SPECIMEN MATERIAL

AQA

GCSE
PHYSICS
PAPER 1F

Mark scheme

Specimen 2018

Version 1.0

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.

Further copies of this mark scheme are available from aqa.org.uk

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 and help to delineate what is acceptable or not worthy of credit or, in discursive answers, to give an overview of the area in which a mark or marks may be awarded
- the Assessment Objectives 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 e.c.f. 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 Ignore / Insufficient / Do <u>not</u> allow

Ignore or insufficient are 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.

Do **not** allow 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.

Level of response marking instructions

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 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. With practice and familiarity you will find that for better answers you will be able to quickly skip through the lower levels of the mark scheme.

When assigning a level you should look at the overall quality of the answer and not look to pick holes in 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 and then use the variability of the response to help decide the mark within the level, ie if the response is predominantly level 3 with a small amount of level 4 material it would be placed in level 3 but be awarded a mark near the top of the level because of the level 4 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 1

Question	Answers	Extra information	Mark	AO / Spec. Ref.
01.1	any **two** from: • nuclear • oil • (natural) gas		2	AO1/1 4.1.3
01.2	4 (hours)		1	AO2/2 4.1.3 WS2
01.3	a system of cables and transformers		1	AO1/1 4.2.3
01.4	The power output of wind turbines is unpredictable		1	AO2/1 4.1.3
01.5	1500 / 0.6 2500 (wind turbines)	allow 2500 with no working shown for **2** marks	1 1	AO2/1 4.1.3
01.6	Most energy resources have negative environmental effects.		1	AO1/1 4.1.3
Total			**8**	

Question 2

Question	Answers	Extra information	Mark	AO / Spec. Ref.
02.1	any **two** from: • bungee rope may snap • rope may extend too much • student may land in the river		2	AO2/1 4.1.1 WS1
02.2	gravitational potential kinetic elastic potential	correct order only	1 1 1	AO1/1 4.1.1.1
02.3	$\frac{1}{2} \times 40 \times 35^2$ 24 500 (J)	accept 25 000 (J) (2 significant figures) allow 24 500 (J) with no working shown for **2** marks	1 1	AO2/2 4.1.1.2
Total			**7**	

Question 3

Question	Answers	Extra information	Mark	AO / Spec. Ref.
03.1	current that is always in the same direction		1	AO1/1 4.2.3.1
03.2	total resistance = 30 (Ω) V = 0.4 × 30 12 (V)	allow 12 (V) with no working shown for **3** marks an answer of 8 (V) or 4 (V) gains **2** marks only	1 1 1	AO2/1 AO2/1 AO2/1 4.2.1.3
03.3	P = 0.4 x 12 = 4.8 5 (W)	allow 5 (W) with no working shown for **2** marks allow 4.8 (W) with no working shown for **1** mark	1 1	AO2/1 AO2/1 4.2.4.1
Total			**6**	

Question 4

Question	Answers	Extra information	Mark	AO / Spec. Ref.
04.1	Student A's measurements had a higher resolution Student B was more likely to misread the temperature		1 1	AO3/1b 4.3.1.3 WS3
04.2	a random error		1	AO3/3a 4.3.1.3 WS3
04.3	8.4 ˚C		1	AO3/2a 4.3.2.3
04.4	740 (seconds)	allow answers in the range 730 – 780	1	AO3/2a 4.3.2.3
04.5	0.40 x 199 000 79 600 (J)	accept 79 600 (J) with no working shown for **2** marks	1 1	AO2/1 4.3.2.3
04.6	stearic acid has a higher temperature than the surroundings temperature will decrease until stearic acid is the same as the room temperature / surroundings	accept stearic acid is hotter than the surroundings	1 1	AO3/2b 4.3.2.3
Total			**9**	

Question 5

Question	Answers	Extra information	Mark	AO / Spec. Ref.
05.1	battery, lamp and ammeter connected in series with variable resistor voltmeter in parallel with (filament) lamp		1 1	AO1/2 4.2.1.3
05.2	**Level 2:** A detailed and coherent description of a plan covering all the major steps is provided. The steps are set out in a logical manner that could be followed by another person to obtain valid results.	3–4	4	AO1/2 4.2.5.1
	Level 1: Simple statements relating to relevant apparatus or steps are made but they may not be in a logical order. The plan would not allow another person to obtain valid results.	1–2		
	No relevant content	0		
	Indicative content • ammeter used to measure current • voltmeter used to measure potential difference • resistance of variable resistor altered to change current in circuit **or** change potential difference (across filament lamp) • resistance (of filament lamp) calculated **or** R=V/I statement • resistance calculated for a large enough range of different currents that would allow a valid conclusion about the relationship to be made			
05.3	(as current increases) resistance increases (at an increasing rate)		1	AO2/2 4.2.1.4 WS3
05.4	any value between 6.3 and 6.9 (Ω)		1	AO2/2 4.2.1.4 WS3
05.5	**A**: Filament lamp **B**: Resistor at constant temperature **C**: Diode		1 1 1	AO1/1 4.2.1.4
Total			**11**	

Question 6

Question	Answers	Extra information	Mark	AO / Spec. Ref.
06.1	**Level 2:** A detailed and coherent explanation is provided. The student makes logical links between clearly identified, relevant points.	3–4	4	AO1/1 4.2.5.1
	Level 1: Simple statements are made, but not precisely. The logic is unclear.	1–2		
	No relevant content	0		
	Indicative content • friction (between cloth and rod) causes • electrons (to) move • from the acetate rod **or** to the cloth • (net) charge on cloth is now negative • (net) charge on rod is now positive			
06.2	there is a force of attraction between the acetate rod and the cloth		1	AO2/1
	(reason) unlike charges attract **or** negative charges attract positive charges		1	AO1/1 4.2.5.1
06.3	increase		1	AO1/1 4.2.5.1
06.4	0.000025 × 60 000		1	AO2/1 4.2.5.2 4.2.4.2
	1.5 (J)	accept 1.5 (J) with no working shown for **2** marks	1	
Total			**9**	

