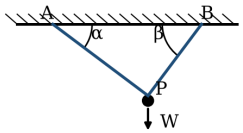
Day 238	A Level Maths: S Tier 10-a-day
1 Solve $x^4 - 13x^2 + 36 \geq 0$.	
2 Solve $e^x + 4e^{-x} = 5$, giving your answers exactly in terms of natural logarithms.	
3 A particle P of weight 115 N hangs in equilibrium from two light strings AP and BP attached to a horizontal ceiling at A and B (see diagram), where $\tan\alpha = \frac{3}{4}$ and $\tan\beta = \frac{4}{3}$. Find (a) the tension in each string, (b) the greatest weight P could have if neither tension may exceed 96 N. 	
4 Prove by contradiction that $\sqrt{19}$ is irrational.	
5 A curve is given by $x = y^3 - y^2 + 2y$. Find dy/dx and d^2y/dx^2 when $y = -2$.	

Day 238	A Level Maths: S Tier 10-a-day

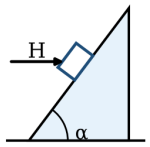
6 $X \sim N(58, 81^2)$. Find the value k such that $P(58 - k < X < 58 + k) = 0.95$.
Give k to 3 significant figures.

7 Solve $2^{2x+1} - 9 \times 2^x + 4 = 0$.

8 Use a suitable trigonometric identity to find the exact value of

$$\int_0^{\pi/4} \sin 3x \cos 2x \, dx$$

9 A particle of weight 40 N rests on a rough plane inclined at α to the horizontal, where $\tan \alpha = \frac{4}{3}$ and $\mu = 0.5$.
A horizontal force H N, in the vertical plane through a line of greatest slope, holds it in equilibrium. Find the range of possible values of H.



10 A box holds 9 components, each faulty with probability 0.15, independently. A box is rejected if it has at least 3 faulty components.
(a) Find the probability that a box is rejected.
(b) 12 boxes are inspected. Find the probability that at least 2 are rejected.