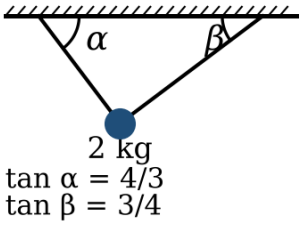
Day 54	A Level Maths: A Tier 10-a-day
1 Solve $\sin 2x = -\sqrt{3}\cos x$ for $0° \leq x \leq 360°$.	
2 Evaluate $\sum_{r=5}^{24}(4r - 3)$.	
3 Use the trapezium rule with 4 strips to estimate $\int_1^5 3(\sqrt{x})\,dx$, giving your answer to 3 s.f. State, with a reason, whether your estimate is an overestimate or an underestimate.	
4 A uniform plank AB (mass 10 kg, length 4 m) rests horizontally on supports at C and D, where AC = 1 m and DB = 1.5 m. A 4 kg particle is placed at E, AE = x m, and the plank is about to tilt about D. Find x.	
5 (a) Express $\frac{x+2}{(x+1)^2}$ in the form $\frac{A}{x+1} + \frac{B}{(x+1)^2}$. (b) Hence find the exact value of $\int_0^3 \frac{x+2}{(x+1)^2}\,dx$.	

Day 54 **A Level Maths: A Tier 10-a-day**

6 The line $4x + 3y = k$ is a tangent to the circle $(x - 2)^2 + (y - 1)^2 = 25$.
Find the two possible values of k.

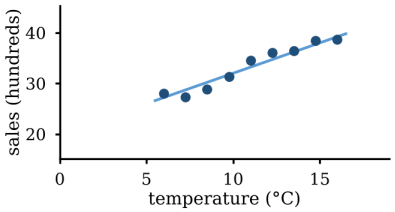
7 The times in seconds of two groups: group X has n = 8, mean 40, sd 9;
group Y has n = 16, mean 22, sd 4.
Find the mean and standard deviation of all 24 values (3 s.f. for the sd).

8 A 2 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.



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

9 The diagram shows data and the regression line $y = 20 + 1.2x$.
(a) Interpret the gradient.
(b) Estimate y when x = 15 and comment.



10 The curve $y = f(x)$, where $f(x) = \frac{3}{x - 3} - 3$, is translated by $\begin{pmatrix} 3 \\ 1 \end{pmatrix}$.
Write down the equations of the asymptotes of the new curve, and find where it crosses the x-axis.