**UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**GCE Ordinary Level**

# MARK SCHEME for the May/June 2008 question paper

# 5054 PHYSICS

**5054/03** 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.

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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**Marking 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)** **(i)** & **(ii)** Sensible $t$ & $d$ determined to the nearest mm or better with unit seen once. B1
Use of 5 coins for one of $t$ or $d$, either in a stack for $t$ or in a line for $d$. B1

**(iii)** Use of 5 coins in a stack for $t$ and in a line for $d$. B1

**(b)** Correct calculation of density to 2/3 s.f. with unit and in the range 5.0 to 10.0 g/cm$^3$. B1

**(c)** Uneven thickness of the coin because of rim, images on the coin, etc. B1 [5]

**2** **(a)** Three temperatures recorded with unit seen somewhere including sensible $\theta_1$. B1
Sensible values for $\theta_2$ and $\theta_3$. B1
Temperature fall > temperature rise. B1

**(b)** Correct calculation of both thermal energy changes. M1

**(c)** The thermal energy lost by the hot water is greater than the thermal energy gained by the cold water because thermal energy is lost to the surroundings. Must be consistent with calculation with correct unit seen somewhere in calculation. A1 [5]

**3** **(a)** $x$ recorded to the nearest mm or better with unit seen here or in **(c)** and between 17.0cm and 25.0cm. B1

**(b)** Image inverted with sensible method described. B1

**(c)** $y$ recorded to the nearest mm or better with unit seen here or in **(a)** and between 73.0cm and 83.0cm. B1

**(d)** Correct calculation of $f$ yielding a value between 13.0cm and 17.0cm with unit. B1
Correct calculation of $f$ yielding a value between 11.0cm and 19.0cm with unit. B1 [5]

(Allow change of $D$ for the last 2 marks)

**4** **(a)** $I$ in the region of 4.0mA to 11.0mA recorded to 0.1mA or better with unit B1
$V$ in the region of 1.5V to 3.0V recorded to 0.01V or better with unit. B1

**(b)** $R_{LED}$ calculated using (candidate's $V$)/(candidate's $I$) with correct unit. B1
Value 150 Ω to 500 Ω and recorded to 2/3 s.f.
(Allow e.c.f. for power of 10 or unit error above) B1 [4]

**Table**

**(c)** Table with units for all values. Allow e.c.f. of incorrect units in **(a)** or **(b)**. B1
Use of three $R$ values with correct trend in $I$.
($I$ decreases as $R$ increases). B1
$R$ = 1070 Ω with the smallest current. B1
Three further $R$ values showing correct trend in $I$. B1 [4]
(If $R_{LED}$ not found take 2 marks off in this section)

**Graph**

**(d)** 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.
(Allow scales to start at origin) 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]

**Calculations**

**(e)** Comment that $R_{LED}$ deceases as $I$ increases. B1

**(f)** Correct value of $R_{LED}$ read from graph when $I$ = 5.0 mA. B1
Value 200 Ω to 600 Ω 2/3 s.f. and unit. B1 [3]

(Allow e.c.f. from power of 10 error in **(b)**)