GCSE
COMBINED SCIENCE: TRILOGY
8464/B/1F

Biology Paper 1F

Mark scheme

June 2021

Version: 1.0 Final 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 Examiner.

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 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.

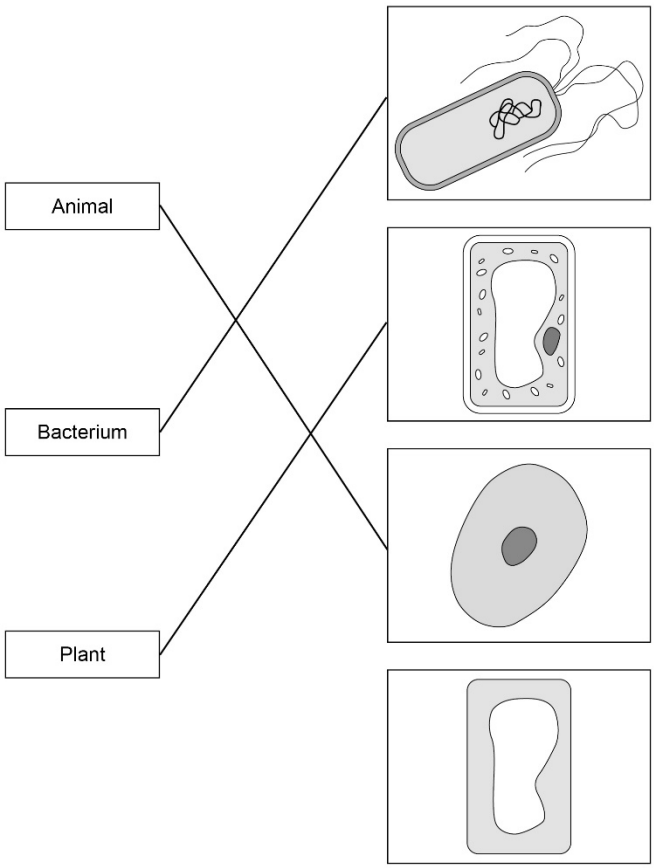
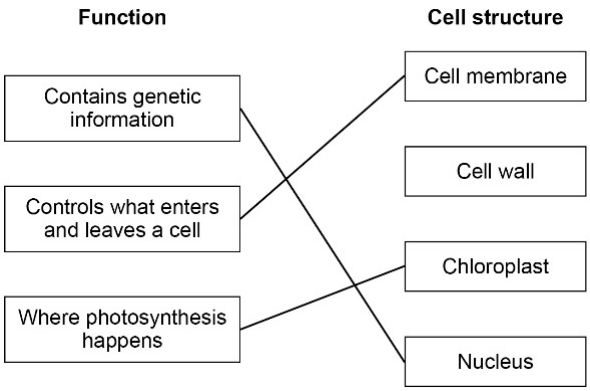
The exemplar materials used during standardisation will help. There will be an answer in the standardising materials which will correspond with each level of the mark scheme. This answer will have been awarded a mark by the Lead Examiner. You can compare the student's answer with the example to determine 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.

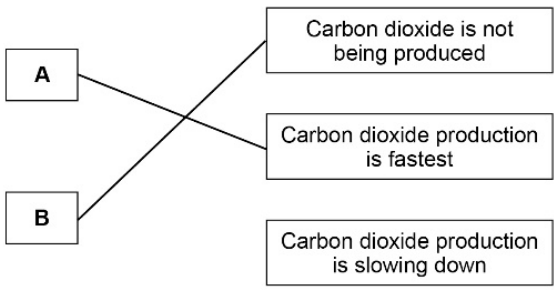
Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	 do **not** accept more than one line from a box on the left		1 1 1	AO1 4.1.1.1 4.1.1.2
01.2	 do **not** accept more than one line from a box on the left		1 1 1	AO1 4.1.1.2 4.1.2.1 4.1.3.1 4.4.1.1

