GCSE

COMBINED SCIENCE: TRILOGY

8464/B/1H

Biology Paper 1H

Mark scheme

Specimen (set 2)

Version: 1.0

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Please be aware that not all schools and colleges will be using these tests at the same time.

Help us to maintain the security of these papers by ensuring they are not distributed on social media or other platforms.

Important – please note

Mark schemes are prepared by the Lead Assessment Writer and considered, together with the relevant questions, by a panel of subject teachers.

It must be stressed that a mark scheme is a working document. This mark scheme has **not** been through the full standardisation process. 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.

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.

The Information to Examiners is included as a guide to how the mark scheme will function as an operational document.

The layout has been kept consistent so that future operational mark schemes do not appear different from these test materials.

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. / Demand
01.1	carbon dioxide + water → (glucose) + oxygen	allow reactants in either order allow correct formulae, balancing not required	1	AO1 4.4.1.1 Standard
01.2	chlorophyll		1	AO2 4.2.3.1 4.4.1.2 Standard
01.3	glucose (produced in photosynthesis) is converted into starch		1	AO2 4.4.1.3 Standard
01.4	starch could be broken down into sugar		1	AO2 4.4.1 4.4.1.3 Standard
01.5	so the colour of the iodine solution / result can be seen		1	AO3 4.2.2.1 4.4.1.3 Standard
01.6	any **one** from: • turn off Bunsen / flame before collecting ethanol • use a water bath to heat the ethanol	allow idea that there are no naked flames near the ethanol	1	AO3 4.4.1.1 Standard
01.7	**A** orange / brown **B** black / blue-black		1 1	AO3 4.2.2.1 4.4.1.2 4.4.1.3 Standard
Total			**8**	

Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
02.1	36 000 (cm^3)		1	AO2 4.2.2.2 4.4.2.2 Standard
02.2	11600 / 1200 9.66666r	 allow any number of decimals	1 1	AO2 4.2.2.2 4.4.2.2 Standard
02.3	 muscles need more energy (for contraction) (so) more oxygen / glucose needed (for) increased respiration	need at least one reference to 'more' for full marks allow so more carbon dioxide / thermal energy needs to be removed	 1 1 1	AO1 4.2.2.2 4.2.2.3 4.4.2.1 4.4.2.2 Standard

02.4	**Level 3:** Relevant points (differences / functions) are identified, given in detail and linked logically to form a clear account.	5–6	AO2 AO1 4.2.2.2 Standard
	Level 2: Relevant points (differences / functions) 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 • artery has a thicker wall • (because) artery has to withstand higher pressure • artery has thicker layer of elastic tissue / fibres • (so) it can stretch • (so) artery returns to original size / shape • artery has thicker layer of muscle • to maintain a force on the blood • vein has valves • (valves) prevent backflow of blood • artery carries blood away from the heart • vein carries blood towards the heart ignore references to oxygenated / deoxygenated blood		

Total			**12**

Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
03.1	stomach and pancreas		1	AO1 4.2.2.1 Standard
03.2	all points plotted correctly smooth curve drawn through all the points	allow **1** mark for 3 points correctly plotted	2 1	AO2 4.2.2.1 Standard Std./High
03.3	as concentration of protein increases the percentage of light passing through decreases (because) mixture more cloudy	 allow idea of more particles in suspension	1 1	AO2 AO3 4.2.2.1 Standard
03.4	use protein concentrations between 2 and 10 g/dm^3		1	AO3 4.2.2.1 Std./High
03.5	any **one** from: • to allow them to reach 37 °C • so they would be at the optimum temperature • so reaction temperature controlled	 to allow them to reach body temperature allow so they would be at the same temperature allow temperature affects enzyme activity	1	AO3 4.2.2.1 Standard

03.6	correctly read concentration at 57% from their graph in **Figure 3**		1	AO2 4.2.2.1 High

03.7	their value given in **03.6** – 0.5	allow use of different values over straight line portion of graph	1	AO2 4.2.2.1 High
	answer for their value given in $\frac{\textbf{03.6} - 0.5}{12}$		1	

03.8	(protease from organ **B**) is inactive **or** rate of digestion is zero **and** protease from organ **A** is active	allow only protease from organ **B** is inactive	1	AO2 AO3 4.2.2.1 Std./High High
	any **one** from: • enzyme denatured by pH • at the wrong pH • enzyme not specific for this protein	allow active site damaged / changed by pH	1	

