

**Reduction To Linear Form Exam Questions MS (From OCR MEI 4752)**

**Q1, (Jun 2006, Q12)**

<b>i</b>	$\log_{10} P = \log_{10} a + \log_{10} 10^{bt}$ $\log_{10} 10^{bt} = bt$ intercept indicated as $\log_{10} a$	B1 B1 B1	condone omission of base	3	
<b>ii</b>	3.9(0), 3.94, 4(.00), 4.05, 4.11 plots ft line of best fit ft	T1 P1 L1	to 3 sf or more; condone one error 1 mm ruled and reasonable	3	
<b>iii</b>	(gradient = ) 0.04 to 0.06 seen (intercept = ) 3.83 to 3.86 seen (a = ) 6760 to 7245 seen $P = 7000 \times 10^{0.05t}$ oe	M1 M1 A1 A1	$7000 \times 1.12^t$ SC $P = 10^{0.05t + 3.85}$ left A2	4	
<b>iv</b>	17 000 to 18 500	B2	14 000 to 22 000 B1	2	12

**Q2, (Jun 2008, Q13)**

<b>i</b>	$\log P = \log a + b \log t$ www comparison with $y = mx + c$ intercept = $\log_{10} a$	1 1 1	must be with correct equation condone omission of base	3	
<b>ii</b>	$\log t$ 0 0.78 1.15 1.18 1.20 $\log P$ 1.49 1.64 1.75 1.74 1.76 plots f.t. ruled line of best fit	1 1 1 1	accept to 2 or more dp	4	
<b>iii</b>	gradient rounding to 0.22 or 0.23 $a = 10^{1.49}$ s.o.i. $P = 31t^m$ allow the form $P = 10^{0.22 \log t + 1.49}$	2 1 1	M1 for y step / x-step accept 1.47 – 1.50 for intercept accept answers that round to 30 – 32, their positive m	4	
<b>iv</b>	answer rounds in range 60 to 63	1		1	

**Q3, (Jun 2009, Q10)**

<b>i</b>	0.6(0.), 0.8(45.), [1], 1.1(76.) 1.3(0.), 1.6(0.) points plotted correctly f.t. <b>ruled line of best fit</b>	T 1 P1 L1	Correct to 2 d.p. Allow 0.6, 1.3 and 1.6 tol. 1 mm	3
<b>ii</b>	$b =$ their intercept $a =$ their gradient $-11 \leq b \leq -8$ and $21 \leq a \leq 23.5$	M1 M1 A1		3
<b>iii</b>	34 to 35 m	1		1
<b>iv</b>	$29 = "22" \log t - "9"$ $t = 10^{1.727..}$ 55 [years] approx	M1 M1 A1	accept 53 to 59	3
<b>v</b>	For small $t$ the model predicts a negative height (or $h = 0$ at approx 2.75) Hence model is unsuitable	1 D1		2

**Q4, (Jun 2014, Q13)**

(i)	$\log_{10}h = \log_{10}a + bt$ www $m = b, c = \log_{10}a$	B1 B1 [2]	
(ii)	$-0.15, 0[.00], 0.23, 0.36, 0.56, 0.67, 0.78, 0.91, 1.08, 1.2[0]$ plots correct (tolerance half square) single ruled line of best fit for values of $x$ from 5 to 50 inclusive	B2 B1 B1 [4]	B1 if 1 error condone 1 error – see overlay line must not go outside overlay between $x = 5$ and $x = 50$
(iii)	$-0.3 \leq y\text{-intercept} \leq -0.22$ valid method to find gradient of line  $h = \text{their } a \times 10^{\text{their } bt}$ or $h = 10^{\text{their } \log a + \text{their } bt}$ $0.028 \leq b \leq 0.032$ and $0.5 \leq a \leq 0.603$ or $-0.3 \leq \log a \leq -0.22$	B1 M1  M1  A1  [4]	may be implied by $0.5 \leq a \leq 0.603$ may be embedded in equation; may be implied by eg $m$ between 0.025 and 0.035
(iv)	$a10^{60b} - a10^{50b}$ their values for $a$ and $b$  8.0 to 26.1 inclusive	M1  A1  [2]	or $10^{\log a + b \times 60} - 10^{\log a + b \times 50}$ or their values for $\log a$ and $b$
(v)	comment on the <b>continuing reduction</b> in thickness <b>and</b> its consequences	B1  [1]	eg in long term, it predicts that reduction in thickness will continue to increase, even when the glacier has completely melted



**Q8, (Jun 2015, Q8)**

$$m = 3 \text{ seen}$$

$$\log y = m \log x + 2 \text{ or } \log y = m \log x + \log 100$$

$$\log y = \log x^3 + 2 \text{ or } \log y = \log x^3 + \log 100$$

or better

$$y = 100x^3 \text{ or } y = 10^{3 \log x + 2} \text{ or } y = 10^{\log x^3 + 2}$$

www isw

**B1**

**M1**

**M1**

**A1**

**[4]**

$$\text{or } \log y - 8 = m(\log x - 2)$$

$$\text{or } 10^{\log y} = 10^{3 \log x + 2} \text{ or } 10^{3 \log x + \log 100} \text{ or better}$$

$$y = 10^{3 \log x + \log 100} \text{ or } y = 10^{\log x^3 + \log 100}$$