

UNIVERSITY OF CAMBRIDGE INTERNATIONAL EXAMINATIONS

General Certificate of Education O Level

MARK SCHEME for the November 2004 question paper

5054 PHYSICS	
5054/04	Paper 4 (Alternative to Practical), maximum mark 30

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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*.

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NOVEMBER 2004

GCE O Level

MARK SCHEME

MAXIMUM MARK: 30

SYLLABUS/COMPONENT: 5054/04

**PHYSICS
(Alternative to Practical)**

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1 **Accept answers from text or drawing**

Method 1. **Turns, N>1, on rule**

- (a) Chosen method is evident from diagram or text. B1
- (b) Uses two readings, accept zero if stated or on diagram, also accept Δx , and N, text or diagram B1
- (c) (i) Some method to prevent the wire moving, use plasticine or tight coils, on diagrams accept blobs to mean plasticine. B1
- (c) (ii) How to avoid parallax/coils close/tight together/accept $d = \Sigma d/N$ (as calc) here. B1
- (d) Text or equation $d = \Delta x/N$ B1
- (e) Each turn has contributed/average of N turns, also accept " $d = \Sigma d/N$ is an average"/no wire will have a constant diameter. B1

{6}

Method 2. **N Turns on the reel**

- (a) Accept statement if Δx within end stops of reel and N mentioned. B1
- (b) Even if method 2(a) not awarded; Uses two readings, accept zero if stated or on diagram, also accept Δx , and N, text or diagram B1
- (c) (i) Some method to prevent the wire moving, use plasticine or tight coils, on diagrams accept blobs to mean plasticine. B1
- (c) (ii) How to avoid parallax/coils close/tight together/accept $d = \Sigma d/N$ (as calc) here/rule close to reel B1
- (d) Text or equation $d = \Delta x/N$ B1
- (e) Each turn has contributed/average of N turns, also accept " $d = \Sigma d/N$ is an average"/no wire will have a constant diameter. B1

{6}

Method 3. **Misreading of Question, Measurement of diameter of the reel by using a loop of wire.**

- (a) Length of "loop" of wire identified/or loop "remade" on bench/do not accept use of end stops B1
- (b) Length of loop measured B1
- (c) (i) Some method to prevent the wire moving, use plasticine B1
- (c) (ii) How to avoid parallax/use a second loop or more B1
- (d) Uses $d = c/\pi$ B1
- (e) Using two wires gives an average/no loop is a perfect circle. B1

{6}

Method 4. **Using more than one piece. {Do not accept use of holes}**

- (a) Several lengths of wire and rule mentioned B1
- (b) Some detail how rule is used to measure d , e.g. *wires place across rule etc.* B1
- (c) (i) How wires fixed B1
- (c) (ii) How to avoid parallax when taking **one** reading. B1
- (d) Explains how d is obtained from **more** than one measurement. B1
- (e) Each piece of wire has contributed/say the method using wires and gives average. B1

{6}

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2. (a) Suitable table (boxes or space) for five sets of θ , l , V , R (or $R=V/l$),
N.B. $R = V/l$ therefore accept θ, R and one other (i.e. 3 quantities).
 Four labels, words or symbols. B1
 Correct units for the three quantities given in the table. B1
[3]
- (b) Any two from:- wait for equilibrium/heat slowly/stir/place thermometer near
 R/reference to length of thermometer immersed/tap meters (having
 pointers)/tight connections/how to avoid parallax (equivalent to line of sight
 perpendicular to reading) leave thermometer in oil when reading the
 temperature. B2
[2]
- (c) Oil has a high resistance between input leads/water low resistance/similar/
 oil less volatile/evaporation/experiment quicker/specific heat capacity low/bigger
 range of temperature. B1
[1]
- {6}**
3. (a) 0, unit not required, B1
 ice melts at 0°C (or reverse) accept statement even if subsequent reason
 is wrong/good comment re ice-water mix B1
[2]
- (b) (i) Diagram showing....liquid level in test tube just within the thickness of
 ice B1
- (ii) 1. All liquid would be at 0°C /cooling more effective B1
 2. Large enough to give accuracy/small enough not to take too long
 to cool/thermometer $1/3^{\text{rd}}$ immersion B1
[3]
- (c) 14°C (unit required) B1
[1]
- {6}**
4. (a) Incident ray starting from O, and correct through points, neat and thin
 (arrows not required) B1
 Emergent ray, “ B1
 Angle, 138° or $42^{\circ} \pm 1^{\circ}$ B1
[3]
- (b) Correct ray through the prism, (ignore drawing qualities) (need not be
 labelled) B1
- (c) Position such that OE along the ray = 25 cm, using see-through graph
 paper, E is on the ray and on or “beyond” the second horizontal thick line. B1
- (d) “Correct” angle shown (normal and ray), accept numerical value of about
 35° /accept correct label i B1
[3]
- {6}**

Page 3	Mark Scheme	Syllabus
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- 5 (a) Axes: correct, non awkward uniform scale, may use true origin, scale can be double, axes labelled with units.
- Plotting: correct to nearest $\frac{1}{2}$ small square (check any one but also penalise obvious miss plot), no plotting mark for awkward scales B1
- Line: good judgement re plots, smooth and does not meander through the points, B1
thin neat line B1
- [4]
- (b) 21 mm of scale between the labels/smallest amount of scale between labels/equiv B1
[1]
- (c) Magnification increases B1
[1]
- {6}

Paper total 30

