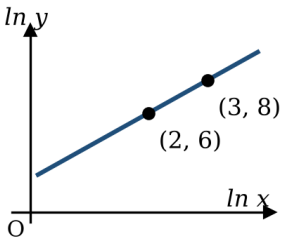
Day 46	A Level Maths: A Tier 10-a-day
1 A ball is thrown vertically upwards at 29.4 m s^{-1} from a point h m above horizontal ground, and hits the ground 10 s later. Find (a) h, (b) the greatest height above the ground. Take g = 9.8.	
2 The 3rd term of an arithmetic sequence is 4 and the 8th term is 34. Find the first term and common difference, and the sum of the first 20 terms.	
3 |a| = 3, |b| = 8 and the angle between a and b is 90°. Find the exact values of a·b and |a + b|.	
4 The life of a battery is N(71, 5^2). A battery is classed as 'special' if its life is less than 62. 10 batterys are chosen at random. Find the probability that exactly 4 are special (3 s.f.).	
5 Particles A (9 kg) and B (1 kg) hang on a light string over a smooth pulley, A being 2 m above the ground. Released from rest; A lands without rebounding. Find (a) the tension while both move, (b) the greatest height of B above its start. Take g = 9.8.	

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6 The curve y = f(x), where $f(x) = \frac{4}{x+3} + 1$, is translated by $\begin{pmatrix} 1 \\ 1 \end{pmatrix}$.
Write down the equations of the asymptotes of the new curve, and find where it crosses the x-axis.

7 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.



8 Prove by contradiction that there are no integers x and y such that $x^2 - y^2 = 22$.

9 X ~ B(30, 0.25).
Find the smallest value of c such that $P(X \geq c) < 0.05$.

10 θ is small and measured in radians. Use small angle approximations to show that
$5\sin 2\theta + 3\cos \theta = 7.5$
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.