CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MARK SCHEME for the October/November 2012 series

0654 CO-ORDINATED SCIENCES

0654/51 Paper 5 (Practical), maximum raw mark 45

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 will not enter into discussions about these mark schemes.

Cambridge is publishing the mark schemes for the October/November 2012 series for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level components and some Ordinary Level components.

1 **(a)** *first row:* 10, 10, 10, 10 ;
second row: 0, 5 – 10, 0, 5 – 10 ;

(b) light not necessary ;
because seeds in **D** germinate (as well as in **B**) ;
water is necessary ;
because seeds in **A** and **C** do not germinate / because seeds in dry cotton wool do not germinate / because seeds in **B** and **D** do germinate / because seeds in wet cotton wool do germinate ; [4]

(c) to improve reliability / because just one seed might be dead or damaged / to take account of individual variability ; [1]

(d) temperature / oxygen / air / carbon dioxide / soil pH / soil type / minerals ; [1]

(e) tube **R1** colour recorded as red / orange / yellow / green ;
tube **S1** colour recorded as no change / blue (not blue-green) ;
tube **R2** colour recorded as orange / brown / yellow ;
tube **S2** colour recorded as blue / black ; [4]

(f) *starch* – seeds (not just **S2**) ;
reducing sugar – radicles / roots (not just **R1**) ;
(must have correct observations in the table) [2]

(g) amylase / carbohydrase / diastase ; [1]

[Total: 15]

2 (a) (i) entry for ***d*** for 50 g (must be < 60) ;

(ii) / (iii) remainder of entries for ***d*** (60, 70, 80, 90 g) ;
all readings to nearest cm or all to nearest 0.1 cm *(consistency)* ;
d values decrease for increasing ***m*** ; [3]

(b) (i) all three 1/m values:
0.017 / 0.0167 (not 0.016)
0.014 / 0.0143 (not 0.0142)
0.013 / 0.0125 (not 0.012) ; [1]

(ii) vertical axis linearly numbered **AND** labelled ;
4 points plotted correctly within ½ square ;
best straight line ;
(no graph marks for plotting wrong column from table but allow gradient to be calculated from a straight line) [3]

(iii) working shown either in space **or** on graph as coordinates, triangle **or** Δx and Δy **AND** change in ***d*** must be at least 10 (or 4 cm of paper vertically) ;
gradient value from a correct working method ;
(no gradient marks from a graph with a curve or point to point lines) [2]

(iv) value using mass of rule = 300 – (gradient from **(b) (iii)**/10) ; [1]

(c) (i) all mass × distance values calculated and entered in table ;
(allow if only four masses in table) [1]

(ii) average mass × distance value ; [1]

(iii) value for mass of rule ; [1]

(d) advantage of plotting shows anomalous results clearly ; [1]

[Total: 15]

3 (a) (i) first value entered in column 2 of table and < 10 ;

(ii) two more readings in column 2 ;
all readings to 1 decimal point ;
2 of the readings within 0.4 cm^3 ; [3]

(iii) column 3 completed (10 – column 2) ; [1]

(iv) average calculation for $\boldsymbol{V_{av}}$; [1]

(v) correct values used ($\boldsymbol{V_{av}}$ = **(a)(iv)**, c_a = 0.013 and $\boldsymbol{V_a}$ = 10) ;
correct rearranging $c_s = 2 \times c_a \times \boldsymbol{V_a}/\boldsymbol{V_{av}}$;
correct c_s calculated value to 2 (or more) significant figures ;
(correct value only scores all 3 marks)
(calculation mark may be awarded following wrong substitution and/or wrong rearrangement providing all terms included) [3]

(b) (i) colour = red/orange **AND** pH = 1 – 4 ; [1]

(ii) colour = yellow (or orange if **(b)(i)** is red) **AND** pH > **(b)(i)** pH and < 7 ; [1]

(iii) colour = yellow/green **AND** pH = 6 – 7 but not < **(b)(ii)** pH ; [1]

(c) colour = purple **AND** pH = 10 – 14 ; [1]

(d) (calcium hydroxide because)
2 spatula loads calcium carbonate and still not neutral (reference to **(b)**) ;
1 spatula load calcium hydroxide produced greater increase in pH (ref to **(c)**) ;
OR
'1 spatula load calcium hydroxide produced greater increase in pH than 1 spatula load calcium carbonate' (*scores 2 marks*) ;; [max 2]

[Total: 15]