Day 293	A Level Maths: A Tier 10-a-day
1 $f(x) = x^2 - 4$ and $g(x) = 2x - 4$. Solve $fg(x) = gf(x)$.	
2 Solve $7^{2x-3} = 3^{3x+1}$. Give your answer to 3 significant figures.	
3 X, the mass (g), is $N(59, 5^2)$. Find the symmetric limits about the mean between which the central 99% of values lie (3 s.f.).	
4 $f(x) = x^2 - 3$. Show that the Newton-Raphson formula gives $x_{n+1} = \frac{1}{2}(x_n + \frac{3}{x_n})$, and use it with $x_0 = 2$ to find x_2 as an approximation to $\sqrt{3}$, to 4 d.p.	
5 $f(x) = x^3 - 5x^2 + 4$. (a) Show that $(x - 1)$ is a factor of $f(x)$. (b) Solve $f(x) = 0$, giving surds in simplest form.	

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6 The mean fill volume of bottles (ml) is normally distributed with standard deviation 10; it was previously 20. A random sample of 25 has mean 15.6. Test, at the 5% level, whether the mean has changed.	
7 A uniform plank AB (mass 12 kg, length 4 m) rests horizontally on supports at C and D, where AC = 1.5 m and DB = 1 m. A 5 kg particle is placed at E, AE = x m, and the plank is about to tilt about C. Find x.	
8 The line $4x - 3y = 21$ meets the circle $(x - 1)^2 + (y + 3)^2 = 16$ at the points A and B. Find the exact length of AB.	
9 A 5 kg particle is in equilibrium on a rough plane inclined at α, $\tan\alpha = \frac{3}{4}$, $\mu = 0.2$. A horizontal force of P N, in the vertical plane through a line of greatest slope, pushes it towards the plane. Find the least and greatest values of P. Take g = 9.8. Give answers to 3 s.f. if not exact.	
10 Given that $\cos\theta = \frac{3}{5}$, find the exact value of $\cos 3\theta$.	