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 2014 series for most Cambridge IGCSE®, Cambridge International A and AS Level components and some Cambridge O Level components.
1 (a) \( h, d_f \) and \( d_b \), recorded in cm and sensible values
\( h > d_f > d_b \) and \( d_A \) correct
\( V \) correctly calculated
unit cm\(^3\) [1]

\( h \geq d \) and \( T \geq d_B \) and \( d_A \) correct [1]
\( V \) correctly calculated [1]

(b) (i) use of at least two values for circumference \( C \)
correct value for \( C \) and \( 3 \times d_A \pm 10\% \)
2 or 3 significant figures [1]

(ii) diagram showing measurement half way up,
or at top and bottom
or a series of measurements all the way up [1]

(c) (i) \( V_w \) between 140 cm\(^3\) and 300 cm\(^3\) [1]

(ii) sensible explanation
\( V_w \): lots of measurements to obtain \( V \) leads to greater inaccuracy [1]

[Total: 10]

2 (a) sensible value for \( \theta_R \) (°C) [1]

(b)–(d) table:
\( s, ^\circ C, ^\circ C \)
correct \( t \) values 0, 30, 60, 90, 120, 150 [1]
temperatures decreasing in both columns [1]
final temperature difference less than initial temperature difference in both columns [1]
evidence of temperatures to precision of at least 1°C [1]

(e) statement to match results and justified by reference to results
reference to same time [1]

(f) lid/cover/smaller cross-sectional area [1]

(g) any one from:
room temperature (or equivalent environmental condition)
initial water temperature
volume of water
same/dry insulation

[Total: 10]
3 (a) $V$ to at least 1 d.p. and $< 3V$ and increasing
$I$ to at least 2 d.p. and $< 1A$ and constant to within 10%
$R$ calculated correctly

(b) graph:
axes correctly labelled and correct way round
suitable scales, with plots using at least half of grid
all plots correct to $\frac{1}{2}$ small square
good line judgement, thin, continuous line

(c) statement to match results
justified by reference to straight line, through the origin

(d) additional readings with $I$ values above 50 cm

[Total: 10]

4 (a)(i)(ii) $v$ sensible value in cm ($55-65$)
$h$ sensible value ($>3$ cm and $<6$ cm) in cm

(iii) image drawn inverted

(iv) $x$ value 1.2–1.8 cm

(b) (i) $h/x$ and $v/u$ correct, both with no unit

(ii) same within 10%

(c) statement to match results (expect yes)
justified by reference to results

(d) any two from:
use of darkened room/brighter lamp
mark position of centre of lens on holder
place metre rule on bench (or clamp in position)
ensure object and centre of lens are same height (from the bench)
repeats and average
move lens slowly/back and forth (to find sharpest image)
screen and lens and object all perpendicular to bench

[Total: 10]