Day 268	A Level Maths: B Tier 10-a-day
1 A puck of mass 2 kg is moving on a smooth horizontal surface at 9 m s^{-1} when a constant horizontal force of 4 N, in the direction of motion, acts for 3 s. Find the speed of the puck at the end of this time and the distance it moves.	
2 Regression line (x from 2 to 10): y = 3.2 + 0.8x. x is the advertising spend, y the weekly sales. (a) Interpret the gradient. (b) Estimate y when x = 9 and comment.	
3 Statement: "$n^2 - n + 17$ is prime for every positive integer n." Find a counter-example to show that the statement is false.	
4 A particle is in equilibrium under three forces: P N at angle θ above the positive x-axis, a force of 15 N in the negative x-direction and a force of Q N in the negative y-direction. $\cos\theta = \frac{5}{13}$. Find P and Q.	
5 A seed supplier says that 0.3 of seeds germinate. In a sample of 20 seeds, 4 germinate. Test, at the 10% level, whether the true proportion is lower than claimed.	

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6 Evaluate $\sum_{r=1}^{7} 2 \times 2^r$.	
7 Solve $e^{2x} - 15\,e^{x} + 54 = 0$, giving your answers as exact values.	
8 Line l_1 has equation $4x - 7y = -4$ and line l_2 has equation $x - y = 2$. The lines meet at P. Find the area of the triangle formed by l_1, l_2 and the x-axis.	
9 Given that $9\cos\theta + 12\sin\theta \equiv 15\cos(\theta - 53.1°)$, solve $9\cos\theta + 12\sin\theta = 5.5$ for $0 \leq \theta \leq 360°$. (1 d.p.)	
10 (a) Write $\frac{2x + 16}{(x + 2)(x + 5)}$ in partial fractions. (b) Hence evaluate $\int_0^1 \frac{2x + 16}{(x + 2)(x + 5)}\,dx$, giving the answer as a single logarithm.	