01.3	urea glycogen starch cellulose	must be in this order	1 1 1 1	AO1 4.1.1.2 4.4.1.3 4.4.2.3
01.4	any **one** from: • (to cause) movement • to contract / shorten	 allow example of movement ignore to relax / expand ignore references to strength / energy / power	1	AO1 4.1.1.3 4.4.2.2
01.5	(many) mitochondria to transfer / release (a lot of) energy	 allow (mitochondria) for respiration do **not** accept to produce / make / create energy ignore reference to the shape / strength of the cells	1 1	AO2 4.1.1.2 4.1.1.3 4.4.2.1
01.6	$\frac{2}{0.05}$ (×) 40	 do **not** accept if a unit is given	1 1	AO2 4.1.1.5 RPA 1
Total			**15**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	penicillin		1	AO1 4.3.1.8 4.3.1.9
02.2	any **one** from: • (yellow / green / white / beige) discharge from vagina / penis • pain on urinating	ignore colour of urine allow yellow / green / white / beige discharge ignore pain unqualified allow pain in abdomen allow pain in testes allow inflammation of foreskin allow bleeding between periods allow bleeding after sex allow fever / nausea / vomiting	1	AO1 4.3.1.3
02.3	any **two** from: • concentration (of antibiotic) • type of disc • size of disc • temperature **or** kept at 25 °C • time **or** kept for 3 days	allow same type of (filter) paper allow use sterile Petri dish **or** use sterile agar	2	AO2 4.3.1.3 4.3.1.8
02.4	B		1	AO3 4.3.1.3 4.3.1.8 4.3.1.9

02.5	C		1	AO3 4.3.1.3 4.3.1.8 4.3.1.9
02.6	A		1	AO3 4.3.1.3 4.3.1.8 4.3.1.9
02.7	any **one** from: • antibiotics do **not** destroy viruses • viruses are inside cells	allow antibiotics do **not** kill viruses allow antibiotics **only** kill bacteria allow HIV is a virus allow HIV is **not** a bacterium allow idea that it is difficult to get the antibiotic to the virus	1	AO1 4.3.1.2 4.3.1.8
02.8	any **one** from: • disinfect / sterilise tools / scissors / files • use a new file for each customer • do not treat people with a fungal nail infection • disinfect hands between customers • use new gloves for each customer	allow put tools / scissors / files in fungicide allow washing / cleaning tools allow use a new tool / scissors for each customer ignore gloves / PPE unqualified allow wear masks	1	AO2 4.3.1.1 4.3.1.4

02.9	any **one** from: • feet are washed less • feet are in (more) moist conditions • feet are (often) warmer	allow converse statements allow idea that less air gets to feet allow idea that feet are wetter / warmer (inside socks) allow idea of (bare) feet in contact with the floor allow idea of sharing footwear	1	AO3 4.3.1.1 4.3.1.4
Total			**10**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	no oxygen (reacting with the glucose)	ignore there is no air	1	AO2 4.4.2.1
03.2	produces ethanol / alcohol		1	AO1 4.4.2.1
03.3	produces carbon dioxide / gas (which) makes the bread / dough rise	 allow idea related to making the bread lighter **or** affecting its texture	1 1	AO1 AO2 4.4.2.1
03.4	45 (cm^3)		1	AO2 4.4.2.1
03.5	to allow time for the mixture to reach 35 °C		1	AO3 4.4.2.1
03.6	**Part of the graph** / **Description of the reaction**  do **not** accept more than one line from a box on the left		1 1	AO3 4.4.2.1

03.7	any **one** from: • glucose / sugar / food ran out • ethanol / alcohol killed the cells / yeast	 ignore yeast / cells died unqualified ignore produced ethanol / alcohol unqualified	1	AO2 4.4.2.1
03.8	(2 °C) too cold (for enzymes / yeast to work)	allow yeast / enzyme was inactive ignore yeast killed allow no / few successful collisions do **not** accept enzymes are denatured	1	AO2 4.2.2.1 4.4.2.1
	(75 °C) enzymes denatured	allow enzymes destroyed allow description eg change in shape of active site or of enzyme allow yeast killed do **not** accept enzymes killed ignore references to collisions unqualified	1	
03.9	glucose → lactic acid	**1** mark for each chemical must be in this order ignore formulae	2	AO1 4.4.2.1
Total			**13**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	root	do **not** accept root hair (cells)	1	AO1 4.2.1 4.2.3.2
04.2	by active transport		1	AO2 4.1.3.3
04.3	translocation		1	AO1 4.2.3.2
04.4	any **one** from: • respiration • (used) to produce starch • (used) to produce fat / oil • (used) to produce cellulose • (used) to produce amino acids / protein	allow to release energy do **not** accept to produce / make / create energy allow for growth	1	AO1 4.2.3.2 4.4.1.3
04.5	guard cell		1	AO1 4.2.3.1 4.2.3.2

