

**CAMBRIDGE INTERNATIONAL EXAMINATIONS**

Cambridge Ordinary Level

**MARK SCHEME for the October/November 2014 series**

**5054 PHYSICS**

**5054/32**

Paper 32 (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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1 In (a) and (b) penalise incorrect precision once only.

- (a)  $L$  in range 98.0 cm to 100.0 cm measured to the nearest mm or better with consistent unit seen for  $L$ ,  $x$  or  $d$  B1
- (b)  $N$  in the range 14 of 18 turns and  $x$  in the range 0.4 cm to 2.5 cm to the nearest mm or better with consistent unit for  $x$ ,  $L$  or  $d$  B1
- correct substitution for  $d$  with consistent unit for  $d$ ,  $x$  or  $L$  B1
- (c)  $m$  in the range 0.5 g to 16 g and correct substitution for  $\rho$  C1
- value in range 2.0 to 10.0 g/cm<sup>3</sup> to 1 to 3 significant figures with unit A1 [5]

2 In this question penalise missing unit once only.

- (a) use of all 5 gaps **or** 5 single measurements averaged leading to a value for  $s$  in the range 0.85 cm to 0.95 cm with unit seen here or in (d) B1

- (c) (i) (image) is magnified/bigger/larger B1

- (ii) magnification increases/gets bigger as  $x$ /height increases B1  
a comparison is needed, (e.g. image is magnified more as the lens is raised.)

if neither of the above marks are scored, allow 1 mark for the image gets blurred (and the image becomes diminished)

- (d) Mark (i) and (ii) together.

accurate value for  $x$  in the range 5.0 cm to 13.0 cm with unit seen here or in (a) allow to nearest cm B1

mark  $x$  value if no result for accurate value

**Either** from repeat measurements shown with correct average (ignore precision)  
**Or** an explanation of how  $x$  was measured accurately B1

e.g. the use of a set square to check that the rule is vertical seen on the diagram or described as being between bench and rule/eye level with reading on rule when recording the value [5]

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- 3 (a)  $y$  in the range 0.700 m to 0.900 m measured to the nearest 0.001 m  
do not accept answer in cm unless unit of m is crossed out and replaced by cm B1
- (b) (i)  $m$  in range 0.050 kg to 0.200 kg  
do not accept answers in g unless kg is crossed out and replaced by g B1
- (ii)  $t$  found from repeated measurements, averaged correctly with unit B1
- (c) no mark here, but  $M$  considered in the answer to (d)
- (d) correct substitutions in (i), (ii) and (iii) including  $M$  in the range 0.15 kg to 0.25 kg B1
- (iv) correct substitution with  $E_P > E_K$  giving  $F$  in the range 0.4 N to 1.2 N with unit B1 [5]

#### 4 Preliminary Results

Apply unit penalty of V once only in (a) and (b).

Apply precision penalty of V once only in (a) and (b).

- (a) (i)  $V_0$  in the range 1.0 V to 2.2 V to 0.1 V or better with unit seen here or in (b)(ii) B1
- (ii), (iii)  $L$  in the range 0.99 m to 1.01 m and  $K$  calculated correctly (ignore unit) B1
- do not accept answer in cm unless unit of m is crossed out and replaced by cm  
condone missing 0s, e.g. allow 1 m and rounded answers to two decimal places for checking range
- (b) (i)  $V$  in the range 0.7 V to 1.6 V to 0.1 V or better with unit seen here or in (a)(i) and  $V$  must be less than  $V_0$  unless an incorrect value of  $V_0$  is obtained B1 [3]  
allow ecf from  $V_0$ , e.g.  $V \approx 0.7 V_0$

#### Table

- (c) table with columns for  $V$ ,  $l$ ,  $\frac{1}{V}$  and  $\frac{1}{l}$  and units for  $\frac{1}{V}$  and  $\frac{1}{l}$  B1
- correct calculation of  $\frac{1}{V}$  and  $\frac{1}{l}$  B1
- check one row of the table  
answer must be correct to the significant figures used by the candidate but must be  $> 1$  significant figure  
condone missing 0s, e.g. for a length of 0.500 m  
a  $1/l$  value of  $2 \text{ m}^{-1}$  is acceptable
- at least 5 points recorded, with correct trend, i.e.  $V$  increases as  $l$  increases  
do not include values of  $l < 0.300 \text{ m}$  B1
- range of at least 0.500 m used B1 [4]

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**Graph**

- (d) axes labelled with units and correct orientation B1  
allow error carried forward from wrong unit in table
- suitable scale, not based on 3, 6, 7 etc. with plotted data and origin occupying  $\geq 12$  cm vertically and 8 cm horizontally B1
- two points plotted correctly B1  
points must be within  $\frac{1}{2}$  small square of the correct position
- best fit fine straight line and fine points or crosses B1 [4]  
line thickness to be no greater than twice the thickness of the thickest lines on the grid

**Calculations**

- (e) straight line drawn on graph **or** tangent drawn to curve M0  
values from the straight line **or** tangent must be used for the gradient calculation
- use of a triangle that uses more than half the drawn line A1
- correct reading of sides of the triangle from a sensible scale A1 [2]
- (f) correct substitution including  $R$  in range  $5.0\Omega$  to  $15.0\Omega$  M1
- correct calculation giving  $R_x$  in the range  $1.0\Omega$  to  $8.0\Omega$  with unit and 2 or 3 significant figures A1 [2]