make other carbon compounds or named example such as proteins, lipids • (glucose) stored as starch Feeding • plants are eaten / consumed by animals • which use the carbon compounds to make other carbon compounds Decay • when plants / animals die they are decomposed / decayed • by microorganisms • which use the carbon compounds to make other carbon compounds Respiration • plants / animals / microorganisms respire • (respiration) releases carbon dioxide back into the atmosphere Level 2 answers must consider photosynthesis and at least one other process in the carbon cycle. Level 2 answers must include some accurate detail.		
Total		**9**	