Day 359	A Level Maths: A Tier 10-a-day
1 Solve $2^{3x-2} = 7^{3x+3}$. Give your answer to 3 significant figures.	
2 Summary statistics for the daily total rainfall (mm) in the same month are: Hurn: mean 21.5, standard deviation 5.3; Beijing: mean 8, standard deviation 5. Make two comparisons.	
3 A circle has equation $x^2 + y^2 + 12x - 10y + 51 = 0$. (a) Find the centre and radius of the circle. (b) Determine whether P$(-6, -1)$ lies inside or outside the circle.	
4 A non-uniform rod AB (length 5 m, mass 10 kg) has its centre of mass at G, AG = 1.75 m. It hangs horizontally from vertical strings at A and B. A particle of mass m kg is fixed at P, AP = 3 m, making the tensions equal. Find (a) m, (b) the tension. Take g = 9.8.	
5 Solve $\log_2(x + 5) + \log_2(x - 7) = 6$.	

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6 A circle passes through A(5, −7) and B(−3, −7). Its centre lies on the line $y = 3x - 7$. Find the equation of the circle.	
7 A particle moves in a straight line with velocity $v = (-2t^2 + 12t)$ m s^{-1} at time t s, $t \geq 0$, starting at O. Find (a) its greatest speed, (b) its distance from O when t = 6, (c) the time at which it returns to O.	
8 A drink at 75°C is left in a room at 15°C. Its temperature θ °C satisfies $\frac{d\theta}{dt} = -k(\theta - 15)$. After 5 minutes the temperature is 60°C. Find k, then the time for it to reach 30°C, to 3 s.f.	
9 $f(x) = 2x^2 - 16x + 34$, $x \geq 4$. Find $f^{-1}(x)$ and state its domain.	
10 X has E(X) = 4 and Var(X) = 3. (a) Find $E(X^2)$. (b) $Y = 5X + 3$. Find E(Y) and Var(Y). (c) X_1 and X_2 are independent copies of X. Find $\text{Var}(X_1 - X_2)$.	