ZIMBABWE SCHOOL EXAMINATIONS COUNCIL

General Certificate of Education Advanced Level

MARKING SCHEME

NOVEMBER 2010

PHYSICS

9188/4

1 Measurements and observations

M1 - Readings   3

Write a number of readings as a ringed total

$N \geq 7$ ↑ sets   3/3
$N = 7$ sets   2/3
$N = 6$ sets   1/3

underline a row and check $\bar{t}/s$ =

M2 - Repeated readings   1

- Not same t for more than half the readings
accept 2 values

~~M3 - Measurement of diameter~~

M4 - Quality of results / Trend   1

Curvilinear of plots / defined trend
good trend.

Presentation of results

R1 - Column headings   1

correct quantity and unit
correct notation

R2 - Consistency of values of t and h   1

h/m 3 dps
h/cm 1 dp   t consistency down 2 dp
h/mm 0 dp

R3 - Range and spread of values   1

$2(\neq 0.5) \leq h \leq 13.0(-0.5)$
$2\sqrt{} \quad\quad 12.5 \text{ to } 13$

Graphical Work

G1 - Axes   1

Labelled h Vs t accept reverse
occupy at least half the grid space in both the
y and x axis Reject Awkward scale / Gap / holes

G2 - Plotting   1

Count the No of plots & ring the total
DO NOT allow plots in the margin

G3 - Best fit line   1

a smooth curve — (R) a straight line

Allow for 6 plots

(R) kinked, hairy line, pt to pt / thick

G4 - Quality of tangents   1

Just touch curve.

G5 - Calculation of gradients   1

c.r.o to the nearest ½ a s.s.

grad $\triangle \geq \frac{1}{2}$ length of tangent/hypotenuse

Analysis

A1 - ~~correct~~ Formulation of simultaneous equations   1

~~correct for~~ Identify 2 equations

A2 - Determination of K   1

Correct method of determining k using equations in A_1

accept e-c-f using A_1 equation

A3 - Determination of C   1

correct method to determine

Accept e-c-f from A_1 & A_2

A4 - ~~Calculation of area~~   1

Unit of K (S^{-1})

Units of C (cm^{-1}, m^{-1}) } Check both to score

A5 - ~~How C compares with area~~   1

Identify T as max time for max height

from table or otherwise even if its not written

Special Cases

S_1 Something is very wrong / Not treated the plots

    $M_1 - 1$

    $G_3 - 1$ Shoot in foot S.i.F

S_2 Plotting a wrong graph — $G_3 - 1$

           $G_1 - 1$

2   Measurements and observations

M1   -   Readings   write the   (N)   6 sets or more   4/4
                                            5 sets   3
                                            4 sets   2/4   A
                                            N < 4 sets   0

         under-line a row & check for R and $\dfrac{100}{100+R}$ ⑤

M2   -   Quality of results

         Good trend judged by Line of Best fit LBF

Presentation of results

R1   -   Column headings (ignore column for $\dfrac{100}{100+R}$) and units (Ω^{-1}) include
         each column must be headed with a qnty & unit   ②

R2   -   Consistency of raw values of **Voltage** V   1

         V - 2 dp   as per infor
         (R) 1 dp
              0-dp

Graphical Work

G1   -   Axes — labelled — (A) even without units
         graph occupy at least half the grid in both dire

G2   -   Plotting - count N° of plots & ring the total
              - Do not allow margin plots
              - check suspect plot & ring → if incorrect the
                mark the correct position

G3   -   Best fit line   1
         Straight line | linear trend
         to avoid accept 4+ plots
         (R) hairy / kinked / thick & pt to pt line

G4   -   Gradient   1
         correct read offs
         hypot of grad Δ ⩾ ½ B.F.L
         Do not worry about |m|

Analysis

A1   -   Gradient equated to -M   1
         Accept any value of gradient

A2   -   Intercept equated to K   1
         Accept correct method to determine K
         - C.R O   if x - axis has Origin
         - Use of any plot on B F L

A3   -   Determination of R for V = 0   1
         Accept R = 100 ± 10%   (90 ⩽ R ⩽ 110 Ω)

A4   -   Units of K / Volts / A Ω   1

④

A5 — Units of M $(V\Omega)$

(R) any other   1

A6 — Any plausible solution e.g. digital more sensitive   2
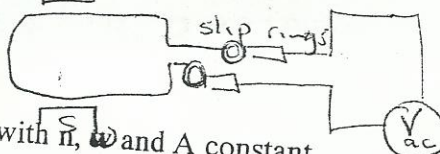
- easy to read off / accept reference No parallax
- Digital is more sensitive
- Accept reference to -ve values
- Accept reference Reference to Voltage follower
- Reference to hold button. Max ②

3   2 A1

workable Mechanical energy input is Compulsory ①

correct diagram of a.c. voltmeter or CRO connected to output of coil. (Reject a.c. voltmeter only).   2

[N]   slip rings   [S]   Ⓥac

B1 — Vary B and measure E, with n, ω and A constant   1

correct method of varying Reference to variation of one factor

B2 — Vary ω and measure E with n, B and A constant   1

B3 — Vary n and measure E with w, B and A constant   1

B4 — Vary A and measure E with w, B and n constant   1

C1 — Use magnets of different strengths (reject different sizes)   1

C2 — Use a calibrated motor to vary ω Accept A/W   1

if reference is made

C3	-	Use coils of different numbers of turns	1
C4	-	Use coils of different Area	1
C5	-	Means of measuring B	1

Reference to Hall Probe
Current Balance

C6 - Means of measuring ω
Speedometer $V = -N\omega AB \sin \omega t$ accept reference to eqn   1
CRO

2 D1 - 2 G. F. Ds Hall probe ⊥r to field   2.

- NO magnetic materials nearby
- Reference to C.R.O.   (Max 2)
- Same material for coil