Day 81	A Level Maths: B Tier 10-a-day
1 A lorry of mass 1000 kg moves along a straight horizontal road. The engine produces a driving force of 4000 N and the resistance to motion is 600 N. Find the acceleration of the lorry.	
2 The points A and B have coordinates $(-2, 6)$ and $(-5, -1)$. (a) Find the midpoint of AB. (b) Find the line AB as $ax + by + c = 0$, with integer a, b, c.	
3 A journey takes X minutes, normal with s.d. 6. Given $P(X > 488.2) = 0.025$, find the mean (3 s.f.).	
4 A charity raises £150 in week 1. In each following week it raises £15 more than in the previous week. (a) Find the amount raised in week 13. (b) Find the total for the first 24 weeks.	
5 For small θ (in radians), find an approximation of the form $1 + p\theta + q\theta^2$ for $\sin 5\theta + \cos 3\theta + 2 \tan \theta$.	

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6 A particle moves in a straight line. At time t s its velocity is $v = 50t - 5t^2$ m s^{-1}, for $t \geq 0$. Find the maximum speed of the particle and the time at which it occurs.	
7 Find the exact value of $\int_0^{\frac{\pi}{6}} (3\cos^2 3x - 1)\,dx$.	
8 X ~ B(11, 0.3) and Y ~ B(8, 0.1) are independent. Find P(X = 4 and Y ≤ 1), to 3 significant figures.	
9 A circle passes through A(7, −3) and B(−4, −6), and its centre lies on the y-axis. Find the centre and the equation of the circle.	
10 Solve $\sin x + 6\cos^2 x - 4 = 0$ for $0 \leq x \leq 360°$, giving answers to 1 d.p. where necessary.	