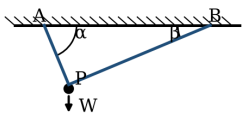
Day 81	A Level Maths: S Tier 10-a-day
1 Large Data Set, daily mean wind speed (knots), Leeming, August 2015 (n = 92): mean 9.9, sd 4.5. (1 knot = 1.852 km/h) (a) Find the mean and sd in km/h. (b) Is a reading of 17.6 more than 2 sd above the mean?	
2 The first row of a theatre has 19 seats. Each row has 5 more seats than the row in front. Find (a) the number of seats in row 29, (b) the least number of rows for at least 1691 seats.	
3 A population of bacteria is modelled by $P = P_0e^{kt}$, t in hours. Initially P = 250 and after 6 hours P = 750. Find k, and the time for the population to reach 2000, to 3 s.f.	
4 A particle P of weight 78 N hangs in equilibrium from two light strings AP and BP attached to a horizontal ceiling at A and B (see diagram), where $\tan\alpha = \frac{12}{5}$ and $\tan\beta = \frac{5}{12}$. Find (a) the tension in each string, (b) the greatest weight P could have if neither tension may exceed 132 N. 	
5 The tangent to $y = x\sqrt{x+2}$ at the point where x = 2 meets the axes at A and B. Find the exact area of triangle OAB, where O is the origin.	

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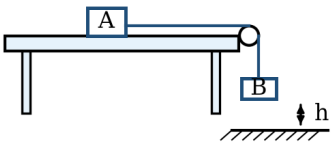
6 Each component is faulty with probability 0.2, independently.
Find the least number n of components that must be tested so that the probability of finding at least one faulty is greater than 0.99.

7 Solve $-x^3 + 7x^2 - 15x + 9 \leq 0$.

8 Use integration by parts to find the exact value of

$$\int_0^{\pi/2} (x + 3) \sin x \, dx$$

9 Particles A (5 kg) and B (5 kg) are joined by a light string over a smooth pulley (see diagram). A lies on a rough table with $\mu = 0.4$, and B is 3 m above the floor.
The system is released from rest. Find the total distance A moves before coming to rest (A does not reach the pulley).



10 The curve C has equation $y = \frac{x - 5}{x - 1}$.
(a) Write down the equations of the asymptotes of C.
(b) The line $y = x + k$ is a tangent to C.
Find the possible values of k.