Day 236	A Level Maths: B Tier 10-a-day
1 Simplify $\frac{3}{\sqrt{3}} - \sqrt{12}$, giving your answer in the form $k\sqrt{3}$.	
2 A ball is projected horizontally at 78.4 m s^{-1} from a point high above the ground. Take g = 9.8 m s^{-2}. Find the speed and the direction of motion 15 s later, to 1 d.p. below the horizontal.	
3 Solve $25^{-2x-3} = 5^{-3x+1}$.	
4 For 13 pairs of values, $\bar{x} = 8$, $\bar{y} = 25$, $S_{xx} = 20$ and $S_{xy} = -20$. (a) Find the regression line of y on x in the form y = a + bx. (b) Estimate y when x = 12.	
5 A is the point (0, −6) and B is the point (−6, 8). Find the perpendicular bisector of AB as ax + by + c = 0, with integer a, b, c.	

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6 Find the exact value of $\int_0^{\frac{\pi}{4}} (\cos^2 2x + 1 - \sin^2 2x)\, dx$.	
7 X ~ B(9, 0.5) and Y ~ B(10, 0.3) are independent. Find P(X = 3 and Y ≤ 2), to 3 significant figures.	
8 A uniform rod AB of length 4 m and mass 18 kg is hinged at A and held horizontal by a light string attached at B. The string makes an angle θ with the rod, where $\sin\theta = \frac{3}{5}$. Take g = 9.8 m s^{-2}. Find the tension in the string.	
9 Solve $8 \sin x + 3 \cos^2 x - 7 = 0$ for $0 \leq x \leq 360°$, giving answers to 1 d.p. where necessary.	
10 A curve has parametric equations $x = 2t + 1$, $y = t^2 - 4$. Find the gradient at $t = -2$ and the equation of the normal there.	