Cambridge IGCSE™

COMBINED SCIENCE **0653/63**

Paper 6 Alternative to Practical **October/November 2024**

MARK SCHEME

Maximum Mark: 40

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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Question	Answer	Marks
1(a)	takes time for/allow the plant to grow / bend / respond ;	**1**
1(b)(i)	(varying) light intensity may affect the (rate of) growth ;	**1**
1(b)(ii)	use same (type of) lamp / keep distance of lamp from plant(s) the same ;	**1**
1(b)(iii)	type of plant / age of plant / time (24 hours) ;	**1**
1(c)	L = 50 ; P = 47 ;	**2**
1(d)(i)	vertical axis labelled 'θ_P / °' and horizontal axis labelled 'θ_L / °' ; linear scales so that plotted points occupy at least half the grid ; plots correct to ½ small square ;	**3**
1(d)(ii)	thin straight line of best fit drawn ;	**1**
1(d)(iii)	as θ_L increases, θ_P increases ;	**1**
1(d)(iv)	straight lines to both axes at θ_L = 60° ; correct value read from graph ;	**2**

Question	Answer	Marks
2(a)	88 ;	**1**
2(b)	white precipitate ;	**1**
2(c)	to ensure complete reaction ;	**1**
2(d)	filter funnel with spout and filter paper correctly drawn and labelled ; residue labelled as barium sulfate ;	**2**
2(e)	remove soluble impurities / contaminants / remove (excess) filtrate (from the residue) ;	**1**
2(f)	not all the solid can be scraped off / some of the precipitate may remain in the beaker ;	**1**

Question	Answer	Marks
3	*one marking point from each section and then any two others* **1 additional apparatus** balance to measure a mass ; measuring cylinder to measure a volume ; **2 method** add UI to acid and add antacid (and stir) and record the colour of universal indicator / pH after adding antacid ; wait until reaction has finished before measuring the pH ; use five different masses of antacid ; suitable safety precaution linked to hazard, e.g. wear gloves to prevent acid touching skin / wear goggles to prevent acid getting in eyes ; **3 measurements** mass of antacid ; pH after adding antacid ; **4 control variables** volume of hydrochloric acid / concentration of hydrochloric acid ; same temperature ; **5 processing and conclusion** use of colour chart to determine pH and calculation of pH increase ; plot graph of pH (increase) against mass of antacid ; repeat and identify anomalous values ;	**7**

Question	Answer	Marks
4(a)(i)	23.3 ;	**1**
4(a)(ii)	1.55(33…) ; 2.40(25) ; both values correctly rounded to 3 sig figs ;	**3**
4(a)(iii)	T^2 (no mark) AND T^2 doubles as L doubles / ratio of T^2 to L is constant ; values from Table 4.1 quoted, e.g. at L = 20, T^2 = 0.797 AND at L = 40, T^2 = 1.61 ;	**2**
4(a)(iv)	7.5 (cm) ;	**1**
4(a)(v)	0.125 ;	**1**
4(b)(i)	avoid parallax error / read protractor at eye level ;	**1**
4(b)(ii)	T values are equal (no mark) AND use maximum or mininum T values or range (1.87,1.80 or 0.07) in a percentage calculation ; calculation compared with 10% AND consistent with statement ;	**2**
4(c)(i)	to reduce the (percentage) effect of human reaction time error ;	**1**
4(c)(ii)	might lose count / the bob stops (before 150 oscillations) / takes too long ;	**1**

Cambridge Assessment International Education

Cambridge IGCSE™

COMBINED SCIENCE **0653/06**

Paper 6 Alternative to Practical **For examination from 2025**

MARK SCHEME

Maximum Mark: 40

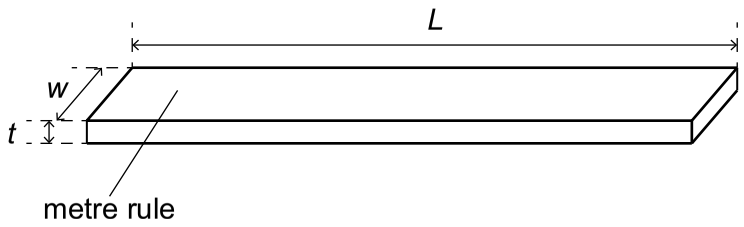
Specimen

This document has **8** pages.

