



GCE A LEVEL MARKING SCHEME

SUMMER 2019

**A2
PHYSICS - UNIT 5
1420U50-1**

INTRODUCTION

This marking scheme was used by WJEC for the 2019 examination. It was finalised after detailed discussion at examiners' conferences by all the examiners involved in the assessment. The conference was held shortly after the paper was taken so that reference could be made to the full range of candidates' responses, with photocopied scripts forming the basis of discussion. The aim of the conference was to ensure that the marking scheme was interpreted and applied in the same way by all examiners.

It is hoped that this information will be of assistance to centres but it is recognised at the same time that, without the benefit of participation in the examiners' conference, teachers may have different views on certain matters of detail or interpretation.

WJEC regrets that it cannot enter into any discussion or correspondence about this marking scheme.

A2 UNIT 5 - PRACTICAL ANALYSIS TASK

MARK SCHEME

GENERAL INSTRUCTIONS

Recording of marks

Examiners must mark in red ink.

One tick must equate to one mark (except for the extended response question).

Question totals should be written in the box at the end of the question.

Question totals should be entered onto the grid on the front cover and these should be added to give the script total for each candidate.

Marking rules

All work should be seen to have been marked.

Marking schemes will indicate when explicit working is deemed to be a necessary part of a correct answer.

Crossed out responses not replaced should be marked.

Credit will be given for correct and relevant alternative responses which are not recorded in the mark scheme.

Extended response question

A level of response mark scheme is used. Before applying the mark scheme please read through the whole answer from start to finish. Firstly, decide which level descriptor matches best with the candidate's response: remember that you should be considering the overall quality of the response. Then decide which mark to award within the level. Award the higher mark in the level if there is a good match with both the content statements and the communication statement.

Marking abbreviations

The following may be used in marking schemes or in the marking of scripts to indicate reasons for the marks awarded.

cao = correct answer only
ecf = error carried forward
bod = benefit of doubt

Question		Marking details	Marks available					
			AO1	AO2	AO3	Total	Maths	Prac
1		Density = 1.49 g cm ⁻³ with units (1) % uncertainty in thickness = 4 % (1) % unc in length = 3[.3]% and in width = 5 or 4.8 % (1) (% unc in mass ignored and) total % uncertainty = 12 % (1) ecf Absolute uncertainty = 0.18 or 0.2 to 1 or 2 s.f (1) ecf	1	1 1 1 1		5	5	5
		Question 1 total	1	4	0	5	5	5

Question		Marking details	Marks available					
			AO1	AO2	AO3	Total	Maths	Prac
2	(a)	See table Appendix 1 1 mark for each correct column ignore s.f. (4) ecf on (mean diameter) ² All (mean diameter) ² uncertainties to 1 or 2 s.f. (1) ecf All uncertainties in impact velocities to 1 s.f. with consistency in the column (1) ecf	4	1 1		6	6	6
	(b)	Both axes labelled and units included – either orientation (1) Suitable scales chosen so that the data points occupy at least ½ of each axis and not involving awkward factors, e.g. 3 (1) All points plotted correctly to within ± ½ small square division ecf (1) All error bars plotted correctly ecf (1) Correct lines of maximum and minimum gradient consistent with the error bars ecf (1)	1	1 1 1 1		5	5	5
	(c)	(i) Large triangles used (should be close to the extremities of the lines) or two suitable points clearly shown on each graph or clearly implied by calculation [see below] (1) Minimum gradient correctly calculated i.e. 0.15 ecf (1) Maximum gradient correctly calculated i.e. 0.22 ecf (1) Note ignore units and number of significant figures in this part of the question.	1	1 1		3	2	3
		(ii) Mean gradient correct i.e. 0.19 ecf (1) Percentage uncertainty correct i.e. 18 or 19% and expressed to 2 s.f. ecf [no unit penalty] (1)		2		2	2	2
		(iii) Data used e.g. ratio calculated / intercept calculated (1) Reasoning – constant ratio / straight line / positive gradient / intercept close to origin so agree (1) Accept converse			2	2		2
	(d)	Smaller diameter [because impact velocity is lower] (1) Impact velocity falls by a factor of $\sqrt{6.1[25]}$ or 2.47 (1)			2	2	2	2
		Question 2 total	6	10	4	20	17	20

Question	AO1	AO2	AO3	TOTAL MARK	MATHS	PRAC
1	1	4	0	5	5	5
2	6	10	4	20	17	20
TOTAL	7	14	4	25	22	25

Appendix 1

Drop height h / m $\pm 5\%$	Diameter reading 1 / cm	Diameter reading 2 / cm	Diameter reading 3 / cm	Mean diameter / cm	Mean diameter squared / cm ²	Uncertainty in (mean diameter) squared / cm ²	Impact velocity $v=\sqrt{2gh}$ / m s ⁻¹	Uncertainty in impact velocity / m s ⁻¹
0.100	2.9	2.7	2.7	2.8	7.7	0.6	1.40	0.04
0.200	3.2	3.2	3.4	3.3	10.7	0.7	1.98	0.05
0.300	3.5	3.7	3.6	3.6	13.0	0.7	2.43	0.06
0.400	3.9	4.1	3.8	3.9	15.5	1.2 / 1	2.80	0.07
0.500	4.2	4.2	4.0	4.1	17.1	0.8	3.13	0.08
0.600	4.4	4.3	4.1	4.3	18.2	1.3 / 1	3.43	0.09

Accept - If candidates take the mean diameter value shown in the table above they will get the following values (i.e. rounding up will have occurred) (15.2 and 18.5)