Day 239	A Level Maths: S Tier 10-a-day
1 A golf ball is hit from a point O on horizontal ground. It lands 48 m from O, and reaches a maximum height of 18 m above the ground. Find the angle of projection and the speed of projection, to 3 s.f. Take g = 9.8 m s^{-2}.	
2 Data pairs (x, y) are coded by u = x − 7 and v = $\frac{y}{5}$. The regression line of v on u is v = 23 + 2u. (a) Find the regression line of y on x in the form y = a + bx. (b) Use it to estimate y when x = 14.	
3 A ball is projected horizontally at 29.4 m s^{-1} from the top of a vertical cliff of height 78.4 m, 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 Solve $x^4 - 8x^3 + 13x^2 + 30x - 72 < 0$.	
5 A drink cools according to $\theta = 15 + Ae^{-kt}$, where θ °C is the temperature after t minutes. Initially θ = 90, and after 4 minutes θ = 65. Find A and k, then find when θ = 61 (3 s.f.).	

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6 $f(x) = \frac{kx + 13}{x - 3}$ for $x \neq 3$. Given that f is self-inverse, find k, and hence solve $f(x) = x$.	
7 The points A, B, C have coordinates $(1, 4, -3)$, $(3, 1, -3)$, $(-3, -1, -2)$. Find angle ABC to 1 d.p., and the exact area of triangle ABC.	
8 The times taken by a bus, in minutes are normally distributed. 5% are less than 26 and 10% are greater than 62. Find the mean and standard deviation, each correct to 3 significant figures.	
9 When a polynomial f(x) is divided by $(x + 1)$ the remainder is 7; when divided by $(x - 2)$ the remainder is -8. Find the remainder when f(x) is divided by $(x + 1)(x - 2)$.	
10 $y = e^{2x} \sin x$. Show that $dy/dx = e^{2x}(2 \sin x + \cos x)$. Find the x coordinate of the stationary point with the smallest positive x (3 s.f.), and its nature.	