UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the May/June 2007 question paper

5054 PHYSICS

5054/03 Paper 3 (Practical Test), maximum raw mark 30

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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.

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Mark scheme code

B1 Independent mark.

M1 Method mark, if not given subsequent A mark falls (up to the next B, M or C mark).

A1 Answer mark, not awarded if an M mark immediately before it is not awarded.

C1 Compensation mark, given automatically if the answer is correct, i.e. working need not be seen if the answer is correct. Also given if the answer is wrong but the point is seen in the working.

1	**(a)**	40.0 cm < v < 53.0 cm and recorded to the nearest mm with unit.	B1	
	(b)	The image has a greater magnification than the image formed solely by the converging lens.	B1	
		$x \leqslant$ 43.0 cm with x and y recorded to the nearest mm or better with unit.	B1	
		70.0 cm < $x + y$ < 83.0 cm.	M1	
	(c)	f calculated correctly with unit and $\geqslant$ 13.0 cm. (Precision penalty to be used once only in **(a)** and **(b)**. Unit penalty to be used once only in **(a)**, **(b)** & **(c)**.)	A1	[5]
2	**(a)**	Sensible values for l, w and T with all recorded to the nearest mm or better. l in range 7.3 to 7.7 cm w in range 2.3 to 2.7 cm T in range 1.1 to 1.5 cm.	B1	
		All measurements repeated.	B1	
	(b)	Correct calculation of density with value in range 2.2 to 2.8 g/cm^3 with unit.	B1	
	(c)	N = 12 and correct method for t and m.	B1	
		Sensible values, 2/3 s.f. and units for t and m.	B1	[5]
3	**(a)**	Use of set square between vertical metre rule and bench.	B1	
	(b)	h_2 found from at least two readings.	M1	
		h_2 found from at least three readings (Accept cm precision in h_2 values)	A1	
	(c)	Correct calculation of both potential energies with 0.50 m for h_1 and sensible h_2.	M1	
		Loss of energy from difference of energy values. (Expect to see unit of energy somewhere, else -1.)	A1	[5]

4 Circuit diagram

(a) Power supply, switch, ammeter and resistor in series with a gap between A and B clearly shown. B1

Initial readings

(b) I_0 in the range 0.40 A to 0.55 A, recorded to 0.01 A or better.
(Ignore missing unit) B1

(c) *R* recorded (Ignore missing unit) B1

Sensible I according to the table below.

R / Ω	I / A
3.3	0.30 – 0.45
4.7	0.30 – 0.40
6.8	0.25 – 0.35

(Ignore missing unit) B1 [4]

Table

(d) Table with units for *R* and I B1

Three single values of *R* with sensible currents (as above).
(Ignore value from **(c)** missing from table.) B1

Two series combinations with correct trend in current. B1

A further two series combinations with correct trend in current. B1 [4]

Graph

(e) 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 3s, 6s, 7s etc. B1

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

Best fine line and fine points. B1 [4]

Comments and Calculations

(f) Value correctly read off from graph. B1

X equal to above value and in the range 10.0 Ω to 12.0 Ω. B1

This answer must be equal to the unknown resistance since the current has been halved. B1 [3]
(For the last mark, allow calculation of X from 6.0 V power supply and I_0,
e.g. 6/0.48 = 12.5 Ω)