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# GCSE

# COMBINED SCIENCE: TRILOGY

# 8464/P/1F

Physics Paper 1F

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## 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	ice water steam	allow 1 mark for 1 or 2 correct answers	2	AO1 6.3.1.1 Low
01.2	1 kg of steam		1	AO1 6.3.1.1 Low
01.3	steam		1	AO1 6.3.2.1 Low
01.4	$\rho = 11\,200 / 12.0$ $\rho = 933 \text{ (kg/m}^3\text{)}$	an answer of $933 \text{ (kg/m}^3\text{)}$ scores 2 marks	1 1	AO2 6.1.2.1 Low
01.5	the internal energy of the iceberg increases  because  energy is transferred from the sea/water to the ice(berg)	allow there is a temperature difference between ice and water / air  therefore	1  1	AO2 6.3.2.1 Low
<b>Total</b>			<b>8</b>	

Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
02.1	<b>A</b>		1	AO1 6.2.1.1 Low
02.2	<b>C</b>		1	AO1 6.2.1.1 Low
02.3	<b>C</b>		1	AO2 6.2.1.4 Low
02.4	<b>B</b>		1	AO2 6.2.1.4 Low
02.5	a series circuit has only one path/loop/branch  a parallel circuit has a branch(es) to provide more than one path / loop	allow answers that describe the difference in terms of potential difference, current or resistance	1  1	AO1 6.2.2 Low
02.6	<b>R</b>		1	AO2 6.2.2 Low
02.7	<b>P</b>		1	AO2 6.2.2 Low
02.8	Q = $0.97 \times 60$  Q = 58.2 (C)  Q = 58 (C)	an answer of 58 (C) scores <b>3</b> marks	1  1  1	AO2 6.2.1.2 Low
<b>Total</b>			<b>11</b>	



Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
03.1	earth		1	AO1 6.2.3.2 Low
03.2	it can prevent an electric shock from the toaster		1	AO1 6.2.3.2 Low
03.3	230 V		1	AO1 6.2.3.1 Low
03.4	(the potential difference) for the alternating supply changes direction	allow current	1	AO1 6.2.3.1 Low
	(the potential difference) for the alternating supply changes magnitude	allow current	1	
		allow converse		
		allow potential difference of alternating supply is greater		
03.5	there is an overall decrease	allow there is an decrease in percentage energy loss until 2013	1	AO3 6.2.4.3 Low
	but there is a (small) increase since 2013		1	
03.6	1.92, 1.72, 1.70, 1.74, 1.77	an answer of 1.77(%) scores <b>3</b> marks	1	AO3 6.2.4.3 Low
	$(1.92+1.72+1.70+1.74+1.77)/5$		1	
	1.77(%)		1	
<b>Total</b>			<b>10</b>	

Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
04.1	80 °C $\Delta E = 0.5 \times 3400 \times 80$ $\Delta E = 136\,000$ (J)	an answer of 136 000 (J) scores <b>3</b> marks	1 1 1	AO2 6.3.2.2 Standard
04.2	energy is dissipated into the surroundings	allow any correct description of wasted energy	1	AO2 6.1.2.1 Low
04.3	put a lid on the pan	allow any sensible practical suggestion eg add salt to the water	1	AO2 6.1.2.1 Low
04.4	efficiency = 300/500 efficiency = 0.6	an answer of 0.6 or 60% scores <b>2</b> marks  allow efficiency = 60%  an answer of 0.6 with a unit scores <b>1</b> mark an answer of 60 without a unit scores <b>1</b> mark	1 1	AO2 6.1.2.2 Low
04.5	lower rate of energy transfer  (so) potato soup will remain at a higher temperature		1 1	AO1 6.1.2.1 Low Standard
<b>Total</b>			<b>9</b>	

Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
05.1	$E = 15\,000 \times 36$ $E = 540\,000$ $E = 540 \text{ (kJ)}$	an answer of 540 (kJ) scores <b>3</b> marks	1 1 1	AO2 6.2.4.2 Low
05.2	(the motor in) scooter <b>B</b> has a higher power  therefore  (because both motors have the same efficiency) scooter <b>B</b> will have a greater kinetic energy		1 1	AO2 6.1.1.2 Low
05.3	the battery in scooter <b>B</b> has a greater store of chemical energy		1	AO2 6.2.4.2 Low
05.4	energy transferred = power $\times$ time	allow $E = P \times t$	1	AO1 6.2.4.2 Low
05.5	$20 \times 60$ $E = 1\,200 \times 700$ $E = 840\,000 \text{ (J)}$	an answer of 840 000 (J) scores <b>3</b> marks	1 1 1	AO2 6.2.4.2 Standard
<b>Total</b>			<b>10</b>	

Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
06.1	ammeter	must be in the correct order	1	AO1 6.2.1.4 Standard
	voltmeter		1	
06.2	0.300 (m)		1	AO3 6.2.1.4 Standard
	there is the smallest spread about the mean		1	
06.3	to reduce the effect of random errors		1	AO1 6.2.1.4 Standard
06.4	potential difference = current $\times$ resistance	allow $V = I \times R$	1	AO1 6.2.1.3 Standard
06.5	$R = V / I$	an answer of $7.0 \Omega$ scores <b>3</b> marks	1	AO2 6.2.1.3 Standard
	$R = 2.1 / 0.30$		1	
	$R = 7.0 \Omega$		1	
06.6	length in m	must be in the correct order	1	AO1 6.2.1.3 Standard
	resistance in $\Omega$	allow other correct labelling eg length / m length (m)  allow <b>1</b> mark if units are omitted	1	
06.7	resistance is directly proportional to length		1	AO3 6.2.1.3 Standard
<b>Total</b>			<b>12</b>	

Question	Answers	Extra information	Mark	AO / Spec. Ref. / Demand
07.1	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	
07.2	only (119) years have passed		1	AO3 6.4.2.3 Standard
	activity has not dropped by much		1	
07.3	<b>Level 3:</b> Relevant points (reasons/causes) are identified, given in detail and logically linked to form a clear account.		5–6	AO1 AO2 AO3 6.4.2.1 Standard
	<b>Level 2:</b> Relevant points (reasons/causes) are identified, and there are attempts at logically linking. The resulting account is not fully clear.		3–4	
	<b>Level 1:</b> Points are identified and stated simply, but their relevance is not clear and there is no attempt at logical linking.		1–2	
	<b>No relevant content</b>		0	
	<b>Indicative content</b>  <b>properties</b> <ul style="list-style-type: none"> <li>• alpha is the least penetrating</li> <li>• alpha is the most ionising</li> <li>• alpha has least range in air</li> <li>• beta is the second most penetrating</li> <li>• beta is the second most ionising</li> <li>• beta has the second longest range in air</li> <li>• gamma is the most penetrating</li> <li>• gamma is the least ionising</li> <li>• gamma has the greatest range in air</li> </ul> <b>hazard</b> (linked to correct property) <ul style="list-style-type: none"> <li>• short-range alpha most dangerous</li> <li>• mid-range beta most dangerous</li> <li>• long range gamma most dangerous</li> </ul>			
<b>Total</b>			<b>10</b>	