UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE O Level

MARK SCHEME for the May/June 2006 question paper

5054 PHYSICS

5054/03   Paper 3   maximum raw mark 30

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which Examiners were initially instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began. Any substantial changes to the mark scheme that arose from these discussions will be recorded in the published *Report on the Examination*.

All Examiners are instructed that alternative correct answers and unexpected approaches in candidates' scripts must be given marks that fairly reflect the relevant knowledge and skills demonstrated.

Mark schemes must be read in conjunction with the question papers and the *Report on the Examination*.

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1 (a) L measured to the nearest mm, in the region of 300 mm and D found from $L/20$ with unit.

   (b) Use of set squares at each end of the length of spheres and scale readings seen.   B1

   (c) V measured correctly with unit and in the region of $30 – 50$ cm^3.   B1

   (d) Correct calculation of V_S with unit giving a sensible value.
        (Could be between 10 cm^3 and 80 cm^3 depending on diameter of spheres.)   B1

   (e) Correct calculation of ratio giving a value in the range 0.35 to 0.60 with no unit.   B1   [5]

2 (a) Scale readings giving a correct extension (approximately 20 cm) measured to the nearest mm.   B1

   (b) Use of the set square with the 90º angle between the metre rule and the bench.
        / Alignment of rule with vertical edge.   B1

   (c) Sensible time for 20 oscillations (approximately 17 seconds) which is repeated or other sensible precaution stated.   B1

        Correct calculation of T to 2/3 s.f. with unit seen somewhere.   B1

   (d) Correct calculation of T^2/x yielding a value in the range 3.8 to 4.2 (ignore unit). Accept 0.038 to 0.042 s^2/cm.   B1   [5]

3 (a) Circuit diagram, showing ammeter, power supply, two resistors in parallel and leads A and B.   B1

   (b) I_1 measured to 0.01 A or better with unit and in the region of 0.3 A.   B1

   (c) I_2 measured to 0.01 A or better with unit and in the region of 0.17 A.   B1

   (d) I_T measured to 0.01 A or better with unit and in the region of 0.47 A.   B1

   (e) Exact calculation not required but realisation that current approximately halved, hence resistance approximately doubled.   B1   [5]
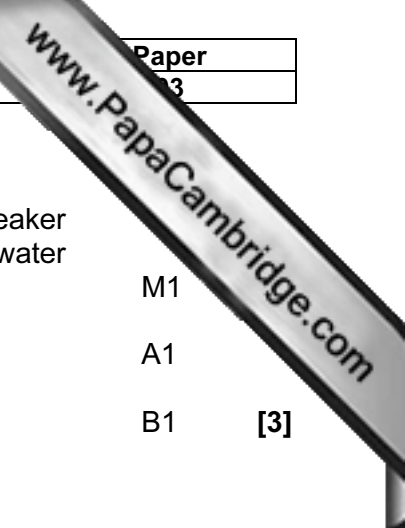
4 **(a)** **Initial readings**

Sensible values for the masses of the empty and water filled beaker recorded to 0.1 g or better giving sensible value for the mass of the water with unit.   M1

Value for the mass of water in the region of 50 g.   A1

Room temperature recorded to better than 1 ºC with unit.   B1   **[3]**

(b) **Table**

Table with units for θ and t.   B1

Temperatures recorded at, at least, ½ minute intervals.   B1

At least one temperature to better than 1 ºC.   B1

Minimum temperature rise of 8 ºC.   B1   **[4]**

(c) **Graph**

Axes labelled with unit and correct orientation.   B1

Suitable scale, data occupies more than half page in both directions and scale is easy to follow; no 3's, 6's, 7's etc.   B1

Two points plotted correctly from an easy to follow scale – check the two points furthest from the line.   B1

Best fine line (which may be a curve) and fine points.   B1   **[4]**

(d) **Calculations**

Tangent drawn at the correct point used to determine the gradient with triangle base > 8 cm.   B1

Correct calculation of gradient with unit.   B1

(e) **Calculations**

Correct calculation of power with unit.   M1

Value of power between 5 W and 20 W.   A1   **[4]**