



**Cambridge International Examinations**  
Cambridge International General Certificate of Secondary Education

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**CO-ORDINATED SCIENCES**

**0654/06**

Paper 6 Alternative to Practical

**For examination from 2019**

MARK SCHEME

Maximum Mark: 60

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**Specimen**

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This document consists of 7 printed pages and 1 blank page.

## Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

### GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

### GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

### GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

### GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

### GENERIC MARKING PRINCIPLE 5:

Marks should be awarded using the full range of marks defined in the mark scheme for the question (however ; the use of the full mark range may be limited according to the quality of the candidate responses seen).

**GENERIC MARKING PRINCIPLE 6:**

Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

mark scheme abbreviations

;	separates marking points
/	alternative responses for the same marking point
not	do not allow
allow	accept the response
ignore	mark as if this material was not present
ecf	error carried forward
avp	any valid point
ora	or reverse argument
owtte	or words to that effect
underline	actual word given must be used by candidate (grammatical variants excepted)
( )	the word/phrase in brackets is not required but sets the context
max	indicates the maximum number of marks
any [number] from:	accept the [number] of valid responses
note:	additional marking guidance

Question	Answer	Marks	Guidance
1(a)(i)	outline concave on one side ; small projections/ridges on the other side ; small circles near ridged side ;	3	 max 2 if more than the cut end has been drawn
1(a)(ii)	label line drawn to one circle and labelled 'S' ;	1	allow: description for <b>S</b> e.g. stained
1(a)(iii)	xylem ; water transport ;	2	allow: water and any idea of movement, ignore 'absorbs water'
1(b)(i)	A sensible range given that is no lower than 0 °C and no higher than 40 °C ; values given go up in equal intervals / at least 4 values given ;	2	
1(b)(ii)	Any two from: pieces from same celery plant ; same length of celery stalk ; same humidity ; same amount of air movement ; same concentration of coloured water ; avp ;	2	max 2
1(c)	careful with cutting blade / cut away from fingers / avp ;	1	

Question	Answer	Marks	Guidance
2(a)(i)	axes labelled correctly and linear, names and % ; all correct plots $\pm 0.5$ square ;	2	not: awkward scales
2(a)(ii)	suitable straight line ;	1	
2(b)	line from number of drops of unknown shown on graph ; correct reading from graph, minimum two decimal places ;	2	
2(c)	a control / to see if water alone has an effect / owtte ;	1	

Question	Answer	Marks	Guidance
2(d)	Any two from: (drops sizes vary so) use e.g. syringe ; (difficult to judge end point (owtte) so) do a titration ; alter concentration of DCPIP ; (not mixed properly so) use a stirring rod after each drop/stir ; constant temp ;	2	max 2
2(e)	repeat/carry out the experiment more than once, <b>and</b> calculate average, <b>and</b> look for consistency <b>or</b> ignore outliers ;	1	

Question	Answer	Marks	Guidance
3(a)(i)	that the solution is alkaline / has a pH between 8–14 ;	1	
3(a)(ii)	green ;	1	
3(a)(iii)	<u>calcium oxide</u> / CaO ;	1	
3(a)(iv)	basic / alkaline ;	1	
3(b)(i)	Cu <sup>2+</sup> ;	1	allow: Cu(II)
3(b)(ii)	so that it gives a solution ;	1	allow: so that it dissolves
3(b)(iii)	wear goggles / protect eyes / avoid spilling on skin / rinse off any acid that gets on skin / avp ;	1	

Question	Answer	Marks	Guidance
4(a)	0 min = 20 °C ; 2.5 min = 47.5 °C ; 4.0 min = 43.5 °C ;	3	
4(b)(i)	$\Delta T = 32.0 \text{ }^\circ\text{C}$ ;	1	
4(b)(ii)	$E = 25 \times 4.2 \times \Delta T$ so $E = \underline{3360}$ (J) ;	1	allow: ecf from <b>4(b)(i)</b>
4(c)	use a lid ; insulate the beaker ;	2	

Question	Answer	Marks	Guidance
5	<p><b>apparatus – max 1</b> suitable collection vessel e.g. gas syringe /inverted measuring cylinder in water trough ; fully labelled diagram showing the gas collection ;</p> <p><b>method</b> minimum of 5 different concentrations ; volume acid /mass Mg ribbon /temperature constant ; wear goggles /not too high a concentration of acid used /wash off skin immediately ;</p> <p><b>measurements and processing</b> time taken to produce certain volume of gas /measurements of gas against time ; plot graph of gas produced in a certain time against concentration ;</p> <p><b>use of results</b> shorter the time /higher the rate the more concentrated the acid ;</p>	6	<p>max 6 in total note: to gain 6 marks at least 1 mark must come from each of:</p> <ul style="list-style-type: none"> <li>• <i>apparatus</i></li> <li>• <i>method</i></li> <li>• <i>measurements and processing</i></li> <li>• <i>use of results</i></li> </ul>

Question	Answer	Marks	Guidance
6(a)(i)	0.2 kg $T = 0.7$ 0.3 kg $T = 0.8$ 0.4 kg $T = 0.9$ 0.5 kg $T = 1.0$ ;	1	note: all four required for one mark
6(a)(ii)	0.2 kg $T^2 = 0.49$ 0.3 kg $T^2 = 0.64$ 0.4 kg $T^2 = 0.81$ 0.5 kg $T^2 = 1.00$ ;	2	note: all four required for one mark award second mark for giving figures to $0.01 \text{ s}^2$ allow: values from non rounded values of T
6(b)(i)	$39.5 \times 0.2/0.49 = 16.12$ ;	1	
6(b)(ii)	$39.5 \times 0.5/1.00 = 19.75$ ;	1	
6(b)(iii)	calculate 5 values of $k$ take average /plot a graph (of $T^2$ against $m$ ) ;	1	
6(c)	time more than 5 oscillations each time ; take more repeat readings for each mass ;	2	

Question	Answer	Marks	Guidance
7(a)(i)	$l = 3.3 \text{ cm}$ ; $w = 3.2 \text{ cm}$ ; $h = 3.6 \text{ cm}$ ;	2	note: award 2 marks for three correct award 1 mark for one or two correct
7(a)(ii)	$3.3 \times 3.2 \times 3.6 = 38.02$ ;	1	
7(b)(i)	a horizontal line is drawn from the pivot/50.0 cm mark to the centre of the cube ; the line is labelled X ;	2	
7(b)(ii)	$2000/19.8 = 101.01 \text{ g}$ (minimum 2 sig. figs.) ;	1	
7(b)(iii)	$101.01/38.02 = 2.66$ ; 2 or 3 sig figs. ; $\text{g/cm}^3$ ;	3	ecf from <b>7(a)(ii)</b>
7(c)(i)	difficulty in moulding a perfect cube/rounded corners/not regular shape/ difficulty in accurate balance point/difficulty in finding middle of the block avp ;	1	
7(c)(ii)	use a knife to cut the cube/use a balance/hang the cube from the ruler/ marking the mid-point on the cube/avp ;	1	allow: <u>repeat and average results</u> note: improvement should link to answer in <b>(c)(i)</b>
7(d)	(none) same material used/shape has no effect on density ;	1	

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