MARK SCHEME for the November 2004 question paper

5054 PHYSICS

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

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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 <u>accept Δx,</u> 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 "<u>$d = \Sigma d/N$ is an average</u>"/no wire will have a constant diameter.	B1

{6}

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

(a)	Accept statement if Δx within <u>end stops of reel</u> and N mentioned.	B1
(b)	Even if method **2(a)** not awarded; Uses two readings, accept zero if stated or on diagram, also <u>accept Δx,</u> 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 "<u>**$d = \Sigma d/N$ is an average**</u>"/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),   B1
N.B. R = V/I 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/<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 $0^{o}C$ (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 $0^{o}C$/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 ^{o}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