Question	Answer	Marks	Guidance
1(a)	**s**ize – more than 50% of box ; **q**uality – continuous smooth outline **AND** no shading ; **d**etail – five core sections shown in star-like shape with some pip halves ;	**3**	**I** inner lines
1(b)(i)	1.4 ;	**1**	
1(b)(ii)	8.6 ;	**1**	**ecf** from **(b)(i)**
1(b)(iii)	8.9 ;	**1**	**ecf** from **(b)(ii)**
1(b)(iv)	to minimise effect of random error by averaging / to identify any anomalous results ;	**1**	**I** so an average can be calculated

Question	Answer	Marks	Guidance
2	**one** from each section and then any other **two** marks	**7**	
	apparatus / chemicals lamp / suitable named light source ; gas syringe / measuring cylinder ; named timing device / named apparatus for varying light intensity / ruler / **AVP** ;		apparatus must be relevant to the method described marks may be awarded from a labelled diagram / results table / suggested axes on a graph to be drawn
	method and safety precautions method described clearly such that another student could use it to obtain suitable results ; safety precaution specific to, water and electricity / hot lamps ;		safety precaution must be linked to a specific hazard that is relevant to the method described
	measurements suitable way of varying and recording light intensity given, e.g. distance of lamp from plant, brightness of lamp, number of lamps, etc. ; suitable way of recording volume of gas given, e.g. displacement of water in a measuring cylinder ;		
	control variables concentration of CO_2 ; temperature of water ; **AVP**, e.g. wavelength of light ;		control variables must be appropriate to the method described
	processing results and conclusion idea of comparing volume per unit time for each intensity ; use of repeated measurements (at each intensity) to, identify / exclude, anomalies ; plot graph of volume of gas against light intensity ;		

Question	Answer	Marks	Guidance
3(a)(i)	hydrogen / H_2 ;	**1**	
3(a)(ii)	fizzes more / solid disappears more quickly ;	**1**	**A** quicker rate of bubbles / more effervescence
3(a)(iii)	zinc / Zn^{2+} **AND** calcium / Ca^{2+} ;	**1**	
3(b)(i)	10 (s) ; 57 (s) ;	**2**	
3(b)(ii)	(independent variable) volume of gas collected **AND** (dependent variable) time taken ;	**1**	
3(b)(iii)	axes correct way round **AND** labelled with quantity **AND** unit ; suitable linear scales such that plots cover > half of the grid ; plots correct ;	**3**	*x*-axis is time / s and *y*-axis is volume (of gas) / cm^3 **ecf** from **(b)(i)** ± ½ small square
3(b)(iv)	line of best fit drawn ;	**1**	
3(b)(v)	as the volume of gas collected increases, the time taken (to collect it) increases, / **ORA**	**1**	**ecf** from **(b)(iii)**
3(b)(vi)	idea of, difficult to look at both volume of gas and stop-watch at the same time / delay between the reaction starting and starting the stop-watch / **AVP** ;	**1**	
3(b)(vii)	use a gas syringe rather than a measuring cylinder / idea of having the reactants separate inside the stoppered boiling tube and then mixing / **AVP** ;	**1**	

Question	Answer	Marks	Guidance
4(a)(i)	 dashed lines added to show both ends of metre rule **AND** double-headed arrow touching dashed lines **AND** arrow labelled *L* ;	**1**	
4(a)(ii)	2.5 (cm) ; 0.5 (cm) ;	**2**	
4(a)(iii)	idea that, the ruler only takes readings with a precision of 0.1 cm / has a smallest division of 0.1 cm ;	**1**	**A** 1 mm for 0.1 cm
4(a)(iv)	125 (cm^3) ;	**1**	**ecf**
4(b)(i)	7.1 (cm) ;	**1**	
4(b)(ii)	14.2 (cm) ;	**1**	
4(b)(iii)	106.5 (g) ;	**1**	**A** 106 / 107 / 110
4(c)(i)	(electronic) (top-pan) balance ;	**1**	
4(c)(ii)	zero / systematic (error) ;	**1**	**A** calibration
4(d)	0.852 / calculation shown ; 0.85 / answer given to **two** significant figures ; g / cm^3 ;	**3**	**ecf** candidate's values