Day 28	A Level Maths: S Tier 10-a-day
1 A(−7, −12) and B(−14, 5). The point C lies on the x-axis and CA = CB. Find the coordinates of C and the area of triangle ABC.	
2 The fill volume of a bottle is N(μ, 25) with known variance 25. The mean was claimed to be 91 ml. A random sample of 16 has mean 92. Test at the 10% level whether the mean is different from 91.	
3 A ball is projected from the top of a vertical cliff, 88.2 m high, at 24.5 m s^{-1} at angle α above the horizontal ($\tan\alpha = \frac{3}{4}$), and lands on horizontal ground. Find (a) the time of flight and the distance from the cliff, (b) the speed and direction on landing. Take g = 9.8 m s^{-2}.	
4 Prove that $(n+2)^3 - n^3 - 8$ is a multiple of 6 for every integer n.	
5 $f(\theta) = \frac{2}{17 + 8\sin\theta + 6\cos\theta}$ (a) Write $8\sin\theta + 6\cos\theta$ as $R\sin(\theta + \alpha)$, $R > 0$, $0 < \alpha < 90°$. (b) Find the greatest and least values of $f(\theta)$, and the smallest positive θ at which the greatest value occurs, to 1 d.p.	

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6 Data pairs (x, y) are coded by $u = x - 6$ and $v = \frac{y}{5}$. The regression line of v on u is $v = 4.4 + 1.8u$. (a) Find the regression line of y on x in the form $y = a + bx$. (b) Use it to estimate y when $x = 13$.	
7 A curve is given by $x = y^3 + y^2 + 5y$. Find dy/dx and d^2y/dx^2 when $y = -2$.	
8 $\frac{dy}{dx} = -4xy$, and $y = 2$ when $x = 0$. Solve the differential equation and find y when $x = 1$.	
9 Find the sum of all the integers from 1 to 740 inclusive that are divisible by 6 or by 10, but not by both.	
10 A box of weight 40 N is pulled at constant speed along rough horizontal ground ($\mu = 0.75$) by a force P N at angle θ above the horizontal. (a) Find P when $\tan\theta = \frac{4}{3}$. (b) Find the least possible value of P as θ varies, and the corresponding θ to 1 d.p.	