Electrical Circuits
Mark Scheme 2

Level	IGCSE
Subject	Physics
Exam Board	CIE
Topic	Electricity and Magnetism
Sub-Topic	Electrical Circuits
Paper Type	Alternative to Practical
Booklet	Mark Scheme 2

Time Allowed: 63 minutes

Score: /52

Percentage: /100

1   **(a**   **(i)** V = 2.2 (V)   [1]

        (ii) I = 0.2(0) (A)   [1]

   (b)   graph:
- axes both correctly labelled, right way round and with units   [1]
- suitable scales, to include origin   [1]
- all plots correct to within ½ small square   [1]
- good best-fit line judgement, single, thin, continuous line   [1]

   (c)   **(i)**   intercept correct to ½ small square   [1]

       (ii)   ratio correct AND R value equal to ratio, ignore any unit, e.c.f. allowed   [1]

      (iii)   2 or 3 sig. figs. AND unit of Ω [1]

[Total: 9]

2   **(a**   **(i)** V_1 = 2(.0) (V)   [1]
             I_1 = 0.32 (A)   [1]

       (ii) R_1 = 6.25 (Ω) OR e.c.f. **(i)** AND correct units V, A, Ω in **(i)** and **(ii)**   [1]

   (b)   correct arrangement of resistors   [1]
      correct position for voltmeter AND correct circuit symbols AND correct labelling of
      resistors **A**, **B** and **C**   [1]

   (c)   **(i)**   3.0 / 3.04 / 3.043 (Ω)   [1]

       (ii)   2.1 / 2.05 / 2.06 / 2.07 / 2.08 OR e.c.f. AND <u>no unit</u>   [1]

   (d)   statement matches results   [1]
      justification including the idea of within (or beyond) the limits of experimental accuracy   [1]

[Total: 9]

3 **(a** correct symbol for voltmeter AND shown connected in parallel   [1]

   (b) 3(.0)(V) AND 0.38(A)   [1]

   (c) arrows showing 2.8–3.0 V AND 0.76–0.78 A   [1

   (d) R_1 = 7.9 (OR e.c.f.), R_2 = 3.8, R_3 = 2.7   [1]
       correct unit (symbol or word)   [1]
       consistently 2 sig. figs. OR consistently 3 sig. figs.   [1]

   (e) **(** statement matches results with any <u>relevant values</u> quoted   [1]
       justification matching statement   [1]

     (ii) R_3 should be $^1/_3 \times R_1$ owtte   [1]

[Total: 9]

4   **(a   (i)**   2.1 (V)   [1]

0.45 (A)   [1]

(ii) R = 4.7 accept 4.67 (Ω) e.c.f. **(a)(i)**   [1]

all units correct, V, A, Ω, symbols or words   [1]

(b) (current) decreases   [1]

(c) correct symbol for variable resistor (rectangle with strike-through arrow)   [1]

(d) clear description or diagram showing triangle method with large triangle **or** taking
two co-ordinates far apart on line   [1]

how to calculate gradient, e.g. equation or rise / run, etc.   [1]

[Total: 8]

5   **(a)(b**   2.8   [1]

             0.9(0)   [1]

             units both correct, symbols or words, V, A   [1]

     (c) (i)   3.1(1) / ecf, 2.0 / 1.95, 1.0(0) penalise rounding errors   [1]

            correct unit seen once and not contradicted   [1]

       (ii)   statement matches results (expect 'Yes' but allow 'No' if ecf >10%)
               with <u>matching</u> and <u>correct</u> justification (which refers to figures)
               (e.g. 'within limits of experimental accuracy' owtte for 'Yes' or 'too different'
               for 'No')   [1]

     (d) any one from:
- switch off between readings
- only switch on for short time
- use smaller currents / p.d.s
- suitable means of dissipating thermal energy   [1]

                                                         [Total: 7]

6   **(a** R calculated correctly:
          0.49, 0.99, 1.5(1), 1.99 or 2.0, 2.5(0)
          note: accept more significant figures for this mark   [1]

          all R values expressed to suitable precision, expect 2 decimal places
          OR 2 significant figures used throughout OR 3 significant figures used throughout   [1]

     (b) graph:
          axes correctly labelled and right way round   [1]
          suitable scales, with plots using at least half of grid   [1]
          all plots correct to ½ small square   [1]
          good line judgement   [1]
          single, thin, continuous line, no large 'blobs' greater than ½ small square   [1]

     (c) statement to match graph (expect yes)   [1]

          justified by reference to straight line through the origin
          OR when l doubles, R doubles owtte   [1]

     (d) additional readings with greater l values   [1]

                                                          [Total: 10]