Day 75	A Level Maths: B Tier 10-a-day
1 Given that $y = \ln(3x + 7)$, find $\frac{dy}{dx}$, and the gradient of the curve when $x = 3$.	
2 A person of mass 80 kg stands on the floor of a lift. The lift accelerates upwards at 2 m s^{-2}. Take $g = 9.8$ m s^{-2}. Find the normal reaction between the person and the floor.	
3 Solve $5^{3x-3} = 39$, giving your answer to 3 s.f.	
4 For 13 pairs of values, $\bar{x} = 8$, $\bar{y} = 30$, $S_{xx} = 50$ and $S_{xy} = 125$. (a) Find the regression line of y on x in the form $y = a + bx$. (b) Estimate y when $x = 11$.	
5 The curve C has equation $y = x^2 + 3x - 1$. C is stretched by scale factor 2 parallel to the y-axis. Find its new equation.	

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6 A car of mass 1500 kg tows a trailer of mass 500 kg along a straight horizontal road by a light horizontal tow bar. The resistances are 500 N on the car and 100 N on the trailer. The engine's driving force is 2800 N. Find the acceleration and the tension in the tow bar.	
7 Express $\frac{12 + 5\sqrt{6}}{\sqrt{6}}$ in the form $p + q\sqrt{6}$, where p and q are integers.	
8 Solve $e^{2x} + e^{x} - 6 = 0$, giving any answers as exact values.	
9 Given that each trap catches a rabbit independently with probability 0.1, find the least number of traps needed for the probability of at least one success to exceed 0.999.	
10 The line $y = -x - 11$ meets the circle $(x + 3)^2 + (y + 1)^2 = 169$ at the points A and B. Find the coordinates of A and B, and the exact length of the chord AB.	