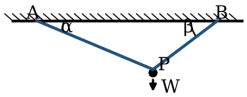
Day 241	A Level Maths: S Tier 10-a-day
1 A particle P of weight 49 N hangs in equilibrium from two light strings AP and BP attached to a horizontal ceiling at A and B (see diagram), where $\tan\alpha = \frac{5}{12}$ and $\tan\beta = \frac{3}{4}$. Find (a) the tension in each string, (b) the greatest weight P could have if neither tension may exceed 90 N. 	
2 For n = 10 pairs of values: $\Sigma x = 40$, $\Sigma y = 350$, $\Sigma x^2 = 305$, $\Sigma xy = 1835$. (a) Find the equation of the regression line of y on x. (b) The x values lie between 0 and 9. Estimate y when x = 10 and comment on its reliability.	
3 A uniform plank AB of length 6 m and mass 40 kg rests on supports at C and D, where AC = 2 m and DB = 2 m. A girl of mass 50 kg stands on it at distance x m from A. Find the range of x for which the plank stays in equilibrium on both supports.	
4 20 recorded times (seconds) have mean 59 and standard deviation 6. One value was recorded as 49 but should have been 57. Find the correct mean and the correct standard deviation.	
5 Solve simultaneously: $x - y = 4$ $x^2 - xy - y^2 = -5$	

Day 241	A Level Maths: S Tier 10-a-day
6 The curves $y = e^x$ and $y = 16\,e^{-x}$ meet at the point P. Find the exact area of the region bounded by the two curves and the y-axis.	
7 Prove by contradiction that $\log_5 10$ is irrational.	
8 Find the exact coordinates of the point of inflection of $y = (x - 2)e^{-2x}$, justifying that it is a point of inflection.	
9 The function f is defined by $f(x) = 4x^2 - 32x + 62$ for $x \leq k$. Given that k is the greatest value for which f is one-one, find k, $f^{-1}(x)$, and the domain of f^{-1}.	
10 The curve C has equation $x^2 + xy + 2y^2 = 126$. Find the coordinates of the points on C where the tangent is parallel to the y-axis.	