

## 2010 PRACTICAL PAPER 3

### ANSWERS TO PRACTICAL QUESTIONS

1. (a)  $h_0 = 85.0 - 99.0 \text{ mm}$  At least 1 d.p.(must) 1mk  
(d)

L(mm)	900	800	700	600	500	
h(mm)	76.0-90.0	78.0-92.0	80.0-94.0	83.0-97.0	85.0-99.0	1dp 1mk for max 4 values
d(mm)				Exact subtraction		>4 values 1mk < 4.0
log L	2.95	2.90	2.84 or 5	2.77 or 8	2.69 or 70	3sf. < 4 values 1mk < 4.0
log d	Candidates own values					> 4 values 1mk < 4.0

- (c) Graph, Axes with no units 1mk  
 Scale (simple and uniform) 1mk  
 Plotting within 1 small square 2mks @  $\frac{1}{2}$  for max. 4 values  
 Line: Drawn with ruler  
 : +ve gradient  
 : Through at least 3 correctly plotted points } 1mk
- (f) (i) At least one point correctly plotted on the graph.  
 Correct intervals 1mk correct evaluation (2dp) 1mk.  
 Accuracy 0.13 - 0.53 1mk.
- (ii) Correct substitution  $\frac{1}{2}$  mk. Correct evaluation 2dp  $\frac{1}{2}$  mk.
- (iii) Extrapolation of candidates line  $\frac{1}{2}$  mk  
 (Accept continuous or broken line)  
 Correct reading when  $\log d = 0$   $\frac{1}{2}$  mk.  
 (Ignore units if given)  
 Accuracy 2.5 - 2.7 1d.p 1mk

Or Forming of two equations ½ mk

Solving for C = G ½ mk

Accuracy 2.5 – 2.7 1mk

(iv) Correct substitution ½ mk } 2dp a must  
 Correct evaluation ½ mk }  
 (To the nearest whole number or to 1dp in  
 std. form)

2. (a)  $d_1 = 4.18 - 5.18\text{cm}$  ½ mk 2dp a must

$d_2 = 4.58 - 5.58\text{cm}$  ½ mk

$X = \frac{d_2 - d_1}{2}$  candidate's substitution ½ mk

Correct evaluation 2sf ½ mk

(b)  $h = 3.8 - 5.4\text{cm}$  1dp must 1mk

$A = \pi d_1 h$  substitution ½ mk

Evaluation 1dp (in the range 60 – 72) ½ mk

(e) Temperatures above 80° are not  
 acceptable.

T(s)	0	20	40	60	80	100	120	140	160	180	
T <sub>1</sub> °C	70-80	69-79	67-77	64-74	62-72	61-71	60-70	59-69	58-68	57-67	½ mk for max of 6 values
T <sub>2</sub> °C	32-42	36-46	40-50	44-54	47-57	49-59	50-60	51-61	52-62	53-63	½ mk for max. of 6 values

Accept repeated values of T<sub>1</sub> and T<sub>2</sub> as from 140sec to 180sec.

- (f) Graphs temperatures above 80°C are not acceptable.  
Axes with **units** or units only 1mk  
Scale: **simple and uniform** 1mk  
Plotting: at **least 4 points** 2mks  
Curve 1mk **smooth** drawn with free hand through at **least 4** correctly plotted points in the expected trend.  
Accept **repeated values** for plotting as from 140sec also as **part** of curve.

- (g) (i) **Whatever the trend;**  
Tangent drawn at  $t = 60\text{sec}$  1mk

Correct intervals 1mk correct evaluation  
2sf 1mk

- (ii) **Correct substitution** 1mk  
(Accept mixed units at the substitution stage only)  
Correct evaluation 3sf in the expected or SI unit 1mk.  
For wrong  $T_2$  check from the graph and accept it.