Day 143	A Level Maths: B Tier 10-a-day
1 Use integration by parts to find the exact value of $\int_0^1 (x + 3)e^x \, dx$.	
2 A bag has 8 white and 9 black sweets; two are taken without replacement. (a) Find P(same colour). (b) Given they are the same colour, find P(both white).	
3 Given that $\sin\theta = \frac{5}{13}$ and $90° < \theta < 180°$, find the exact value of $\tan 2\theta$.	
4 A particle of mass 2 kg is acted on by forces $(5\mathbf{i} + 6\mathbf{j})$ N and $\mathbf{P}$ N only. Its acceleration is $(-\mathbf{i} + 2\mathbf{j})$ m s^{-2}. Find $\mathbf{P}$, and its magnitude to 3 significant figures.	
5 (a) Write $\frac{2x + 3}{(x + 1)(x + 2)}$ in partial fractions. (b) Hence evaluate $\int_0^2 \frac{2x + 3}{(x + 1)(x + 2)} \, dx$, giving the answer as a single logarithm.	

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6 The random variable X has E(X) = 3 and Var(X) = 5. Find (a) E(3X − 1), (b) Var(3X − 1), (c) $E(X^2)$.	
7 f(x) = 4x − 1 and $g(x) = x^2 - 5$ for $x \in \mathbb{R}$. (a) Find fg(x). (b) Solve gf(x) = 284.	
8 A particle moves along a straight line so that its displacement from O after t s is $s = 3t^3 + t^2$ metres. Find (a) the average velocity over the first 6 seconds, (b) the velocity at t = 6.	
9 A circle passes through A(7, −5) and B(8, −2), and its centre lies on the y-axis. Find the centre and the equation of the circle.	
10 Solve the equation $3^{2x} + 3\times3^x - 4 = 0$.	