232/3 – PHYSICS PAPER 3 - MARKING SCHEME

1.

Question one

(a)

Table 1

Mass m (g)	100	200	300
Time for 10 oscillations. (s)	4.75	6.74	8.02
Periodic time T (s)	0.475	0.674	0.0802

Award 2 mks 3 correct values for 10 oscillations to 2d.c

1mak for two correct values

Award 1mk for correct evaluation of T

c) $T = \pi \sqrt{\left(\frac{m}{k}\right)}$ (2 marks)

$\{K_1 = 4.375, k_2 = 4.346, k_3 = 4.605\}$ award 1mk

$K = 4.442$ kg/m or 44.42 N/m   award 1 mk

(d) $T_o = 23.0\,^\circ C$ (1 mark)

Table 2

Time, t (min)	2	4	6	8	10	12	14
Temperature (T) $^\circ C$	61.0	57.0	53.0	51.0	49.0	47.0	45.0
$(T-T_o)$	38.0	34.0	30.0	28.0	26.0	24.0	22.0
Log $(T-T_o)$	1.580	1.531	1.477	1.447	1.415	1.380	1.342

Award ½ mark for @ correct value of T up to a max. of six points

Award 1 mark for correct evaluation of $(T-T_o)$

Award 1 mark for correct evaluation of log $(T-T_o)$ (5 marks)

    (e) On the grid paper.
        Plotting P = 2 marks
        Scale S= 1mk
        Labeling axes A = 1 mk
        Line L = 1mark with –ve gradient

    (f) P = y-intercept
        = **1.61** 1 mk
        Evidence from the graph

    (g) N = the antilog of P
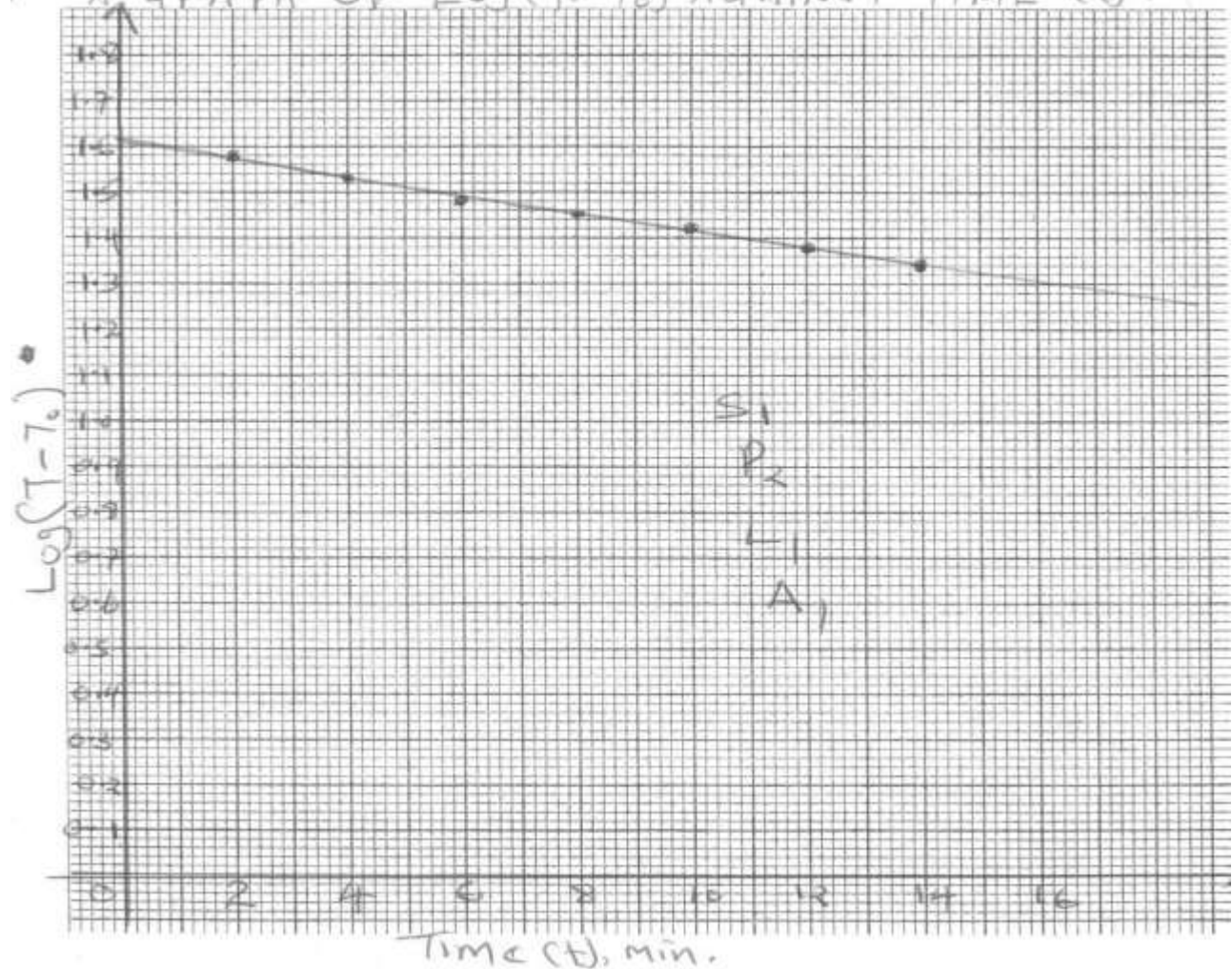   = antilog 0f 1.61
        = **40.74** °C 1 mk

