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.
<table>
<thead>
<tr>
<th>Question</th>
<th>Mark Scheme</th>
<th>Syllabus</th>
<th>Paper</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (a) (i) $h = 2.5$, $w = 2.7$, and $d = 2.7$</td>
<td>1</td>
<td>0625</td>
<td>62</td>
</tr>
<tr>
<td>(ii) $V_A = 18.225$ (cm$^3$) to 2 or more sig. figs. ecf (i)</td>
<td>1</td>
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<tr>
<td>(iii) density = 3.22 g/cm$^3$ to 2 or 3 sig. figs. ecf (ii)</td>
<td>1</td>
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<tr>
<td>(b) diagram showing blocks and rule correctly used – blocks touching the sphere, and rule spanning gap and touching blocks</td>
<td>1</td>
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<tr>
<td>(c) (i) $V_1 = 66$ (cm$^3$)</td>
<td>1</td>
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<tr>
<td>(ii) line of sight at right angles to measuring cylinder</td>
<td>1</td>
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<tr>
<td>(d) $V_B = 18$ (cm$^3$) ecf from candidate’s $V_1$</td>
<td>1</td>
<td></td>
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<tr>
<td>(e) any two from:</td>
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<tr>
<td>measuring cylinder not sensitive owtte</td>
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<td></td>
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<tr>
<td>some clay left on fingers</td>
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<tr>
<td>cube not perfectly shaped/difficult to measure owtte</td>
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<td>air bubbles clinging to modelling clay/within the modelling clay</td>
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<tr>
<td>volume of string</td>
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<tr>
<td>difficult to judge the bottom of the meniscus/bubble on meniscus</td>
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<tr>
<td>ignore parallax</td>
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<tr>
<td>do not credit poor experimental practice e.g. spills or splashes</td>
<td></td>
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</tbody>
</table>

[Total: 9]
2 (a) 19 (°C) cao [1]

(b) table:
   cm³, °C [1]
   NOT °C, centigrade
   correct V values 10, 20, 30, 40, 50 [1]

(c) lid/insulation/polystyrene cup/minimal time delay [1]

(d) \( R_1 = 2.00 \) \( R_2 = 1.43 \) [1]
   note: do not give the mark if using incorrect stopwatch reading e.g. 35.5 rather than 35.05
   cm³/s [1]

(e) rate/flow is not constant [1]

(f) any two from:
   room temperature/air conditioning
   initial/hot water temperature
   volume/quantity/amount of hot water
   cold water temperature
   intervals/time between adding volumes of water [2]
   ignore draughts/humidity/pressure

[Total: 9]
3 (a) all units correct: m, V, A, Ω – symbols and/or words [1]

(b) graph:
axes correctly labelled and correct orientation [1]
suitable scales, plots using more than half available axes [1]
all plots correct to ½ small square [1]
good line judgement, thin, continuous, [1]
note: do not allow ‘blobs’ greater than half square diameter

(c) triangle method shown on graph [1]
note: do not allow use of y/x if graph does not go to origin

G using large triangle/half of candidate’s line used [1]
note: second mark can be given from coordinates used in equation if nothing shown on graph

(d) $R_1$ value to 2 or 3 significant figures – ignore unit [1]
note: this mark does not depend on actual value being correct

$R_1$ in range 5.8 to 6.2 Ω
OR accept $R_1 = G$ value if outside tolerance [1]

[Total: 9]

4 (a) refracted ray in correct position and at 20°±1 [1]

(b) emergent ray in correct position and approximately parallel with incident ray [1]
note: allow a 3° tolerance

all lines present and neat [1]

(c) (i) $P_3P_4$ distance far apart, at least 5.0 cm [1]

(ii) any two from:
viewing bases of pins / ensure that pins are vertical/not bent [1]
large pin separations
use of repeats
use of thin pencil lines (or equivalent comment)
close one eye (when aligning pins)
use thin/sharp pins
ignore parallax error
NOT dark room [2]

(d) idea of within/beyond limits of experimental accuracy [1]

[Total: 7]
5 (a) tape measure

(b) (i) symbols for ammeter, voltmeter and resistor (for copper wire) correct
note: accept in wrong places for this mark
variable resistor or potential divider present with symbol
NOT if labelled “copper wire”
ammeter in series and voltmeter in parallel with copper wire/resistor
note: do NOT award this mark if there is no power supply

(ii) observe current shown on ammeter (ignore any reference to a voltmeter)
accept change variable resistor / use rheostat (to see if it then glows)
accept ‘change current’ as meaning changing variable resistor
ignore checking wires or changing power supply or use of a voltmeter
accept connect lamp directly across supply

(iii) no, deflection too small / range too large (owtte)
accept suggestion of alternative maximum meter
accept readings not precise enough / sensitivity not sufficient;
accept accurate for precision, ignore misuse of ‘reliable’
ignore ‘circuit voltage not large enough’

[Total: 6]