Day 281	A Level Maths: S Tier 10-a-day
1 X ~ B(60, 0.25). (a) State why a normal approximation is suitable for X. (b) Use a normal approximation to estimate P(9 ≤ X ≤ 18), to 3 significant figures.	
2 A stone is thrown vertically upwards with speed 14 m s^{-1} from the top of a cliff. The top of the cliff is 92.4 m above the sea. Find (a) the time taken for the stone to reach the sea, (b) the total distance travelled by the stone, to 3 s.f. Take g = 9.8 m s^{-2}.	
3 Describe a sequence of two transformations that maps the curve $y = x^2$ onto the curve $y = -x^2 - 8x - 10$.	
4 Solve $3\sec^2\theta - 5\tan\theta - 5 = 0$ for $0 \leq \theta < 360°$, giving answers to 1 d.p.	
5 Solve $x^4 - 13x^2 + 36 < 0$.	

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6 Use integration by parts to find the exact value of

$\int_0^{\pi/2} (x + 2) \sin 2x \, dx$

7 The table shows the times, t minutes, taken by some runners.
Using linear interpolation, the median is estimated as 25 minutes. Find the value of k.

t (min)	0-10	10-20	20-30	30-40	40-60
Frequency	k	7	13	9	11

8 Express $\frac{3x^3 - 11x^2 - 15x + 26}{(x - 4)(x - 1)}$ in the form $ax + b + \frac{C}{(x - 4)} + \frac{D}{(x - 1)}$.

9 A population N satisfies $\frac{dN}{dt} = -0.02N^2$, with N = 20 when t = 0.
Find N when t = 10, and the time taken for N to halve.

10 Car A passes a point O travelling at a constant speed of 12 m s^{-1}. 9 s later, car B leaves O from rest with constant acceleration 2 m s^{-2}, travelling in the same direction.
B overtakes A at the point X. Find (a) the time B takes to reach X, (b) the distance OX, (c) the speed of B at X.