Day 164	A Level Maths: S Tier 10-a-day
1 Solve the simultaneous equations $\log_5 x - \log_5 y = 1$ $x + y = 6$	
2 A stone is thrown vertically upwards with speed 21 m s^{-1} from the top of a cliff. The top of the cliff is 50.4 m above the sea. Find (a) the time taken for the stone to reach the sea, (b) the total distance travelled by the stone, to 3 s.f. Take g = 9.8 m s^{-2}.	
3 The first row of a theatre has 19 seats. Each row has 3 more seats than the row in front. Find (a) the number of seats in row 34, (b) the least number of rows for at least 1265 seats.	
4 Solve $4\sec^2\theta - 9\tan\theta - 2 = 0$ for $0 \leq \theta < 360°$, giving answers to 1 d.p.	
5 Solve simultaneously: $x - y = 1$ $x^2 - xy + y^2 = 1$	

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6 Find the exact coordinates of the stationary point of $y = x^4e^{-3x}$ for $x > 0$, and determine its nature.	
7 X takes values 1, 2, 3, 4 with $P(X = x) = k(x + 1)$. X_1 and X_2 are independent copies of X. (a) Find k. (b) Find $P(X_1 + X_2 = 4)$. (c) Find $P(X_1 = X_2)$ and $E(X_1 + X_2)$.	
8 A curve has parametric equations $x = 2(t + \frac{1}{t})$, $y = 3(t - \frac{1}{t})$, $t \neq 0$. Find a Cartesian equation of the curve.	
9 A ball is projected from a point O on horizontal ground at 21 m s^{-1}, at angle θ above the horizontal. It passes through the point P, 39 m horizontally and 2 m vertically from O. Find the two possible values of $\tan\theta$, and the two possible values of θ to 1 d.p. Take g = 9.8 m s^{-2}.	
10 The pdf of X is $f(x) = a + bx$ for $0 \leq x \leq 3$, and 0 otherwise, where a and b are constants. $E(X) = \frac{9}{5}$. (a) Find a and b. (b) Find $P(X < 1.5)$.	