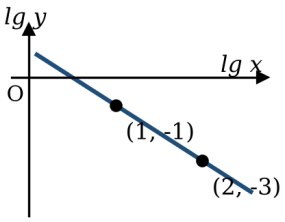
Day 303	A Level Maths: A Tier 10-a-day
1 A and B have position vectors $\begin{pmatrix}5\\3\end{pmatrix}$ and $\begin{pmatrix}-5\\3\end{pmatrix}$. The point P lies on AB with AP : PB = 3 : 2. Find the position vector of P and the exact distance OP.	
2 A ball is thrown vertically upwards at 34.3 m s^{-1} from a point h m above horizontal ground, and hits the ground 9 s later. Find (a) h, (b) the greatest height above the ground. Take g = 9.8.	
3 Solve $3^{2x+2} = 2^{x}$. Give your answer to 3 significant figures.	
4 A driver at constant speed sees a hazard 77.5 m ahead. After a reaction time of 0.6 s she brakes with deceleration 5 m s^{-2} and stops exactly at the hazard. Find (a) her initial speed, (b) the total time from seeing the hazard to stopping.	
5 The line l has equation $3x - 3y = 6$. (a) Find the coordinates of the foot of the perpendicular from P(−3, −6) to l. (b) Hence find the shortest distance from P to l, in exact form.	

Day 303 **A Level Maths: A Tier 10-a-day**

6 The mean mass of a sack (kg) is normally distributed with standard deviation 3; it was previously 73.
A random sample of 9 has mean 71.1.
Test, at the 10% level, whether the mean has changed.

7 The diagram shows the graph of lg y against lg x for $y = A x^n$.
Find the value of n and the value of A.



8 The circle $x^2 + y^2 + 2x - 2y - 23 = 0$ passes through P(−4, −3).
(a) Find the equation of the tangent at P, in the form ax + by = c.
(b) Find the coordinates of the point where this tangent crosses the x-axis.

9 $u_1 = 0$ and $u_{n+1} = \frac{1}{3} u_n + 4$.
(a) Find the limit L of the sequence as $n \to \infty$.
(b) Find the least n for which $|u_n - L| < 0.001$.

10 For 40 values of x, the coded variable $y = \frac{x - 50}{2}$ gives
$\Sigma y = 60$ and $\Sigma y^2 = 450$.
Find the mean and standard deviation of x.