Day 232	A Level Maths: A Tier 10-a-day
1 $y = (3x + 6)^5$. Find $\frac{dy}{dx}$ and the gradient of the curve at $x = 3$.	
2 Forces $F_1 = (7\mathbf{i} - 6\mathbf{j})$ N, $F_2 = (-12\mathbf{i} + 9\mathbf{j})$ N and $F_3 = (a\mathbf{i} + b\mathbf{j})$ N keep a 3 kg particle in equilibrium. Find (a) a and b. F_2 is then removed; (b) find the magnitude of the acceleration.	
3 Find the exact value of $\int_0^3 \frac{3}{4x + 3}\,dx$.	
4 X, the mass (g), is normally distributed with mean 59 and standard deviation 5. Find (a) $P(X > 54.5)$ (b) $P(54.5 < X < 57)$, each to 3 s.f.	
5 Solve $\log_3(x + 1) + \log_3(x - 5) = 3$.	

Day 232	A Level Maths: A Tier 10-a-day
6 Expand $(1 - 2x)^{-3}$ in ascending powers of x up to and including the term in x^3. State the range of values of x for which the expansion is valid.	
7 A particle P has position vector $\mathbf{r} = (t^3 + 6t)\mathbf{i} + (2t^2 - 4t)\mathbf{j}$ metres at time t s. Find (a) the speed of P when t = 4, (b) the value of t when P is moving parallel to $\mathbf{i}$. Give answers to 3 s.f. if not exact.	
8 Expand $(4 + x)^{\frac{1}{2}}$ in ascending powers of x, up to and including x^2. State the range of x for which the expansion is valid.	
9 $u_1 = 18$ and $u_{n+1} = -\frac{1}{2}u_n + 12$. (a) Find the limit L of the sequence as $n \to \infty$. (b) Find the least n for which $\lvert u_n - L \rvert < 0.01$.	
10 The marks of two groups: class A has n = 28, mean 47, sd 7; class B has n = 35, mean 20, sd 4. Find the mean and standard deviation of all 63 values (3 s.f. for the sd).	