Day 58	A Level Maths: B Tier 10-a-day
1 Find the x-coordinate(s) of the stationary point(s) of the curve $y = \frac{x}{x^2 + 5}$.	
2 (a) Write $-2x^2 + 24x - 69$ in the form $a(x + p)^2 + q$. (b) Write down the coordinates of the maximum point of $y = -2x^2 + 24x - 69$.	
3 A uniform rod AB of length 4 m and mass 4 kg hangs horizontally from two vertical strings attached 0.5 m from A and 0.5 m from B. A particle of mass 5 kg is attached 2 m from A. Take $g = 9.8$ m s^{-2}. Find the tension in each string.	
4 Ordered data, waiting times (min) of 7 patients: 16, 23, 27, 31, 35, 37, 40. Find Q_1, Q_3, the IQR and any outliers (more than 1.5 × IQR beyond a quartile).	
5 The height of the tide in a harbour is modelled by $H = 7 + 6\sin(\frac{\pi t}{6})$, where t is in hours after midnight. Find (a) the greatest and least values, (b) the values of t with $0 \leq t \leq 12$ when it equals 10 m.	

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6 Solve $(x + 4)x(x + 3) \leq 0$.	
7 Bottle volumes are normal, s.d. 6 ml. Set mean 200 ml; 40 bottles have mean 197.7 ml. Test at the 5% level whether the true mean differs from 200.	
8 (a) Write $\frac{7x + 10}{(x + 1)(x + 2)}$ in partial fractions. (b) Hence evaluate $\int_0^1 \frac{7x + 10}{(x + 1)(x + 2)}\,dx$, giving the answer as a single logarithm.	
9 Express $\frac{8 - 4\sqrt{2}}{2 - 2\sqrt{2}}$ in the form $p + q\sqrt{2}$, where p and q are integers.	
10 A sledge of mass 4 kg is pulled along rough horizontal ground by a horizontal force of 21.6 N. It accelerates at 0.5 m s^{-2}. Take g = 9.8 m s^{-2}. Find the coefficient of friction between the sledge and the ground.	