UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the October/November 2011 question paper for the guidance of teachers

5054 PHYSICS

5054/31 Paper 3 (Practical Test), maximum raw mark 30

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

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1 **(b)** Measured the height of the string above the bench at 2 places /
Used set square to check angle MBC /
Aligned with horizontal surface in room, e.g. bench. B1 [1]

(c) l in range 24.0 cm to 26.0 cm and $l > h_1 - h_2$ with correct unit seen somewhere. B1

All lengths recorded to the nearest mm or better. B1 [2]

(d) Correct calculation of sin θ and θ giving a value of θ in the range 40° to 80°. C1

θ in the range 50° to 70° with unit. A1 [2]

[Total: 5]

2 **(a)** **(ii)** Expect value in range 12.0 s to 16.0 s, otherwise allow value within 2.0 s of Supervisor's value, with t_1 repeated and averaged. Allow nearest second. B1 [1]

(iii) Correct calculation of T_1 to 2/3 s.f. and unit seen somewhere in **(a)**. B1 [1]

(b) Two values of t_2, T_2 found correctly and $T_2 > T_1$ with 2/3 s.f. and unit. B1 [1]
(In **(a)** and **(b)**, penalise significant figures once only and penalise units once only.)

(c) Correct calculation of ratio of periods with value in the range 1.10 to 1.50. M1
(Allow 0.67 to 0.90 if f calculated in **(a)** and **(b)**.)
(Also allow t_2 / t_1.)

Ratio in range 1.20 to 1.40 with no unit (or 0.71 to 0.83 if f used). A1 [2]

[Total: 5]

3 **(b)** u in the range 16.0 cm to 21.0 cm and $u + v = 100.0 \pm 1.0$ cm.
Ignore precision and unit. M1
At least one measurements recorded to the nearest mm or ½ mm with unit. A1 [2]

(c) **(i)** d found correctly from more than one gap and in the range 6.0 mm to 13.0 mm. Allow repeat measurements of one gap, but must see evidence of repeats. B1 [1]

(ii) A minimum of 3 spacings used to find d. This may be shown on a diagram or stated in the results. B1 [1]

(d) s in the range 1.3 mm to 3.0 mm from correct calculation, with unit seen here or in **(c)(i).** B1 [1]

[Total: 5]

4 Preliminary Results

(a) Circuit diagram showing:
Series circuit with power supply (allow d.c or a.c), two resistors, (switch) and ammeter. B1

Voltmeter in parallel with power supply and one resistor. B1 [2]
Voltmeter in series loses both marks.

(b) V in the range 0.7 V to 1.7 V measured to 0.1 V or better with unit. B1
I in the range 0.050 A to 0.110 A measured to the nearest 0.01 A or better with unit. B1 [2]

Table

(c) Table with units for resistance, V and I. B1

Minimum of 3 readings for V with correct trend for all readings i.e. as R increases V increases. M1

Minimum of 3 readings for I with correct trend for all readings i.e. as R increases I decreases. M1

7 values in total. A1 [4]

Graph

(d) Axes labelled with units and correct orientation. B1
(Allow e.c.f. from wrong unit in table but not no units)

Suitable scale, not based on 3, 6, 7 etc. with data occupying more than half the page in both directions. B1

Two points plotted correctly – check the two points furthest from the line.
This mark can only be scored if the scale is easy to follow. B1
(Points must be within ½ small square of the correct position)

Best fit fine line and fine points or crosses. B1 [4]
(Line thickness to be no greater than the thickest lines on the grid)

Calculations

(e) Use of a triangle that occupies more than half the drawn line. B1
(Not using points that are not on the line or points that are on a curve.)

Correct calculation 2/3 s.f. (ignore absence of unit). B1

Gradient in range 26 to 40 (Ω or V/A) from correct calculation with consistent sign (expect negative sign). B1 [3]
(Allow –0.026 to –0.040 if I axis in mA.)

[Total: 15]