Day 126	A Level Maths: S Tier 10-a-day
1 X ~ B(80, 0.2). (a) State why a normal approximation is suitable for X. (b) Use a normal approximation to estimate P(9 ≤ X ≤ 19), to 3 significant figures.	
2 Solve $x - 1\sqrt{x} - 20 = 0$.	
3 Solve $\cot(\theta + 30°) = 1$ for $-90° \leq \theta \leq 270°$.	
4 Scores are N(35, 36^2). The highest 10% and the lowest 10% of scores are discarded. Find the range of scores that remain, correct to 3 significant figures.	
5 A is acute and B is acute. $\sin A = \frac{7}{25}$ and $\cos B = \frac{15}{17}$. Find the exact values of sin(A + B) and tan(A − B).	

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6 Express $\frac{-18x^2 + 21x - 15}{(x-2)(2x-1)^2}$ in the form $\frac{A}{(x-2)} + \frac{B}{(2x-1)} + \frac{C}{(2x-1)^2}$.	
7 Particles of mass 12 kg and 6 kg hang on a light string over a smooth fixed pulley. The 12 kg particle is 0.75 m above the ground; the 6 kg one is on the ground. Released from rest, find (a) the tension, (b) the greatest height reached by the 6 kg particle. Take g = 9.8 m s^{-2}.	
8 A car of mass 1200 kg, with engine power 6.704 kW, climbs a straight road with sin $\alpha = \frac{1}{25}$ against a constant resistance of 200 N. Find (a) the greatest steady speed up the hill, (b) the acceleration at $\frac{10}{3}$ m s^{-1}. Take g = 9.8 m s^{-2}.	
9 Solve simultaneously, giving integer x and y: $8^x \times 2^y = 16$ $27^x \div 3^y = 9$	
10 $f(\theta) = \frac{1}{12 + 4\sin\theta + 3\cos\theta}$ (a) Write $4\sin\theta + 3\cos\theta$ as $R\sin(\theta + \alpha)$, $R > 0$, $0 < \alpha < 90°$. (b) Find the greatest and least values of $f(\theta)$, and the smallest positive θ at which the greatest value occurs, to 1 d.p.	