Total			**13**

Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
04.1	any **two** from: • synthesis of new molecules • for active transport • to keep warm (in mammals / birds)	 allow named molecule eg starch / glycogen / cellulose / lipids / fats / proteins / hormones / antibodies allow description allow to keep warm (in animals) allow for movement (in animals) allow for transmission of nerve impulses (in animals)	2	AO1 AO2 4.1.3.3 4.4.2.1 4.4.2.3 4.5.1 Standard Std./High
04.2	mitochondria / mitochondrion		1	AO1 4.1.1.1 4.1.1.2 Standard
04.3	both occur without oxygen both release (a small amount of) energy muscle cells produce lactic acid but plant cells produce ethanol muscle cells do **not** produce carbon dioxide but plant cells do	 marks can be awarded from correct word or balanced symbol equations	1 1 1 1	AO1 4.4.2.1 AO1 AO2 AO2 Standard Std./High High
04.4	the amount of oxygen needed to react with the lactic acid formed	allow the amount of oxygen needed to break down **or** oxidise the lactic acid	1	AO1 4.4.2.2 Std./High
Total			**8**	

Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
05.1	transports water in the transpiration stream		1	AO1 4.2.3.1 4.2.3.2 Std./High
05.2	transports dissolved sugars using translocation		1	AO1 4.2.3.1 4.2.3.2 Std./High
05.3	2/(0.1 × 0.1) **or** 2/ 0.01 200	an answer of 200 scores **2** marks	1 1	AO2 4.2.3.1 4.2.3.2 Std./High
05.4	cooler around lower surface more humid around lower surface (so) less water evaporated	allow converse argument for upper surface of leaf if qualified allow less breeze around lower surface	1 1 1	AO2 AO3 4.2.3.2 Std./High High

05.5	**Level 3:** Relevant points (correct processes / explanations) are identified, given in detail and linked logically to form a clear account.	5–6	AO3 AO1 4.1.3.1 4.1.3.2 4.1.3.3 4.2.3.2 Std./High High
	Level 2: Relevant points (correct processes / explanations) are identified and there are attempts at logical thinking. 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 thinking.	1–2	
	No relevant content	0	
	Indicative content • water is absorbed by osmosis • osmosis is a passive process, or described • water in soil is at a higher concentration than inside cell • water moves down concentration gradient • through a partially permeable membrane • phosphate ions absorbed by diffusion • diffusion is a passive process, or described • phosphate ions are in a higher concentration in soil than inside cells • magnesium ions are absorbed by active transport • magnesium ions are in lower concentration in soil than inside cells • magnesium ions move from an area of lower concentration to an area of higher concentration inside the cells • magnesium ions move up the concentration gradient • process requires energy • energy from respiration		

Total			**13**

Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
06.1	(1 572 189 × 3 467) / 100 000 54 507.79263 or any correct rounding 54 508	an answer of 54 508 scores **3** marks	1 1 1	AO2 4.3.1.3 Std./High
06.2	to control for the different (group) population sizes	allow so the different groups can be compared	1	AO3 4.3.1.1 4.3.1.3 Std./High
06.3	thick yellow / green discharge from penis / vagina **and** pain on urinating	allow any **two** correct symptoms	1	AO1 4.3.1.3 Std./High
06.4	diameter of clear area		1	AO2 4.3.1.8 Standard
06.5	3.14 × 8.5 × 8.5 227	an answer 227 scores **2** marks allow 226.865 or any correct rounding for max **1** mark	1 1	AO2 4.3.1.8 Std./High
06.6	comment relating to data, eg higher concentrations did not show much improvement **or** 5 mg/dm^3 was much more successful at killing bacteria than at lower concentrations comment relating to patient safety eg much less likely to cause toxic / side effects than at higher concentrations		1 1	AO3 4.3.1.3 4.3.1.8 4.3.1.9 Std./High High

06.7	**Level 3:** Relevant points (correct stages / reasons) are identified, given in detail and linked logically to form a clear account.	5–6	AO1 4.3.1.8 4.3.1.9 Std./High High
	Level 2: Relevant points (correct stages / reasons) are identified and there are attempts at logical thinking. 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 thinking.	1–2	
	No relevant content	0	
	Indicative content names of stages are not required, but a logical progression through stages of testing is required for Levels 2 and 3. **phase 1 clinical testing:** • tested on healthy volunteers • low doses used **reason:** • to test for side effects / toxicity / safety **phase 2 clinical testing:** • tested on patients • patients given placebo or drug • double blind trial **reason:** • to test for side effects / toxicity / safety • to test its efficacy / effectiveness **phase 3 clinical testing:** • larger numbers of patients used • patients given placebo or drug • double blind trial **reason:** • to verify efficacy / effectiveness • to determine correct dose **prior to licensing:** • analysis of results • peer review **reason:** • to check results are valid • to avoid bias		

Total			**16**