Day 225	A Level Maths: S Tier 10-a-day
1 The curve C has parametric equations $x = 3t$, $y = 3t^2$. The line $y = -3x + 12$ meets C at A and B. Find the exact length AB.	
2 The times taken by a bus, in minutes are normally distributed. 20% are less than 30 and 20% are greater than 54. Find the mean and standard deviation, each correct to 3 significant figures.	
3 Solve simultaneously: $x + y = 1$ $2x^2 - 2xy - y^2 = 2$	
4 (a) Express $4\cos\theta + 3\sin\theta$ in the form $R\cos(\theta - \alpha)$, where $R > 0$ and $0 < \alpha < 90°$. Give α to 1 d.p. (b) Hence solve $4\cos\theta + 3\sin\theta = -1$ for $0 \leq \theta < 360°$, giving answers to 1 d.p.	
5 A particle starts from rest at the top of a rough slope of length 15 m ($\sin\alpha = \frac{4}{5}$, $\mu = 0.6$), then slides along rough horizontal ground with the same μ. Use energy to find (a) its speed at the foot of the slope (3 s.f.), (b) the distance it slides on the ground. Take $g = 9.8$ m s^{-2}.	

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6 The curve C has equation $x^2y + xy^2 = -12$. Find the equation of the normal to C at the point $(4, -3)$, in the form $ax + by + c = 0$ with integers a, b, c.	
7 Solve $\sqrt{6x + 7} = 2x - 1$.	
8 A drink cools according to $\theta = 10 + Ae^{-kt}$, where θ °C is the temperature after t minutes. Initially $\theta = 100$, and after 10 minutes $\theta = 73$. Find A and k, then find when $\theta = 48$ (3 s.f.).	
9 A ball is projected from a point O on horizontal ground at 45° to the horizontal. The ball just passes over the top of a vertical wall of height 10.8 m, at a horizontal distance of 99 m from O. Find (a) the speed of projection, (b) the greatest height of the ball above the ground, to 3 s.f. Take $g = 9.8$ m s^{-2}.	
10 The Venn diagram shows probabilities; A and B are independent. Find x and y. 	