Day 68	A Level Maths: A Tier 10-a-day
1 Evaluate $\sum_{r=7}^{29}(5r-3)$.	
2 n = 8 pairs of (x, y): $\Sigma x = 107$, $\Sigma y = 430$, $\Sigma x^2 = 1661$, $\Sigma xy = 6459$. (a) Find the equation of the regression line of y on x (3 s.f.). (b) Estimate y when x = 17.	
3 $y = (\ln x)^4$ for $x > 0$. Find $\frac{dy}{dx}$ and its exact value at x = e.	
4 Find the coefficient of x^{-1} in the expansion of $(x - \frac{2}{x^2})^5$.	
5 A 6 kg block is released from rest on a rough plane inclined at α, $\tan\alpha = \frac{4}{3}$, μ = 0.5, and slides 10 m down a line of greatest slope. Use work and energy to find (a) the work done against friction, (b) its speed after 10 m. Take g = 10.	

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6 A curve has parametric equations $x = 2t^2 + 5$, $y = 2t(t^2 - 4)$. Find the coordinates of the points where the curve meets the x-axis.	
7 A uniform rod AB (4 kg, 2.5 m) is smoothly hinged at A to a vertical wall, with a 5 kg particle at B. A light string from B to the wall above A holds the rod horizontal, at angle θ to it, $\tan\theta = \frac{3}{4}$. Find (a) the tension, (b) the magnitude of the hinge force. Take $g = 9.8$. Give answers to 3 s.f. if not exact.	
8 (a) Express $\frac{x+7}{(x+4)^2}$ in the form $\frac{A}{x+4} + \frac{B}{(x+4)^2}$. (b) Hence find the exact value of $\int_0^4 \frac{x+7}{(x+4)^2}$ dx.	
9 Complaints occur as a Poisson process at a mean rate of 6 per day. After a change, the number recorded in one day is 12. Test at the 10% level whether the mean rate has increased.	
10 Solve $\log_2(x+6) + \log_2(x-2) = 7$.	