

Question Number	Answer	Mark
3(a)	<p>Any PAIR from</p> <p>$\ln \theta = \ln \theta_0 - \lambda n$ (1)</p> <p>Is in the form $y = c + mx$ where $-\lambda$ is the <u>gradient</u> (1)</p> <p>Or</p> <p>$\ln \theta = -\lambda n + \ln \theta_0$ (1)</p> <p>Is in the form $y = mx + c$ where $-\lambda$ is the <u>gradient</u> (1)</p> <p>MP2 dependent on MP1</p>	2
3(b)(i)	<p>Values of $\ln \theta$ correct to 2 d.p. Accept 3 d.p. (1)</p> <p>Axes labelled: y as $\ln (\theta / ^\circ)$ and x as n Accept degrees for $^\circ$ (1)</p> <p>Appropriate scales chosen (1)</p> <p>Values plotted accurately (1)</p> <p>Best fit line drawn (1)</p>	5
3(b)(ii)	<p>Calculation of gradient using large triangle shown (1)</p> <p>Value of λ in range $(-)0.038$ to $(-)0.042$ (1)</p> <p>Value of λ given to 2 or 3 s.f, positive, no unit (1)</p> <p><u>Example of calculation</u></p> <p>$-\lambda = (4.82 - 3.20) / (10 - -50) = -1.62 / 40 = -0.0405$</p> <p>$-\lambda = -0.0405$</p> <p>$\lambda = 0.041$</p>	3
3(b)(iii)	<p>Correct value of $\ln \theta_0$ obtained using value of λ and data point from best fit line</p> <p>Or</p> <p>Correct value of $\ln \theta_0$ obtained using y-intercept (1)</p> <p>Conversion of $\ln \theta_0$ to θ_0 (1)</p> <p>Valid conclusion based on calculated value of θ_0 (1)</p> <p><u>Example of calculation</u></p> <p>$\ln \theta = \ln \theta_0 - \lambda n$</p> <p>$\ln \theta_0 = \ln \theta + \lambda n = 3.2 + (0.041 \times 50) = 5.25$</p> <p>$\theta_0 = e^{5.25} = 191^\circ$</p> <p>As this is greater than 180° the claim is correct</p>	3
Total for question 3		13