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Cambridge Ordinary Level

MARK SCHEME for the October/November 2015 series

5054 PHYSICS

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

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1 **(a)** Each l measured to the nearest mm or better with unit and the average value found and in range 1.5 cm to 3.0 cm. B1

(b) l_A and l_B measured to the nearest mm or better with unit. B1

$l_B < l_A$. B1

(c) **(i)** Correct calculation of extensions with unit. Allow use of average or individual initial lengths. M1

(ii) Correct calculation of forces with unit with $F_A > 1.0$ N. A1

[5]

2 **(a)** $\theta_I \leqslant 15$ °C recorded with unit. B1

Sensible θ_R and θ_H and θ_H in the range $\theta_{AVE} \pm 3$ °C with units. B1

(b) The warmer water is at the top / the colder water is at the base of the cylinder and will not mix by convection. B1

Average temperature found correctly. M1

Reason related to comment, e.g.
For $\theta_H < \theta_{AVE}$, not true because heat is gained by the cold **cylinder**.
For $\theta_H < \theta_{AVE}$, not true because some ice is transferred with the cold water
For $\theta_H > \theta_{AVE}$ not true because heat is gained from the surroundings.
For $\theta_H = \theta_{AVE}$ true because heat gained = heat lost.
Allow any other correct physics suggestion but do not allow heat lost to the surroundings because thesurroundings are at a lower temperature. A1

[5]

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3 **(a)** No mark for length.
t_1 in the range 27 s to 37 s from repeat measurements with unit seen here or in **(b)**. (Allow measurements to nearest second) B1

T_1 in the range 1.50 to 1.70 s with unit seen here or in **(b)**. B1

(b) t_2 slightly smaller than part (a) to 0.1 s or better with unit seen here or in **(a)** and T_2 correct. (Penalise missing unit once only) B1

(c) Sensible comment based on the candidate's results, e.g. the periods of oscillation are virtually the same / T_2 is slightly smaller than T_1 / difference is small. B1

Sensible comment based on the candidate's results, e.g. it is not possible for it to be directly proportional because as the length halves it would be expected that the period halved. B1

[5]

4 **Preliminary results**

(a) **(i)** V_{AB} recorded to 0.1 V or better with unit and in the range 0.5 V to 1.8 V. B1

(ii) V_{BC} recorded to 0.1 V or better with unit and in the range 0.5 V to 1.8 V. B1

(iii) Correct calculation of I with unit and in the range 0.10 A to 0.40 A. B1

[3]

Table

(b) Table with units for all columns with results from **(a)** included in the table. B1

All R values correct. (4.7, 10, 22, 36.7, 3.2, and one of 14.7, 26.7 or 32 Ω). B1

Correct trend in V_{AB} for correct R values (V_{AB} decreases as R increases). B1

Correct trend in V_{BC} for correct R values (V_{BC} increases as R increases). B1

Correct calculation of I (Check R = 22 Ω). B1

[5]

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Graph

(c) Axes labelled with units for I and V and correct orientation. B1

Suitable scale, not based on 3, 6, 7 etc. with data occupying more than half the page in both directions. (Allow the graph to start at the origin). 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. (Points must be within 1/2 small square of the correct position) B1

[3]

Correct box ticked based on the best fit to the plotted points. B1

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

[2]

Calculations

(d) Correct reading of I at a voltage of 1.50 V. M1

Correct calculation of resistance in the range 2 Ω to 15 Ω to 2/3 s.f. and unit. A1

[2]

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