## Cambridge International Examinations

Cambridge Ordinary Level

## PHYSICS

Paper 3 Practical Test

## MARK SCHEME

Maximum Mark: 30

## Published

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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Cambridge is publishing the mark schemes for the October/November 2016 series for most Cambridge IGCSE ${ }^{\circledR}$, Cambridge International A and AS Level components and some Cambridge O Level components.

| Page 2 | Mark Scheme | Syllabus | Paper |
| :---: | :---: | :---: | :---: |
|  | Cambridge O Level - October/November 2016 | 5054 | 32 |

1 (a) $t$ in the range $0(\mathrm{~mm})$ to $4(\mathrm{~mm})$
(b) (i) sensible value of $D$. Repeats shown and correctly averaged, measured to the nearest mm or better
(ii) clear description or clear diagram of how values of $D$ obtained accurately.
eye vertically above edge of lens on scale /
set square used against edge of lens, resting on scale / measurements in two different orientations shown.
(c) (i) diagram showing set square on each side of the lens
(like the jaws of vernier callipers)
(ii) and sensible $T$ in the range $t<T \leqslant 10 \mathrm{~mm}$
(d) correct calculation of $f$ giving an answer in the range 7.5 cm to 30.0 cm with consistent unit with elsewhere in (a), (b)(i) or (c)(ii). (Ignore s.f.)

2 (a) decreases owtte
(b)(i)(ii) $\quad T_{1}=$ their $t_{1} / 10 \quad$ B1
$T_{1}$ given to $2 / 3$ s.f. Correct unit seen in (b) or (c)
B1
(c) $t_{2}>t_{1}$
(d) $T_{2} / T_{1}$ in the range 1.0 to 1.2 when rounded (ignore unit)

3 (a) $V_{1}$ in the range 1.8 V to 2.8 V to 0.1 V or better with unit seen here or in (b). and $I_{1}$ in the range 0.18 A to 0.28 A to 0.01 A or better with unit seen here or in (b)
(b) $V_{2}>V_{1}$ and in the range 2.4 V to 4.0 V to 0.1 V or better with unit seen here or in (a)
and $I_{2}<I_{1}$ and in the range 0.10 A to 0.20 A to 0.01 A or better with unit seen here or in (a).
(c) (increasing the resistance) reduces the current which increases the voltmeter reading or vice versa
(d) correct calculation of $R$ from their (a) and (b) note - B0 if sign error in calculation

| Page 3 | Mark Scheme | Syllabus | Paper |
| :---: | :---: | :---: | :---: |
|  | Cambridge O Level - October/November 2016 | 5054 | 32 |

## 4 Preliminary results

(a) $y$ measured to the nearest mm or better and in the range 1.5 cm to 3.0 cm with consistent unit seen here or in (b)
(b) (i) $x$ in the range 39.6 cm to 40.4 cm to nearest mm or better and with consistent unit seen here or in (a) or (b)(ii)
(ii) correct determination of $e$ in the range 9 cm to 14 cm with unit seen here or in (a) or (b)(i)
(iii) diagram or explanation measured the height of the metre rule above the bench in at least 2 places (and found to be equal)/Horizontal alignment with window sill/top of door etc.

## Table

(c) column headings with units for $x, L$ and $e$ and results from (b) included ..... B1
correct calculation of $e$ ..... B1
$\Delta x$ values $\geqslant 50 \mathrm{~cm}$ ..... B1
at least 5 results showing correct trend, $e$ increases as $x$ increases ..... B1

## Graph

(d) axes labelled with units and correct orientation (allow e.c.f. from wrong unit in table but not no units)
suitable scale, not based on 3, 6, 7 etc. with plotted data occupying $\geqslant$ half the page in both directions
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)
best-fit fine straight line and fine points or crosses
(line thickness to be no greater than the thickest lines on the grid)

| Page 4 | Mark Scheme | Syllabus | Paper |
| :---: | :---: | :---: | :---: |
|  | Cambridge O Level - October/November 2016 | 5054 | 32 |

## Calculations

(e) correct readings used for a pair of points on the line used for the gradient
determination
(triangle seen or implied)
more than half the drawn line used for points B1
correct calculation of gradient in the range 0.2 to 0.3 when rounded (ignore unit)

B1

