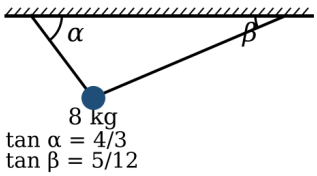
Day 341 **A Level Maths: A Tier 10-a-day**

1 A 8 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. Give answers to 3 s.f. if not exact.



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

2 X, the score (marks), is $N(70, 12^2)$.
Find the symmetric limits about the mean between which the central 99% of values lie (3 s.f.).

3 θ is acute and $\tan \theta = \frac{1}{3}$.

Show that $\cos 2\theta = \frac{4}{5}$ and find the exact value of $\sin 2\theta$.

4 Solve $x - 6\sqrt{x} + 8 = 0$.

5 A, B and C have position vectors $\begin{pmatrix} 2 \\ 2 \\ -2 \end{pmatrix}$, $\begin{pmatrix} -1 \\ -1 \\ -2 \end{pmatrix}$ and $\begin{pmatrix} k \\ -4 \\ -2 \end{pmatrix}$ relative to O, where k is a constant. Given that A, B and C are collinear, find k and the ratio AB : BC.

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6 X ~ B(150, 0.5). Use a normal approximation to estimate P(X ≥ 81) to 3 significant figures.	
7 Solve $3\text{cosec}^2 x + 9\cot x - 15 = 0$ for $-180° < x < 180°$, $x \neq 0$. Give answers to 1 d.p.	
8 Find the set of values of k for which the line $y = 4x + k$ does not meet the curve $y = 2x^2 + 3x + 3$.	
9 A uniform ladder AB (5 m, 10 kg) rests with A on rough ground, $\mu = 0.2$, and B against a smooth wall, B being 3 m above the ground. A man of mass 70 kg climbs the ladder. How far along the ladder from A can he climb before it slips?	
10 The line $4x + 3y = 3$ meets the circle $(x - 4)^2 + (y - 2)^2 = 49$ at the points A and B. Find the exact length of AB.	