Day 236	A Level Maths: S Tier 10-a-day
1 Solve $\|4x - 6\| < \|-2x - 2\|$.	
2 10 recorded times (seconds) have mean 37 and standard deviation 2. One value was recorded as 33 but should have been 35. Find the correct mean and the correct standard deviation.	
3 Solve $3^{2x} - 24 \times 3^{x} - 81 = 0$.	
4 A drink cools according to $\theta = 25 + Ae^{-kt}$, where θ °C is the temperature after t minutes. Initially $\theta = 95$, and after 4 minutes $\theta = 60$. Find A and k, then find when $\theta = 29$ (3 s.f.).	
5 For 20 observations x, $\Sigma(x - 20) = 10$ and $\Sigma(x - 20)^2 = 205$. (a) Find the mean of x. (b) Find the standard deviation of x. (c) Find the value of Σx^2.	

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6 A shell is projected from level ground with horizontal and vertical velocity components 9.8 and 24.5 m s^{-1}. Find (a) the two times at which it moves at 45° to the horizontal, (b) the horizontal distance between those two points. Take g = 9.8 m s^{-2}.	
7 The curve C has equation $x^2 + xy - y^2 = -1$. Find the equation of the tangent to C at the point $(-3, 2)$, in the form $ax + by + c = 0$ with integers a, b, c.	
8 Use a suitable trigonometric identity to find the exact value of $\int_0^{\pi/3} \sin 4x \cos x \, dx$	
9 A circle passes through A$(-2, 5)$, B$(1, 6)$ and C$(-4, 1)$. Find its equation.	
10 A plank of mass 5 kg lies on a smooth horizontal table, with a block of mass 5 kg on it ($\mu = 0.4$ between them). A horizontal force P N acts on the plank. (a) Find the greatest P for which the block does not slip. (b) Find the accelerations of block and plank when P = 117.6. Take g = 9.8 m s^{-2}.	