**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

**GCE Ordinary Level**

# MARK SCHEME for the October/November 2012 series

## 5054 PHYSICS

**5054/32** 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.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

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## Section A

**1** **(b)** One of $x$ or $y$ measured to the nearest mm or better with unit seen and neither greater than 30.0 cm, with correct calculation of $y$ / $x$ with no unit. B1
(Allow unit of cm/cm)

**(c)** **(i)** If $x$ > ($x$ in **(b)**) then $y$ < ($y$ in **(b)**) or vice versa and one of the values measured to the nearest mm or better with unit, with correct $y$ / $x$ with no unit. B1
(Allow e.c.f here, in **(c)(ii)** and in **(d)** if candidate used $x$ / $y$ in **(b)**)

**(ii)** Correct average value of $y$ / $x$ with no unit. B1

(Unit penalty and precision penalty to be applied once only in **(b)** & **(c)**.)

**(d)** Two or more values for $x$ and $y$ and average $y$ / $x$ within 0.10 of the previous value.
As in **(c)(i)** if second $x$ > first $x$ then second $y$ must be < first $y$ or vice versa. B1

**(e)** A simple comparison of the ratio values in **(c)(ii)** and **(d)**
(e.g. one value is greater than the other) with a consistent conclusion (e.g. the theory is not supported). B1 [5]

**2** **(a)** **(i)** $V_d$ in the range 1.4 to 2.0 V, measured to 0.01 V or better with unit seen here or in **(ii)**. B1

**(ii)** $V_r$ in the range 0.5 to 1.5 V, measured to 0.01 V or better with unit seen here or in **(ii)**. B1

(penalise missing or wrong unit once only.)

**(iii)** Correct calculation of $I$ to ≥ 2 s.f. with unit. B1

**(b)** Decrease in $V_d$ not greater than 0.20 V and increase in $V_r$ not greater than 0.3 V and correct calculation of $I$ to ≥ 2 s.f. with unit. B1

(Penalise missing or wrong unit for $I$ once only or 1 s.f. in $I$ once only.)

**(c)** Comment on both voltages and current, e.g.
Small change in the p.d. across each component even though there is a large drop in the current / $V_d$ decreases, $V_r$ increases and $I$ decreases /
Allow $V_d$ + $V_r$ is constant or increases slightly /
Allow resistance of LED increases so LED non-ohmic. B1 [5]

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**3** **(a)** **(ii)** Checked with set-square against bench and metre rule / aligned with a vertical in the room e.g. edge of window frame. B1

**(b)** *e* in the range 5.0 cm to 9.0 cm, measured to the nearest mm or better with unit. B1

**(c)** Correct calculation of *C* to ≥ 2 s.f. B1

**(d)** **(i)** New *e*, less than the extension in **(b)** and in the range 2.0 cm to 5.0 cm, measured to the nearest mm or better with unit. B1
(Penalise missing or wrong units once only and penalise the precision of *e* once only.)

**(ii)** Total mass of modelling clay and hook in range 100 g to 130 g with unit (must follow from correct new *e* and *C*). B1 [5]

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## Section B

**4 Preliminary Results**

**(a)** One value of $t$ in the range 1.0 to 3.0 s, measured to 0.1 s or better. M1

$t_{av}$ correct and obtained from at least 3 values of $t$ with unit. A1

**(b)** **Front** of ball at the 90.0 cm mark (may be seen from a diagram). B1

**(c)** Correct calculation of $v$ and $v^2$. B1

**(d)** $h$ in range 5.0 cm to 15.0 cm measured to the nearest mm or better with unit. B1 [5]

**Table**

**(e)** Table with units for $x$, $t$, $t_{av}$ and $h$. B1

In awarding the next marks, a correct trend is indicated by the following: as $x$ decreases, $h$ decreases and $v^2$ decreases both in approximate direct proportion to 1 s.f.
In counting the number of values, allow $x$ = 30.0 cm.
(Note $v = x / t_{av}$ is a systematic error, should be $2x$, hence –1 penalty)

3 values of $x$ with correct trend. B1

4 values of $x$ with correct trend. B1

5 values of $x$ with correct trend. B1 [4]

**Graph**

**(f)** Axes labelled with units and correct orientation. B1
(No e.c.f. from table)

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)

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**Calculations**

**(g)** Correct reading of the sides of the triangle used for the gradient determination and correct calculation. M1
(Note triangle does not have to be present. The sides of the triangle must be read to within ½ a small square as in the plotting of points.)

Triangle uses more than half the drawn line and gives a value in the range 500 to 2000 (cm $s^{-2}$). A1 [2]

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