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.

- Cambridge will not enter into discussions or correspondence in connection with these mark schemes.

Cambridge is publishing the mark schemes for the May/June 2012 question papers for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses and some Ordinary Level syllabuses.
1 (a) Table:
  cm, N
  Correct \( d \) values 70.0, 60.0, 50.0, 40.0, 30.0, 20.0, 10.0
  \( F \) values all less than 4 N
  \( F \) values decreasing
  \( F \) values all to at least 0.2 N

(b) (i) \( d \) against \( F \) (or \( F \) against \( d \))

(ii) Straight line
  Through origin

(c) Would change forcemeter reading/change mass on rule/disturb balance/wtte

(d) Check distance from bench is the same at two points/
  Line up by eye with windowsill (or suitable horizontal reference)/
  Suitable use of set-square

[Total: 10]

2 (a) Sensible room temperature value in °C

(b) Correct times 0, 30, 60, 90, 120, 150
  Temperatures falling

(c) Graph:
  Axes correctly labelled
  Suitable scales
  All plots correct to ½ small square
  Good line judgement
  Thin, continuous line

(d) Two from:
  Room temperature
  Draughts
  Initial water temperature

[Total: 10]
3  (a)  \( V_1 \) to at least 1 d.p. and < 3V and \( I_1 \) to at least 2 d.p. and < 2A  
\( R_P \) and 4\( R_P \) values correct  

(b)  \( V_2 \) and \( I_2 \) present with \( I_2 < I_1 \)  
\( R_S = 4 R_P \pm 10\% \)  

(c)  Correct statement (from candidate’s work, expect Yes) with matching justification (idea of within or beyond experimental accuracy)  

(d)  (i)  Circuit:  
Correct symbols for ammeter, voltmeter and lamp  
Correct series circuit  
(ii)  \( V_3 \) and \( I_3 \) present with \( L_S \) to 2 or 3 significant figures  

(e)  Units V, A and Ω  

(f)  Filament glows/lamp gets hot  

[Total: 10]  

4  Trace:  
Normal at 90° in correct position  
Angle of incidence 20° and N at 4 cm  
All lines present and neat  
First emergent ray correct direction  
First \( P_3P_4 \) distance > 5.0 cm  

(c)  \( a \) value correct to ± 1 mm  

(i)  \( b \) value correct to ± 1 mm  

(j)  \( n \) value correct (ecf allowed)  
to 2 or 3 significant figures and no unit  

(k)  \( a \) and \( b \) present, both \( n \) values 1.4–1.6  

[Total: 10]