

# Electrical Circuits

## Mark Scheme 8

<b>Level</b>	IGCSE
<b>Subject</b>	Physics
<b>Exam Board</b>	CIE
<b>Topic</b>	Electricity and Magnetism
<b>Sub-Topic</b>	Electrical Circuits
<b>Paper Type</b>	Alternative to Practical
<b>Booklet</b>	Mark Scheme 8

**Time Allowed:** 54 minutes

**Score:** /45

**Percentage:** /100

Question	Answer	Marks
1(a)(i)	<i>R</i> values 1.60, 1.51, 1.35, 1.21 <i>R</i> values all to 2 significant figures or all to 3 significant figures.	1 1
1(a)(ii)	Column headings <i>m</i> , <i>V</i> , <i>A</i> , $\Omega$	1
1(b)	No; there is a <u>current</u> reading	1
1(c)	filament changes brightness, owtte	1
	increase / decrease / change in temperature of <u>filament / lamp</u>	1
1(d)(i)	Variable resistor (rheostat)	1
1(d)(ii)	Correct symbol for variable resistor	1
	Correct diagram, with variable resistor in series with power supply	1
		<b>Total 9</b>

- 2 (a) arrow indicating 0.4 V [1]  
arrow indicating 0.08 A [1]
- (b) graph:
- axes labelled with quantity AND unit [1]
  - appropriate scales (plots occupying at least  $\frac{1}{2}$  grid) [1]
  - plots all correct [1]
  - well-judged line AND thin line, neat plots [1]
- (c) (i)  $G$  present and triangle method seen using at least  $\frac{1}{2}$  line [1]
- (ii)  $R$  in range  $4.6\Omega$  to  $4.9\Omega$  [1]  
to 2/3 significant figures and with correct unit [1]
- (d) statement matching graph with reference to straight line [1]  
reference to passing through origin (within limits of experimental accuracy/owtte) [1]
- (e) suitable change: [1]  
e.g. reduce supply voltage / current,  
use thinner / longer wire,  
material with greater resistivity

[Total: 12]

- 3 (a) (i) 1.9 (V) [1]  
0.26 (A) [1]
- (ii)  $R = 7.3$  (7.3077) ( $\Omega$ ) accept any sig. figs.  $> 2$ , ecf allowed [1]  
all units V, A,  $\Omega$  correct, symbols or words [1]
- (b) brightness increases (from X to Z) [1]
- (c) one from:  
  - exact placement of S
  - width of S
  - battery running down/voltage changed
  - wire/lamp getting hot
  - resistance of lamp/wire changed [max 1]
- (d) increases (note: if this mark is not scored, the next mark cannot be scored) [1]  
  
V increases more quickly than  $I$  (accept greater rate)  
or V increases proportionately more than  $I$   
or doubling V causes  $I$  to increase by less than double  
allow gradient is increasing [1]

**[Total: 8]**

- 4 (a) tape measure [1]
- (b) symbols for ammeter, voltmeter and resistor (for copper wire) correct [1]  
note: accept in wrong places for this mark
- variable resistor or potential divider present with symbol [1]  
NOT if labelled "copper wire"
- ammeter in series and voltmeter in parallel with copper wire/resistor [1]  
note: do NOT award this mark if there is no power supply
- (ii) observe current shown on ammeter (ignore any reference to a voltmeter) [1]  
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) [1]  
accept 'scale' for range  
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]**

- 5 (a) (i) (cm, V, A) [no mark awarded]
- (ii) Graph:
- Axes correctly labelled with quantity and unit and correct way around [1]
  - Suitable scales – plots occupy at least half the grid [1]
  - All plots correct to  $\frac{1}{2}$  small square [1]
  - Good line judgement (ecf for curve if  $d$  plotted) [1]
  - Single, thin, continuous line [1]
- (iii) Triangle using at least half of candidate's line clearly indicated on graph [1]
- Evidence of subtraction seen [1]
  - G value 1.5 when rounded to 2 significant figures [1]
- (b) Same as G, rounded to 2 or 3 significant figures [1]
- unit  $\Omega$ /ohms [1]

**[Total: 10]**