

Cambridge IGCSE™

COMBINED SCIENCE**0653/62**

Paper 6 Alternative to Practical

February/March 2023

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.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the February/March 2023 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

Question	Answer	Marks
1(a)(i)	all results recorded ; number score used instead of, words / descriptions ; correct values assigned ;	3
1(a)(ii)	higher concentration of acid gives higher clotting score / ORA ;	1
1(a)(iii)	the higher the concentration of acid the more the protein has changed shape ;	1
1(a)(iv)	temperature recorded as 24.5 (°C) ;	1
1(a)(v)	<i>not a source of error because</i> all test-tubes exposed to same temperature ;	1
1(a)(vi)	idea that time in water bath not controlled / clotting score is subjective / insufficient mixing ;	1
1(b)(i)	67 / 66.7% ;	1
1(b)(ii)	(yes because) both show same trend / results (in Table 4.1) show more, solid / clotting when more acid is added ;	1
1(c)(i)	47 (mm) ;	1
1(c)(ii)	47 ÷ 15 000 ; 0.0031 / 3.1 × 10 ⁻³ (mm) ;	2

Question	Answer	Marks
2(a)(i)	21.0 ;	1
2(a)(ii)	y-axis labelled temperature in °C AND x-axis labelled (total) volume (of acid added) in cm ³ ; suitable linear scales so that points occupy at least half of the grid ; plots correct ± ½ small square ;	3

Question	Answer	Marks
2(a)(iii)	best fit curve drawn ;	1
2(a)(iv)	as the volume of acid increases the temperature increases ; and (after increase) then decreases ;	2
2(a)(v)	to ensure an even temperature ;	1
2(a)(vi)	less thermal energy lost between experiments / less cooling / do not need to keep refilling burette ;	1
2(a)(vii)	use a plastic beaker / use a polystyrene cup / wrap beaker with insulation ;	1
2(b)(i)	iron(II) ;	1
2(b)(ii)	it is a qualitative test not a quantitative test / only depends on the observation not any numerical values ;	1
2(b)(iii)	blue precipitate / ppt ;	1

Question	Answer	Marks
3(a)	keep your eyes level with the, point being measured / top of the spring / avoid parallax / look perpendicular to the, point behind measured / top of the spring / fiducial aid / keep ruler as close as possible to the spring ;	1
3(b)(i)	43 ± 1 ;	1
3(b)(ii)	20 ;	1
3(b)(iii)	0.03 ;	1
3(c)	anomalous value = 0.05 ; <i>reason:</i> other values are all 0.03 / is different from the other k values ;	2
3(d)	measure as load is both added and removed, to check that l is the same / check spring has not stretched / repeat the measurement and see if it is the, same / similar / close to original ;	1

Question	Answer	Marks
4	One mark from each section and any two other marking points: additional apparatus: (Max two from this section) measuring cylinder / balance ; stop-watch ; thermometer ; method and measurements: measure volume / mass of liquid before starting / states a volume or mass for the liquid ; measure temperature of liquid before starting and after heating ; heat the liquid for a fixed time and <u>measure</u> temperature (increase) / heat the liquid for a fixed temperature increase and measure the time taken ; control variables: use constant mass or volume of each liquid ; voltage and / or current of heater ; use the same initial temperature of liquid ; table of results: table shown with four liquids and columns for voltage, current, temperature and / or time (depending on their method) ; with units for each column shown ; conclusion: <u>describes</u> how to calculate energy transferred for each liquid ; compare the results in the table to see which is greatest ; repeat to, identify anomalies / increase confidence (take average) ;	7