Day 114	A Level Maths: A Tier 10-a-day
1 The random variable X has $P(X = x) = k(7 - x)$ for $x = 2, 3, 4, 5, 6$. (a) Show that $k = \frac{1}{15}$. (b) Find E(X) and Var(X). (c) Find $P(X \geq 3)$.	
2 A crate of mass 10 kg is pulled at constant speed along rough horizontal ground, $\mu = 0.2$, by a force of P N at angle θ above the horizontal, $\tan\theta = \frac{4}{3}$. Find P and the normal reaction. Take g = 9.8. Give answers to 3 s.f. if not exact.	
3 Solve $7^{3x-2} = 5^{3x-2}$. Give your answer to 3 significant figures.	
4 P(A) = 0.35, P(B) = 0.4 and $P(A \cap B) = 0.1$. Find (a) $P(A \cup B)$ (b) $P(A \mid B')$ (c) $P(B' \mid A')$	
5 The line $y = -2x - 3$ meets the curve $y = x^2 + 6x + 12$ at A and B. (a) Find the coordinates of A and B. (b) Find the exact length AB.	

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6 Find the exact value of $\int_1^2 (\frac{3}{x} + \frac{7}{x^2})\, dx$.	
7 A 2 kg particle rests on a smooth plane inclined at α, $\tan\alpha = \frac{5}{12}$, held by a string in the vertical plane through a line of greatest slope, at angle θ above the slope, $\tan\theta = \frac{5}{12}$. Find the tension and the normal reaction. Take g = 9.8. Give answers to 3 s.f. if not exact.	
8 Solve $3 \times 3^{2x} - 28 \times 3^x + 9 = 0$.	
9 Find the coefficient of x^4 in the expansion of $(3 + 3x)(2 - x)^6$.	
10 Use integration by parts to find the exact value of $\int_0^{\frac{\pi}{6}} x \cos 3x\, dx$.	