



GCSE

COMBINED SCIENCE: TRILOGY

8464/P/1H

Physics Paper 1H

Mark scheme

Specimen (set 2)

Version: 1.0

Keep secure

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 not 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	ammeter	must be in the correct order	1	AO1 6.2.1.4 Standard
	voltmeter		1	
01.2	0.300 (m)		1	AO3 6.2.1.4 Standard
	there is the smallest spread about the mean		1	
01.3	to reduce the effect of random errors		1	AO1 6.2.1.4 Standard
01.4	potential difference = current × resistance	allow $V = I \times R$	1	AO1 6.2.1.3 Standard
01.5	$R = V / I$	an answer of 7.0Ω scores 3 marks	1	AO2 6.2.1.3 Standard
	$R = 2.1 / 0.30$		1	
	$R = 7.0 \Omega$		1	
01.6	length in m	must be in the correct order	1	AO1 6.2.1.3 Standard
	resistance in Ω		1	
		allow other correct labelling eg length / m length (m)		
		allow 1 mark if units are omitted		
01.7	resistance is directly proportional to length		1	AO3 6.2.1.3 Standard
Total			12	

Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
02.1	horizontal line drawn from 92 000 Bq	allow 90 000–94 000	1	AO2 6.4.2.3 Standard
	1600 years	allow 1500–1700	1	
02.2	only (119) years have passed		1	AO3 6.4.2.3
	activity has not dropped by much		1	
02.3	Level 3: Relevant points (reasons/causes) are identified, given in detail and logically linked to form a clear account.		5–6	AO1 AO2 AO3 6.4.2.3 Standard
	Level 2: Relevant points (reasons/causes) are identified, and there are attempts at logically 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 properties <ul style="list-style-type: none"> • alpha is the least penetrating • alpha is the most ionising • alpha has least range in air • beta is the second most penetrating • beta is the second most ionising • beta has the second longest range in air • gamma is the most penetrating • gamma is the least ionising • gamma has the greatest range in air hazard (linked to correct property) <ul style="list-style-type: none"> • short-range alpha most dangerous • mid-range beta most dangerous • long range gamma most dangerous 			
Total			10	

Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
03.1	atoms with the same number of protons but with a different number of neutrons	allow atoms of the same element	1 1	AO1 6.4.2.1 Standard
03.2	protons = 11 neutrons = 12		1 1	AO2 6.4.1.2 Standard Std./High
03.3	electrons falling to a lower energy level		1	AO1 6.4.1.1 Std./High
03.4	<p>Level 2: Scientifically relevant facts, events or processes are identified and given in detail to form an accurate account.</p> <p>Level 1: Facts, events or processes are identified and simply stated but their relevance is not clear.</p> <p>No relevant content</p> <p>Indicative content</p> <p>solid</p> <ul style="list-style-type: none"> atoms closely packed atoms in a regular arrangement atoms vibrate about a fixed position <p>liquid</p> <ul style="list-style-type: none"> atoms are close together atoms are not in regular arrangement atoms can move past each other <p>gas</p> <ul style="list-style-type: none"> atoms are well separated atoms are not in regular arrangement atoms move randomly at high speeds 		3–4 1–2 0	AO1 6.1.3 Standard Std./High

03.5	60 × 60	an answer of 540 000 (J) scores 3 marks	1	AO2 6.2.4.1 Std./High
	E = 150 × 3600		1	
	E = 540 000 (J)		1	

03.6	less energy transferred		1	AO3 6.2.4.2 Standard Std./High
	not as bright		1	

Total			14	
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Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
04.1	80	an answer of 1 700 000 (J) or 1 680 000 (J) scores 3 marks	1	AO2 6.3.2.2 Std./High
	$E = 5.0 \times 4200 \times 80$		1	
	$E = 1\,700\,000$ (J)	allow 1 680 000	1	
04.2	in part A the increase in internal energy raises the temperature of the water		1	AO3 6.3.2.1 Std./High
	in part B the increase in internal energy changes the state		1	
	without changing the temperature		1	
04.3	the heater would continue to transfer energy which would not be transferred to the water		1	AO2 AO1 6.2.4.2 Std./High
	so would raise the temperature of the device		1	
	causing it to be damaged		1	
04.4	brown blue green and yellow stripes	allow 1 mark for 2 correct	2	AO1 6.2.3.2 Std./High
04.5	it stops the casing of the appliance becoming live		1	AO1 6.2.3.2 Standard

04.6	$P = I^2R$ $I = \sqrt{P/R}$ $P = 2\,500 \text{ (W)}$ $I = \sqrt{2\,500 / 17}$ $I = 12.1267812$ $I = 12 \text{ (A)}$	an answer of 12 (A) scores 5 marks	 1 1 1 1 1	AO2 6.2.4.1 High
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Total			17
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Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
05.1	very little cloud cover favourable wind speed	allow high intensity sunlight allow high wind speed	1 1	AO2 6.1.3 Std./High
05.2	35.4×10^9 $E = 35.4 \times 10^9 \times (20.8 / 100)$ $E = 7.4 \times 10^9(\text{J})$	an answer of $7.4 \times 10^9(\text{J})$ or 7 400 000 000 scores 3 marks allow 35 400 000 000 allow 7 400 000 000	1 1 1	AO2 6.1.3 High
05.3	nuclear		1	AO1 6.1.3 Std./High

05.4	Level 3: Relevant points (reasons/causes) are identified, given in detail and logically linked to form a clear account.	4–6	AO1 6.4.1.3 Std./High
	Level 2: Relevant points (reasons/causes) are identified, and there are attempts at logically 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 step up transformer <ul style="list-style-type: none"> • increases the potential difference • decreases the current • reduces heating of transmission cables • less wasted energy • more efficient energy transfer transmission cables <ul style="list-style-type: none"> • low resistance • reduces heating • reduces wasted energy step down transformer <ul style="list-style-type: none"> • increases the current • decreases the potential difference • to a safe level • the level is suitable for domestic appliances 		

05.5		an answer of 22 (A) scores 5 marks		AO2 6.2.4.1 High
	$P = E / t$		1	
	$P = 18\,000\,000 / 3\,600$		1	
	$P = 5\,000$			
	$P = I V$		1	
	$I = P / V$		1	
	$I = 5\,000 / 230$		1	
	$I = 22 (A)$	allow an answer that rounds to 22 (A)	1	

Total			17
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