Day 87	A Level Maths: A Tier 10-a-day
1 A cyclist passes P with speed 6 m s^{-1} and accelerates uniformly. She travels 57.6 m in the next 8 s, reaching Q. Find (a) her acceleration, (b) her speed at Q, (c) her speed at the midpoint of PQ. Give answers to 3 s.f. if not exact.	
2 A drink at 100°C is left in a room at 20°C. Its temperature θ °C satisfies $\frac{d\theta}{dt} = -k(\theta - 20)$. After 15 minutes the temperature is 60°C. Find k, then the time for it to reach 40°C, to 3 s.f.	
3 Faults are reported at random at an average of 8 per hour. Find the probability that in a 120-minute period there are (a) zero events (b) at least 2. (c) Find the probability that at least one occurs in each of two separate 120-minute periods.	
4 Solve $\|3x + 2\| = -4x - 7$.	
5 X ~ B(80, 0.3). Use a normal approximation to estimate $P(X \leq 24)$ to 3 significant figures.	

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6 A car costs £12000 new. Its value falls by 10% each year, so after t years its value is £V. (a) Write down V in terms of t. (b) Find, to 3 s.f., the time when the value is £4000.	
7 A uniform plank AB (mass 12 kg, length 4 m) rests horizontally on supports at C and D, where AC = 0.5 m and DB = 1.5 m. A 8 kg particle is placed at E, AE = x m, and the plank is about to tilt about D. Find x.	
8 $u_1 = 0$ and $u_{n+1} = \frac{1}{2} u_n + 5$. (a) Find the limit L of the sequence as $n \to \infty$. (b) Find the least n for which $\lvert u_n - L \rvert < 0.01$.	
9 The line $y = k - 2x$ is a tangent to the curve $y = \frac{8}{x}$. Find the possible values of k.	
10 $y = 5^x$. The gradient of the curve at P is 25 ln 5. Find the x-coordinate of P.	