MARK SCHEME for the NOVEMBER 2004 question paper

5054 PHYSICS

5054/03   **Paper 3 (Practical Test), maximum mark 30**

GCE O Level

MARK SCHEME

MAXIMUM MARK: 30

SYLLABUS/COMPONENT: 5054/03

PHYSICS
Paper 3 (Practical Test)

Marking scheme – general points.

Where the marking scheme does not give specific instructions, apply the following principles;

- Disregard of instructions leading to poor presentation
  or error   max loss of marks = 1

- Systematic error   max loss of marks = 1

- Supervisor's help;
  > No penalty for correction of faulty apparatus.
  > No marks to be awarded where the candidate is at fault in the section where he/she was helped. eg if told how to use the apparatus in question 4 then the observation marks cannot be scored but subsequent marks can score.

Marking scheme code.

B1   Independent mark.

M1   Method mark, if not given subsequent A mark falls (up to the next B, M or C mark).

A1   Answer mark, not awarded if an M mark immediately before it is not awarded.

C1   Compensation mark, given automatically if the answer is correct, i.e. working need not be seen if the answer is correct. Also given if the answer is wrong but the point is seen in the working.

1. **(a)** R recorded to 0.01 N with unit and in the range 0.65 N to 0.95 N. (Not allow 1 s.f. or 3 or more s.f. for R)   B1

    (b) heights and length recorded with at least one measurement to the nearest mm and unit on at least one measurement.   B1

    (c) use of metre rule with set square against bench with positions of bench, set square and rule, shown or stated.

           Or align rule with vertical feature and correct use of set square at top of rule shown.   B1

    (d) Correct calculation of θ (ignore unit)   M1

           Correct calculation of W and in the range 0.95 N to 1.45 N with unit. (or 10 x mass of block $\pm$ 0.25 N if block mass not 120 g)   A1

                                                   Total [5]

2. **(a) and (b)** Sensible temperatures with unit seen at least once.   B1

                      At least one reading attempted to better than 1 ˚C   B1

    (b) Correct calculations of both thermal energy changes with unit seen at least once. (Note m = 50 g and energy changes should be of the order of 5000 J)   B1

           Energy changes approximately the same within about 1000 J (the energy gain of the cold water may be greater than the energy loss of the hot water)   B1

    (c) Energy gained greater than energy lost as cold water gains thermal energy from beaker
           Or
           Energy gained less than energy lost as thermal energy is lost to the surroundings/beaker.
           Or
           Energy gained is approximately equal to the energy lost as the heat capacity of the beaker is negligible or there is no time for thermal energy loss to the surroundings.   B1

                                                   Total [5]

3. **(b)** f_1 in range 12.0 cm to 18.0 cm with unit.   B1
(allow 10.0 $\pm$ 2.0 cm if 10 cm lens used)

(c) Some indication of height from centre of lens, e.g. height of
pin above bench measured and height of centre of lens above
bench measured and subtracted from previous height.   B1
(Subtracted value must not be greater than 1.0 cm)

(d) Either f_1 or f_2 recorded to the nearest mm.   B1

f_2 in range 18.0 cm to 27.0 cm with unit.   B1
(12.0 cm to 18.0 cm if 10.0 cm lens)

(d) Shape of water shown in cross section between lens and
mirror and statement that this is equivalent to a diverging
lens.   B1

Total [5]

4. **Circuit diagram**

(a) Power supply and ammeter in series with gap or resistor
between A and B (which need not be labelled) and voltmeter
not in series.(allow internal resistance shown)   M1

Voltmeter in parallel with power supply / gap.   A1
(Apply penalty of – 1 if a variable resistor is shown instead
of a fixed resistor)

Initial readings

(b) I 0.19 to 0.27 to at least 0.01 (assume unit is A)   B1

V 2.8 to 4.1 to at least 0.1 (assume unit is V)   B1

Total [4]

Give credit for results for R = 15 Ω if shown in table but not
here.

Table

(c) Table with units for R, V and I.   B1

Three results with sensible I and V.   B1

At least one further result with sensible I and V.   B1

Three further results with sensible I and V.   B1

Total [4]

Sensible means voltage decreases as current increases.
Ignore R = 0 or ∞
R values should be 5, 7, 15 (single values) and 12, 20, 22 and
27 Ω (combinations)

Graph

(d)   Axes labelled with unit and correct orientation.   **B1**

Suitable scale (not based on 3, 7 etc) with data occupying
more than half the page in both directions.   **B1**
(Allow axes to start 2 cm in, in either or both directions.)

Two points plotted correctly from sensible scale – check the
two points which are furthest from the line.   **B1**

Best thin line and fine points from a minimum of 3 points.   **B1**

Total [4]

Calculations

(e) and (f)   Good tangent drawn at point of maximum slope.   **B1**

Correct calc. of S from sides of large triangle (relative to
tangent line) read to better than half a small square.   **B1**

ve S gives +ve r **B1**
(no e.c.f. +ve gradient)

Total [3]