UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

GCE Ordinary Level

MARK SCHEME for the October/November 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 instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began.

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.

The grade thresholds for various grades are published in the report on the examination for most IGCSE, GCE Advanced Level and Advanced Subsidiary Level syllabuses.

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1 **(a)**   *D* measured correctly and, recorded to the nearest mm or better with unit and in the range 4.50 cm to 5.50 cm   B1

    (b)   Diameter measured in 2 places (stated or shown on diagram)
       Or   Use of set squares against lens and rule as in part **(d)**,
            (Accept top or bottom of rule or 3D view with set squares in middle of rule)
       Or   Eye vertically above reading seen or stated.
       Or   Repeats seen in part **(a)**.   B1

    (c)   *T* measured to the nearest mm or better with unit and in the range 4.0 mm to 8.0 mm.   B1

    (d)   Diagram showing set squares used like vernier callipers.
         (Accept top or bottom of rule or 3D view with set squares in middle of rule)   B1

    (e)   *f* calculated correctly with unit and yielding a value in the range 10.0 cm to 20.0 cm.   (Ignore s.f.)   B1   **[5]**

2 **(a)**   *I* in the region of 5 mA, measured to 0.1 mA or better with unit seen here or in **(c)**.
         V in the region of 3 V, measured to 0.1 V or better with unit seen here or in **(c)**.   B1

    (b)   Correct calculation of resistance with unit seen here or in (d). (Ignore s.f.).   B1

    (c)   *I* reduced to approximately 1 mA, measured to 0.1 mA or better with unit seen here or in **(a)**.
         V similar to **(a)**, measured to 0.1 V or better with unit seen here or in **(a)**.   B1

    (d)   Correct calculation of resistance with unit seen here or in **(b)**.   (Ignore s.f.)   B1

    (e)   Resistance increases as the amount of light decreases.
         (Must be reference to change in light level).   B1   **[5]**

3 **(a)**   Normal correct and angle of incidence = 30° by eye.   B1

    (b)   Points A and B to be at least 10 cm apart.   B1

    (c)   Points C and D to be at least 10 cm apart.   B1

    (d)   Angle of reflection = 30° $\pm$ 2° with correct unit.   B1

    (e)   Refraction through the glass of the mirror /
         Thickness of pins leads to an error in positioning/
         Thickness of glass.   B1   **[5]**

4 <u>**Initial readings**</u>

(a) t recorded to 0.1 s or better with unit and in the range 1.50 s to 2.50 s from at least 2 readings correctly averaged.
(Seen here or in the table).   B1

(b)   Correct calculation of w and v (Ignore unit errors – penalise in table).
(May be scored from table if not seen here)   B1   **[2]**

<u>**Table**</u>

(c) & (d)   Table with units for x, t, w and v.   B1

Correct trend in time values (t increases as x increases)   B1

One value of $x \geq 90.0$ cm.   B1

Range of $x \geq 35.0$ cm.   B1

Total of at least 5 values of x showing correct trend in v i.e. v increases as t increases. (Do not include values of x below 40.0 cm).   B1   **[5]**

<u>**Graph**</u>

(e)   Axes labelled with unit and correct orientation.   B1

Suitable scale, data occupies ≥ 8 cm squares horizontally and ≥ 12 cm squares vertically and scale is easy to follow; no 3's, 6's, 7's etc.   B1

All points plotted from an easy to follow scale. Check the two points furthest from the line are plotted correctly. Ring these points.   B1

Best fit fine line through the data and fine points.   B1   **[4]**
(Ignore the line beyond the data.)
(Fine judged to be equal to or thinner than the major grid lines.)

<u>**Comments and Calculations**</u>

(f)   Correct description of acceleration from candidate's line.
     e.g.   constant if straight line,
     or   increasing if curving upwards,
     or   decreasing if curving downwards,
     or   increasing and then decreasing if S shaped.   B1

Either describes shape
Or   gradient = acceleration (stated or implied)   B1

(g)   (Any reasonable v – any reasonable u) / time   M1

Correct calculation of acceleration with unit and 2/3 s.f.   A1   **[4]**