Day 187	A Level Maths: A Tier 10-a-day
1 The 5th term of an arithmetic sequence is 20 and the 11th term is 62. Find the first term and common difference, and the sum of the first 25 terms.	
2 X is normally distributed with mean 45 and standard deviation σ. Given that $P(X > 48) = 0.0668$, find σ to 3 significant figures.	
3 Solve $3^{4x} = 7^{2x+2}$. Give your answer to 3 significant figures.	
4 Particles A (5 kg) and B (5 kg) move towards each other on a smooth horizontal line at 6 m s^{-1} and 5 m s^{-1}. They collide directly, and A then moves in the opposite direction at 2 m s^{-1}. Find (a) the speed of B after the collision, (b) the magnitude of the impulse of A on B.	
5 A and B have position vectors $\begin{pmatrix}6\\3\end{pmatrix}$ and $\begin{pmatrix}-3\\6\end{pmatrix}$. The point P lies on AB with AP : PB = 1 : 2. Find the position vector of P and the exact distance OP.	

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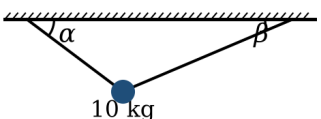
6 The second term of a geometric series is 5 and its sum to infinity is 36.
Find the two possible values of the first term.

7 Eggs are defective with probability 0.25, independently. A tray of 10 eggs is rejected if it has at least 2 defective.
From 8 such trays, find the probability that exactly 4 are rejected (3 s.f.).

8 θ is small and measured in radians. Use small angle approximations to show that
$5\sin\theta + 4\cos\theta = 6.5$
can be written as $a\theta^2 + b\theta + c = 0$ with integers a, b, c. Hence find the approximate solution with $0 < \theta < 0.8$, to 3 s.f.

9 (a) Expand $(1 - 3x)^{\frac{1}{2}}$ in ascending powers of x up to x^2.
(b) Use x = 0.01 to estimate $\sqrt{97}$ to 4 decimal places.

10 A 10 kg particle hangs in equilibrium from two light strings, as shown. Find the tension in each string (T_1 in the string at angle α). Take g = 9.8.



$\tan\alpha = 3/4$
$\tan\beta = 5/12$