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**

This mark scheme is published as an aid to teachers and students, to indicate the requirements of the examination. It shows the basis on which Examiners were initially instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began. Any substantial changes to the mark scheme that arose from these discussions will be recorded in the published *Report on the Examination*.

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*.

- CIE will not enter into discussion or correspondence in connection with these mark schemes.

CIE is publishing the mark schemes for the November 2004 question papers for most IGCSE and GCE Advanced Level syllabuses.

NOVEMBER 2004

GCE O Level

MARK SCHEME

MAXIMUM MARK: 30

SYLLABUS/COMPONENT: 5054/04

PHYSICS
(Alternative to Practical)

UNIVERSITY of CAMBRIDGE
International Examinations

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
(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 = Σd/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
(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 = **Σd/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
(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
(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}

2. **(a)** Suitable table (boxes or space) for five sets of θ, *I, V, R (or R=V/I), N.B. R = V/I therefore accept θ,R and one other (i.e. 3 quantities).* B1
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/<u>how</u> 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 <u>*just*</u> 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 1/3rd 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° +/- 1° 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}

5 **(a)** Axes: correct, non awkward uniform scale, may use true origin, scale cannot be double, axes labelled with units. B1

Plotting: correct to nearest ½ 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