

Electrical Circuits

Mark Scheme 1

Level	IGCSE
Subject	Physics
Exam Board	CIE
Topic	Electricity and Magnetism
Sub-Topic	Electrical Circuits
Paper Type	Alternative to Practical
Booklet	Mark Scheme 1

Time Allowed: 63 minutes

Score: /52

Percentage: /100

Question	Answer	Marks
1	<p>Circuit diagram:</p> <p>MP1 Sample of wire must be clearly identifiable by a label on the diagram or by letters on the diagram with an explanation in the text</p> <p>MP2 All circuit symbols correct (even if circuit is incorrect)</p> <p>Method:</p> <p>MP3 Take readings of V and I</p> <p>MP4 For 5 or more lengths</p> <p>MP5 Range of lengths must be between 5 cm and 2 m with the largest length at least twice the smallest</p> <p>Table drawn with headings:</p> <p>MP6 $l/m, V/V, I/A, R/\Omega$</p> <p>Key variables to control:</p> <p>MP7 Any one from</p> <ul style="list-style-type: none"> • Material/resistivity/conductivity/type of wire • Diameter/radius/thickness/cross sectional area • Temperature of wire 	<p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p> <p>1</p>
		Total: 7

Question	Answer	Marks
2(a)	correct voltmeter symbol in parallel with lamp P	1
2(b)	$I = 0.23$ unit of A	1 1
2(c)	$V_P = 2.7$ <u>and</u> $V_Q = 0.3$	1
2(d)(i)	some current in the circuit, pd across lamp Q is small / not equal to supply voltage / reference to lamp P bright <u>and is in series</u>	1
2(d)(ii)	V_P greater than / near working voltage V_Q <u>much</u> less than working voltage	1 1
2(e)	$R = 13(.0)$ allow ecf 2/3sig figs and unit of Ω	1 1
2(f)	statement matches results some correct values used and reference to 'within limits of experimental accuracy' / owtte	1 1
		Total: 11

- 3 (a) correct symbol [1]
correct position [1]
- (b) table: [1]
1.68 (V)
- (c) (brightness) decreases (as length increases) [1]
- (d) statement: no [1]
justification matches statement and by reference to results
e.g. V/l not constant, as l increases V decreases, V does not double as l doubles [1]
- (e) any one from: [max 1]
width of sliding contact
achieving exact same position on wire
accept heating changes resistance of wire
accept other sensible practical reason
NOT human error
- (f) do not touch (bare/hot) wire [1]
OR do not allow C to touch terminal between lamp and supply

- 4 (a) (i) $V = 1.8$ [1]
 $I = 0.25$ AND both units correct, V and A [1]
(ii) R_S calculated correctly, e.c.f. (i), expect $7.2 (\Omega)$ [1]
- (b) (i) lamps in parallel and ammeter in a correct position [1]
voltmeter in correct position, with rest of circuit and symbols correct [1]
(ii)(iii) $R_P = 3.3$ or 3.33 with unit Ω and 2 or 3 significant figures AND R_S/R_P calculated [1]
- (c) (i) voltage or p.d., accept current [1]
(ii) adjust power supply OR add resistor/variable resistor [1]

[Total: 8]

- 5 (a) (i) $V = 2.4(0)(V)$ [1]
 $I = 0.84(A)$, both units correct [1]
(ii) $R_P = 2.86$ OR $2.9(\Omega)$ ecf (a)(i) [1]
- (b) lamps in series [1]
voltmeter and ammeter in correct position, with rest of circuit and symbols correct [1]
- (c) $R_S = 11.4$ OR $11(\Omega)$ NOT more than 3 sig. figs. [1]
- (d) (i) correct symbol for variable resistor NOT potentiometer [1]
(ii) X correctly positioned [1]

[Total: 8]

- 6 (a) correct voltmeter symbol with appropriate parallel connection [1]
- (b) (i) meter with 5 V range circled [1]
(ii) arrow indicating 1.5 V on circled meter [1]
- (c) R calculations correct (9.6 or 9.62, 7.9 or 7.89, 4.5 or 4.55) [1]
consistent 2 or consistent 3 sig. figs. [1]
note: allow 1 sig. fig. fewer for $l = 20$ cm
- (d) link consistent with results [1]
figures to support, matching statement – at least two R values compared [1]
- (e) increased supply voltage [1]
use of variable resistor OR variable voltage supply clearly indicated as such [1]
any other suitable point, e.g. [1]
- voltmeter with larger range
 - ammeter with larger range
 - variable resistor symbol and connection correctly shown

[Total: 10]