

# Electrical Quantities

## Mark Scheme

<b>Level</b>	IGCSE
<b>Subject</b>	Physics
<b>Exam Board</b>	CIE
<b>Topic</b>	Electricity and Magnetism
<b>Sub-Topic</b>	Electrical Quantities
<b>Paper Type</b>	Alternative to Practical
<b>Booklet</b>	Mark Scheme 2

**Time Allowed:** 62 minutes

**Score:** /51

**Percentage:** /100

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

- 2 (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

- 3 (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  $\Omega$  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]**

- 4 (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]**

- 5 (a) (i)  $\theta = 30^\circ$  and  $65^\circ$  both to  $\pm 2^\circ$  [1]
- (ii) suitable procedure e.g.: [1]
- use of plumb line
  - measure from line of stand
  - use of spirit level
  - attach protractor behind solar panel
- (b) any one reason from: [1]
- ambient light owtte
  - zero error on meter
- corresponding solution: [1]
- do experiment in complete darkness
  - subtract zero reading (from each voltage measurement)
- (c) any two aspects relating to apparatus e.g.: [2]
- same distance between panel and lamp
  - lamp at same height
  - panel at constant height
  - same pd across lamp OR same current in lamp OR same brightness of lamp

[Total: 6]

- 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]