    (h) N = 65- T_R
        40.74 = 65- T_R 1mark
          T_R =**24.26** °C   1 mark

1(e)

A GRAPH OF Log $(T - T_0)$ AGAINST TIME (t).

2. (e) Table 2

x(cm)	100	95	90	85	80	
u_1(cm)	25.0	27.0	29.0	30.0	32.0	$\pm$1.0cm
u_2(cm)	71.0	64.0	61.0	52.0	48.0	$\pm$1.0cm
d=u_2-u_1(cm)	46.0	37.0	32.0	22.0	16.0	
$y = \dfrac{d^2}{x}$ (cm) (2dp)	21.16	14.41	11.38	5.69	3.20	(8mks)

 u_1 and u_2 values each ½ mk
 d value a maximum of 1 mark   4 – 5 = 1mk
                            3 values = ½ mark
 y value a maximum of 2 marks   correct to 2d.p
             4 – 5 =   2 marks
             3   =   1 mark

(f)   Axes with units = 1 mark   (each axis = ½ mark)
          Simple and uniform scale = 1 mark   (vertical axis only)
          Plotting within 1 small square = 2 marks   (4 – 5 = 2 marks)
                                             (3 = 1 mark)

          Straight line drawn with a ruler = 1mark
          (Line should have positive gradient and passes at least 3 plotted points)
(g)   Xo = 80cm $\pm$ 1cm
(h)   k   = $\dfrac{Xo}{4}$ = $\dfrac{80}{4}$ =   20cm $\pm$ 0.5cm

(i)   Bo   =   3.0v $\pm$ 0.1v
(k)   v   =   0.40 volts $\pm$ 0.05v

3

(l) $\dfrac{1}{v}$ = $\dfrac{35}{x}$ + $\dfrac{1}{y}$

    = $\dfrac{1}{0.40}$ = $\dfrac{35}{30}$ + $\dfrac{1}{y}$

            y   =   0.75v

(m) k   = $\dfrac{8}{35Eo}$ = $\dfrac{8}{35x3}$ =   0.07619 or 0.0762 v-1

A GRAPH OF y(cm) AGAINST x(cm)

A graph of y (cm) against x (cm)

X (cm)