

MARK SCHEME for the October/November 2012 series

8780 PHYSICAL SCIENCE

8780/04

Paper 4 (Advanced Practical Skills), maximum raw mark 30

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.

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- 1 (a) Apparatus connected up correctly, check sensible figure for I given in mA
- (b) 6 sets of sensible readings
- Range: at least from 0.15 – 0.85 m, no gaps greater than 0.2 m [1]
- Quality V increases consistently as I increases (check from graph) [1]
- (c) All columns headed: l/m , I/A , V/V (accept " l in m", but NOT " l m" etc) [1]
- All raw data in a column to the same precision [1]
- The calculated column correct and V to same number (or 1 more) significant figures as I [1]
- (d) (i) Axes labelled, sensible scales chosen (at least half graph paper used and no awkward scales: false origin will almost certainly need to be used) [1]
- Points plotted correctly (minimum 5 to within $\frac{1}{2}$ square) [1]
- Best-fit line ignoring any anomalous points [1]
- (ii) Attempt to measure gradient using at least half drawn scale and correct substitution of figures into calculation [1]
(Do not allow use of figures from table)
- (iii) Intercept correctly read from graph or calculated [1]
- (e) (i) Use of gradient to find r [1]
- (ii) Use of intercept to find R [1]
- (iii) Parallax when reading l , thickness of crocodile clip C , wire bends, or other [1]

[TOTAL: 15]

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Question 2

Supervisor's Report

Check all subtractions in (a). Use the titres, corrected where necessary, to select the "best average" titre to be used as an accuracy standard using the following hierarchy:

- value of 2 identical titres
- average of titres within 0.05 cm³
- average of titres within 0.10 cm³, etc.

Candidate scripts

Check and correct all subtractions as above for accuracy and concordancy marks.

- 2 (a) (i) Tabulates initial and final burette readings(not volume) and volume added in table [1]
 Table has correct labels and units (cm³)
Tabulation may be vertical or horizontal
Do NOT award this mark if 50 is used as the initial burette reading
- Burette readings for all accurate readings and titres in the titration table recorded to the nearest 0.05 cm³ [1]
- Has at least two uncorrected titres within 0.1 cm³ [1]
Titre labelled 'rough' may be included
- Accuracy – ranges** [2]
 Give 2 marks if two titres within 0.30 cm³ of supervisor average
 Give only 1 mark if one titre within 0.30 cm³ of supervisor average
- (ii) **Working must be shown in this section or the selected titres ticked in the titration table**
 Candidate selects/calculates appropriate "average" from any titre values within 0.20 cm³ [1]
 Candidate is permitted to use a titre labelled "rough" or "trial"
 Where all titres are given to 1 decimal place the average should be calculated correct to 1 or 2 decimal places
 Where any titre is recorded to 2 decimal places, the average should be calculated to 2 decimal places or rounded to the nearest 0.05 cm³
- (iii) $\times \frac{1}{1} \times \frac{\text{titre}}{25}$
 Award 1 mark for the correct calculation, with marking [1]
 Award 1 mark for the answer given to 3 or 4 significant figures in each answer in calculation [1]
- (iv) ± 0.1 in 10 cm³ is a larger % in uncertainty (than ± 0.1 in 25 cm³)/% uncertainty in 25 cm³ pipette less than that of 10 cm³ pipette
 Award 1 mark for a qualitative argument [1]
 Award 1 mark for uncertainty in end point (1 drop) is less significant with larger pipette [1]

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- (b) (i) White precipitate formed addition of NaOH
- (ii) White precipitate formed addition of NH_3
soluble in excess in BOTH [1]
- (iii) Zinc/ Zn^{2+} [1]
White precipitate with BOTH NaOH and NH_3 and soluble in excess of BOTH [1]

[TOTAL: 15]