Day 275	A Level Maths: A Tier 10-a-day
1 Find the coordinates of the stationary points of $y = \frac{x^2 + 7}{x + 3}$.	
2 A cyclist passes P with speed 6 m s^{-1} and accelerates uniformly. She travels 70 m in the next 10 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.	
3 Solve $3^{x-1} = 7^{x-3}$. Give your answer to 3 significant figures.	
4 X, the mass (g), is normally distributed with mean 62 and standard deviation 5. Find (a) P(X > 59.5) (b) P(59.5 < X < 68.5), each to 3 s.f.	
5 A curve has parametric equations $x = 3t^2 - 5$, $y = -t(t^2 - 4)$. Find the coordinates of the points where the curve meets the x-axis.	

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6 (a) Express $\frac{-x-1}{(x+3)^2}$ in the form $\frac{A}{x+3}+\frac{B}{(x+3)^2}$. (b) Hence find the exact value of $\int_0^2 \frac{-x-1}{(x+3)^2}\,dx$.	
7 Accidents occur as a Poisson process at a mean rate of 5 per week. After a change, the number recorded in one week is 9. Test at the 5% level whether the mean rate has increased.	
8 $u_1 = 12$ and $u_{n+1} = -\frac{1}{2}u_n + 9$. (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 At t = 0, P and Q have position vectors $(15\mathbf{i} + 12\mathbf{j})$ m and $(4\mathbf{i} + 5\mathbf{j})$ m and velocities $(-5\mathbf{i} - 4\mathbf{j})$ m s^{-1} and $(-2\mathbf{i} - 3\mathbf{j})$ m s^{-1}. Find (a) the time when they are closest, (b) the least distance between them. Give answers to 3 s.f. if not exact.	
10 A salary is £25000 in year 1 and increases by 2% each year. In which year does the salary first exceed £62500?	