04.6	to allow carbon dioxide in		1	AO2 4.2.3.1 4.2.3.2
04.7	$\frac{9}{0.25}$ 36	 do **not** accept if a unit is given allow correct calculation using $\frac{9}{25}$	1 1	AO2 4.2.3.2
04.8	$\frac{37 + 36 + 30 + 32 + 35}{5}$ 34	allow $\frac{170}{5}$	1 1	AO2 4.2.3.2
04.9	there are fewer stomata on the upper surface of the leaves (conditions on upper surface will:) any **one** from: • be warmer • be drier • be more exposed to wind • have more light (so) less water will be lost	allow converse statements a comparative term is required	1 1 1	AO3 AO2 AO2 4.2.3.2
Total			**13**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	$6\,CO_2 + 6\,H_2O \rightarrow C_6H_{12}O_6 + 6\,O_2$		1	AO1 4.4.1.1
05.2	distance of the pondweed from the lamp		1	AO1 4.4.1.2 RPA5
05.3	bubbles (of gas) would be produced faster	allow more / bigger bubbles of gas would be produced (in a given time)	1	AO3 4.4.1.2 RPA5
	(because) enzymes work faster	allow (because) photosynthesis is controlled by enzymes allow (because) photosynthesis would be faster	1	AO2 4.2.2.1 4.4.1.2
05.4	any **one** from: • use an LED (lamp) • place a tank / beaker of water between the lamp and tube / pondweed • put the tube in a beaker of water • put the tube in a (thermostatically controlled) water bath • place a piece of glass between the lamp and tube / pondweed	allow use a light that does not emit (a lot of) infrared / thermal radiation allow place a heat shield between the lamp and tube / pondweed	1	AO3 4.4.1.2 RPA5

05.5	any **two** from: • measure the volume of gas produced • allow the pondweed time to equilibrate • repeat **and** calculate a mean **or** repeat **and** remove anomalies • control the concentration of carbon dioxide (in the water) • use the same bulb / lamp	 allow amount for volume allow use a cylinder / gas syringe to collect the gas allow a description of this ignore repeat unqualified allow put the pondweed in sodium hydrogen carbonate (solution) **or** sodium bicarbonate (solution) allow use the same type / size / age / piece of pondweed allow record the number of bubbles of gas produced in a longer period of time	2	AO3 4.4.1.2 RPA5
05.6	3 (bubbles of gas produced per minute)	allow 3.2 (bubbles of gas produced per minute) do **not** accept 3.0 (bubbles of gas produced per minute)	1	AO2 4.4.1.2 RPA5
05.7	as light intensity decreases the rate of photosynthesis decreases	allow as distance from lamp increases rate of photosynthesis decreases allow as distance from lamp increases number of bubbles produced decreases	1	AO3 4.4.1.2 RPA5

05.8	all points plotted correctly line of best fit through their points	allow tolerance of ± ½ a small square allow **1** mark for four points plotted correctly do **not** accept line extended to 0, 0 ignore extrapolations of line	2 1	AO2 4.4.1.2 RPA5
05.9	8	allow correct value from their line ± ½ a small square allow value in range 6 to 9 if a curved line of best fit is not drawn	1	AO3 4.4.1.2 RPA5
Total			**13**	

Question	Answers	Mark	AO / Spec. Ref.
06	**Level 3:** The method would lead to the production of a valid outcome. All key steps are identified and logically sequenced.	5–6	AO1 4.2.2.1 RPA3
	Level 2: The method would not necessarily lead to a valid outcome. Most steps are identified, but the method is not fully logically sequenced.	3–4	
	Level 1: The method would not lead to a valid outcome. Some relevant steps are identified, but links are not made clear.	1–2	
	No relevant content	0	
	Indicative content **Protein** • grind up food • add Biuret (reagent / solution) **or** add copper sulfate (solution) **and** sodium hydroxide (solution) **or** add Biuret 1 and Biuret 2 • turns purple / lilac **Starch** • add iodine (solution) • turns black / blue-black / dark blue - ignore blue / purple **Sugar** • grind up food • mix with water • add Benedict's (reagent / solution) • heat mixture (≥ 65 °C) • in a water bath • turns (brick) red / orange / brown / green / yellow For Level 3 correct references to all three tests are needed.		
Total		**6**	