Day 17	A Level Maths: B Tier 10-a-day
1 Find the binomial expansion of $(3 + 4x)^7$ in ascending powers of x, up to and including the term in x^3.	
2 A population is modelled by $N = N_0e^{kt}$, where t is in hours. Initially N = 500 and after 5 hours N = 750. Find (a) k to 3 s.f., (b) when N reaches 2500, to 3 s.f.	
3 A person of mass 80 kg stands on the floor of a lift. The lift accelerates downwards at 0.25 m s^{-2}. Take g = 9.8 m s^{-2}. Find the normal reaction between the person and the floor.	
4 Simplify $\frac{35}{\sqrt{7}} + \sqrt{112}$, giving your answer in the form $k\sqrt{7}$.	
5 £1000 is invested at 8% compound interest per year. Find the least whole number of years for the investment to exceed £3000.	

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6 Find the coefficient of x^2 in the expansion of $(1 + 2x)(1 - 2x)^6$.	
7 The continuous random variable X has pdf f(x) $= \frac{3x^2}{216}$ for $0 \leq x \leq 6$, and 0 otherwise. (a) Find P(X > 5). (b) Find the median of X, to 3 significant figures.	
8 A particle is in equilibrium under three forces: P N at angle θ above the positive x-axis, a force of 9 N in the negative x-direction and a force of Q N in the negative y-direction. $\cos\theta = \frac{3}{5}$. Find P and Q.	
9 Find the exact value of $\int_0^{\frac{\pi}{4}} (3\cos^2 2x - 1)\,dx$.	
10 Packet masses are normal, s.d. 6 g. Claimed mean 60 g; 9 packets have mean 62 g. Test at the 5% level whether the true mean differs from 60.	