

**MARK SCHEME for the October/November 2011 question paper  
for the guidance of teachers**

**8780 PHYSICAL SCIENCE**

**8780/04**

Paper 4, 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 must be read in conjunction with the question papers and the report on the examination.

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1

**MMO**

- (a) (ii) 0.1 cm or 0.2 cm [1]
- (b) 6 different sets of readings [1]  
 range: at least from 25.0 – 10.0 cm, no gaps greater than 3.5 cm unless skewed for  $\ell^2$  [1]  
 quality:  $h$  increases consistently as  $\ell$  increases (check from graph) [1]

**PDO**

- (b) all columns headed,  $\ell/\text{cm}$ ,  $h/\text{cm}$ ,  $\ell^2/\text{cm}^2$  [1]  
 all raw data in a column to same precision [1]  
 the calculated column correct and  $\ell^2$  to same number, or 1 more, significant figures as  $\ell$  [1]

**ACE**

- (c) (i) axes labelled, sensible scales chosen (at least half graph paper used and no awkward scales) [1]  
 6 points plotted correctly [1]
- (ii) best-fit straight line or curve for candidate's data [1]
- (iii) attempt to measure gradient using at least  $\frac{1}{2}$  range of data and  $dy/dx$  / tangent drawn if necessary [1]  
 correct calculation of gradient [1]
- (d) (i) suitable limitation: e.g. parallax error in reading  $h$  or oscillation [1]
- (ii) suitable improvement, e.g. clamping ruler, repeat AND calculate average [1]
- (iii) suitable argument, consistent with graph [1]  
*(acceptable answers:*  
 no because it's a curve;  
 no because the straight line does not go through the origin;  
 yes because it's a straight line through the origin)

**[Total: 15]**

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- 2 (a) **MMO/PDO**  
goes out/does not relight AND cloudy/milky/chalky/white precipitate  
yellow when hot/during heating AND  
white when cold/cooling down
- (b) **MMO/PDO**  
two temperature readings to 0.1/0.05 °C [1]  
accuracy mark [1]  
(compare  $m/\Delta T$  with Supervisor's)
- (c) **MMO/PDO**  
white precipitate AND  
no reaction/no precipitate [1]
- (d) **MMO/PDO**  
white precipitate with ammonia [1]  
white precipitate with sodium hydroxide [1]  
dissolves in excess in BOTH [1]
- (e) **ACE**  
sulfuric [1]  
zinc AND carbonate [1]  
(these conclusions must be consistent with the observations recorded)
- (f) **ACE**  
correct calculation of Q [1]  
correct use of mass and molar mass [1]  
correct use of units [1]
- (g) **ACE**  
suitable source of error / valid improvement [1]  
explanation of how it affects enthalpy change [1]

[Total: 15]