Day 48	A Level Maths: B Tier 10-a-day
1 A particle has velocity $(-3\mathbf{i})$ m s^{-1} at time t = 0 and moves with constant acceleration $(\mathbf{j})$ m s^{-2}. Find its velocity and speed when t = 4.	
2 Use integration by parts to find the exact value of $\int_0^1 xe^{2x}\,dx$.	
3 Express $\frac{12 + 2\sqrt{3}}{\sqrt{3}}$ in the form $p + q\sqrt{3}$, where p and q are integers.	
4 A uniform rod AB of length 4 m and mass 10 kg hangs horizontally from two vertical strings attached 1.5 m from A and 1.5 m from B. A particle of mass 5 kg is attached 2 m from A. Take g = 9.8 m s^{-2}. Find the tension in each string.	
5 Items numbered 1 to 192; systematic sample of size 16. (a) Find the sampling interval. (b) The first item is number 12. Find the 3-th item.	

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6 A new car costs £20000. Its value falls by 15% each year. (a) Find its value after 3 years (nearest £). (b) In which year does it first fall below £3000?	
7 £1000 is invested at 10% compound interest per year. Find the least whole number of years for the investment to exceed £2000.	
8 A coin is thought to land heads with probability 0.2. It is tossed 40 times and lands heads 4 times. Test, at the 5% significance level, whether the probability of heads is different from 0.2.	
9 (a) Expand $(1 + 3x)^{\frac{1}{3}}$ in ascending powers of x up to and including the term in x^3. (b) State the range of values of x for which the expansion is valid.	
10 Find y in terms of x, given that $\frac{dy}{dx} = \frac{6x}{y}$ and y = 1 when x = 0.	