Question 7

Question	Answers	Extra information	Mark	AO / Spec. Ref.
07.1	Alpha – two protons and two neutrons Beta – electron from the nucleus Gamma – electromagnetic radiation		1 1 1	AO1/1 4.4.2.1
07.2	Gamma Beta Alpha	allow **1** mark for 1 or 2 correct	2	AO1/1 4.4.2.1
07.3	any **two** from: • (radioactive) source not pointed at students • (radioactive) source outside the box for minimum time necessary • safety glasses **or** eye protection **or** do not look at source • gloves • (radioactive) source held away from body • (radioactive) source held with tongs / forceps	accept any other sensible and practical suggestion	2	AO3/3a 4.4.2.4 WS1
07.4	half-life = 80 s counts/s after 200 s = 71	 accept an answer of 70	1 1	AO2/2 4.4.2.3
07.5	very small amount of radiation emitted	accept similar / same level as background radiation	1	AO2/1 4.4.3.2
Total			**10**	

Question 8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	he may receive an electric shock **or** he may be electrocuted		1	AO1/1 4.2.3.1
	if he touches the live wire		1	
08.2	10 690 = I x 230		1	AO2/1
	I = 10 690 / 230		1	4.2.3.1
	46.478(260) (A)		1	
	46		1	
		allow 46 (A) with no working shown for **4** marks		
08.3	cost is higher		1	AO1/1
	more energy is used (per second)		1	AO2/1 4.2.4.2
Total			**8**	

Question 9

Question	Answers	Extra information	Mark	AO / Spec. Ref.
09.1	range of speeds moving in different directions	 accept random motion	1 1	AO1/1 4.3.3.1
09.2	internal energy		1	AO1/1 4.3.2.1
09.3	density = mass / volume		1	AO1/1 4.3.1.1
09.4	0.00254 / 0.0141 0.18 kg/m^3	accept 0.18 with no working shown for the **2** calculation marks	1 1 1	AO2/1 AO2/1 AO1/1 4.3.1.1
Total			**7**	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
10	**Level 3:** A detailed and coherent explanation is provided. The student gives examples that argue a strong case and demonstrate deep knowledge. The student makes logical links between clearly identified, relevant points.	5–6	6	2xAO2/2
	Level 2: An attempt to link the description of the experiment and the results with differences between the two models. The student gives examples of where the plum pudding model does not explain observations. The logic used may not be clear.	3–4		1xAO1/1 1xAO2/2
	Level 1: Simple statements are made that the nuclear model is a better model. The response may fail to make logical links between the points raised.	1–2		2x AO1/1 4.4.1.3
	No relevant content	0		
	Indicative content • alpha particle scattering experiment • alpha particles directed at gold foil • most alpha particles pass straight through • (so) most of atom is empty space • a few alpha particles deflected through large angles • (so) mass is concentrated at centre of atom • (and) nucleus is (positively) charged • plum pudding model has mass spread throughout atom • plum pudding model has charge spread throughout atom			
Total			**6**	

Question 11

Question	Answers	Extra information	Mark	AO / Spec. Ref.
11.1	power output increases (to meet demand) due to people returning home from work / school	accept many electrical appliances are switched on (which increases demand) accept other sensible suggestions	1	AO3/1a 4.1.3
11.2	00.00	accept midnight allow answers between 00.00 and 04.00	1	AO3/1a 4.1.3 WS3
11.3	any **two** from: • conserves fuel reserves • spare capacity to compensate for unreliable renewable resources • provides spare capacity in case of power station emergency shut-down • so as to not make unnecessary environmental impact		2	AO2/1 4.1.3
Total			**4**	

Question 12

Question	Answers	Extra information	Mark	AO / Spec. Ref.
12.1	0.1 (ºC)		1	AO3/3a 4.1.1.3 WS2.3
12.2	power = energy transferred / time	allow P = E / t allow E = P x t	1	AO1/1 4.1.1.4
12.3	1050 / 300 3.5 (W)	accept 3.5 (W) with no working shown for **2** marks	1 1	AO2/1 4.1.1.4
12.4	1050 = m x 4200 x 0.6 m = 1050 / (4200 x 0.6) m = 0.417 (kg)	accept 0.417 (kg) with no working shown for **3** marks	1 1 1	AO2/2 4.1.1.3
12.5	any **one** from: • energy used to heat metal pan (as well as the water) • energy transfer to the surroundings (through the insulation) • angle of solar radiation will have changed during investigation • intensity of solar radiation may have varied during investigation		1	AO3/3a 4.1.1.3 WS3
Total			**8**	

Question 13

Question	Answers	Extra information	Mark	AO / Spec. Ref.
13.1	weight (lifted) **or** height (lifted)		1	AO3/3a 4.1.2.2 WS2
13.2	any **two** from: • calculate a mean • spot anomalies • reduce the effect of random errors		2	AO3/3a 4.1.2.2 WS3
13.3	as speed increases, the efficiency increases (but) graph tends towards a constant value **or** appears to reach a limit	accept efficiency cannot be greater than 100%	1 1	AO3/2b 4.1.2.1
13.4	heating the surroundings		1	AO1/1 4.1.2.1
13.5	0 (%)		1	AO1/1 4.1.2.2
Total			**7**	