Day 126	A Level Maths: A Tier 10-a-day
1 $y = (\ln x)^2$ for $x > 0$. Find $\frac{dy}{dx}$ and its exact value at $x = e^3$.	
2 A club has 200 members: 32 Bronze, 104 Silver and 64 Gold. A stratified sample of size 25 is taken. Find the number of members sampled from each group.	
3 Find the coefficient of x^4 in the expansion of $(3x - \frac{1}{x})^6$.	
4 The equation $x^3 = 6x + 2$ has a root α. Use the iteration $x_{n+1} = \sqrt[3]{6x + 2}$ with $x_0 = 3$ to find x_1, x_2 and x_3 to 4 d.p., and hence the value of α to 2 d.p. (continue until the 2 d.p. value is settled).	
5 15 values have $\Sigma x = 885$ and $\Sigma x^2 = 52950$. One value was recorded as 52 but should have been 55. Find the correct mean and standard deviation (3 s.f.).	

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6 The region bounded by the curve y = sin x, the x-axis, x = 0 and x = π is rotated through 360° about the x-axis. Find the exact volume of the solid formed.	
7 A curve has parametric equations $x = 3t^2 - 1$, $y = -2t(t^2 - 9)$. Find the coordinates of the points where the curve meets the x-axis.	
8 Particle A (3 kg) rests on a smooth table, joined by a light string over a smooth pulley at the edge to particle B (1 kg), hanging 0.5 m above the floor. Released from rest. Find (a) the tension, (b) the speed of B as it hits the floor. Take g = 9.8. Give answers to 3 s.f. if not exact.	
9 Car A passes P at constant speed 4 m s^{-1}. 2 s later car B leaves P from rest, in the same direction, with acceleration 3 m s^{-2}. B overtakes A at Q. Find (a) the time B takes to reach Q, (b) PQ, (c) the speed of B at Q.	
10 The diagram shows a sketch of the curve y = f(x), where f(x) is a cubic. Find f(x), giving your answer in expanded form. 	