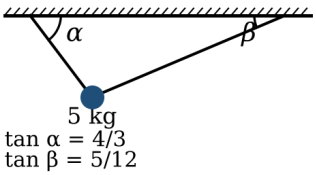
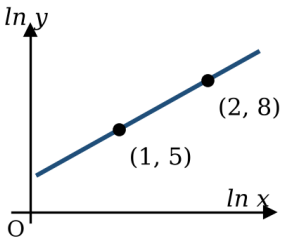
Day 116	A Level Maths: A Tier 10-a-day
1 y = x cot(3x). Find the exact gradient at $x = \frac{\pi}{9}$.	
2 A company employs 432 people: 108 Sales, 168 Admin and 156 Production. A stratified sample of size 36 is taken. Find the number of people sampled from each group.	
3 A 5 kg particle hangs in equilibrium 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 α = 4/3 tan β = 5/12	
4 (a) Solve $3x + 5 \leq 7$. (b) Solve $x^2 + 7x + 10 > 0$. (c) Hence find the values of x satisfying both inequalities.	
5 A 4 kg box is pulled along rough horizontal ground, $\mu = 0.25$, by a rope at angle θ above the horizontal, where $\tan\theta = \frac{4}{3}$. The tension is 20 N. Find (a) the normal reaction, (b) the acceleration of the box. Take g = 9.8.	

Day 116 **A Level Maths: A Tier 10-a-day**

6 The diagram shows the graph of ln y against ln x for $y = A x^n$.
Find the value of n and the exact value of A.



7 The curve y = f(x), where $f(x) = \frac{2}{x - 4} + 4$, is translated by $\begin{pmatrix} 3 \\ -3 \end{pmatrix}$.
Write down the equations of the asymptotes of the new curve, and find where it crosses the x-axis.

8 The marks of two groups: class A has n = 21, mean 57, sd 2;
class B has n = 21, mean 63, sd 2.
Find the mean and standard deviation of all 42 values (3 s.f. for the sd).

9 A closed cylinder has radius r cm and volume 16π cm^3.
Show that its surface area is $A = 2\pi r^2 + \frac{32\pi}{r}$, and find the minimum value of A in terms of π.

10 $f(x) = \frac{-3x - 5}{(1 - 3x)(1 + 3x)}$.
(a) Express f(x) in partial fractions.
(b) Hence expand f(x) up to x^2.
(c) State the range of x for which the expansion is valid.