Day 353	A Level Maths: B Tier 10-a-day
1 $f(x) = 2x^3 + kx^2 - 8x + 24$. Given that $(x - 3)$ is a factor of $f(x)$, (a) find the value of k, (b) factorise $f(x)$ completely.	
2 Solve $e^{-3x} = 10$, giving your answer to 3 s.f.	
3 Marks are normal: Maths $N(48, 6^2)$, Physics $N(40, 8^2)$. Anna scores 55.5 in Maths and 36 in Physics. Which is her better performance, relatively?	
4 (a) Write $6\cos\theta + 8\sin\theta$ in the form $R\cos(\theta - \alpha)$, with $R > 0$ and $0 < \alpha < 90°$. (b) Hence find its maximum value and the smallest $\theta \geq 0$ at which it occurs. Give α to 1 d.p.	
5 Prove that $(2n + 3)^2 - (2n - 3)^2$ is a multiple of 24 for all integer values of n.	

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6 Given that $\sin A = \frac{5}{13}$ and $\cos B = \frac{3}{5}$, where A and B are acute, find the exact value of $\cos(A - B)$.	
7 A particle moves along a straight line so that its displacement from O after t s is $s = 3t^3 + 4t^2$ metres. Find (a) the average velocity over the first 6 seconds, (b) the velocity at t = 6.	
8 A bag has 4 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).	
9 The line $y = -3x - 12$ meets the circle $x^2 + (y + 2)^2 = 50$ at the points A and B. Find the coordinates of A and B, and the exact length of the chord AB.	
10 A uniform plank AB of length 5 m and mass 30 kg rests horizontally on supports at C and D, where AC = 2 m and DB = 1.5 m. A girl of mass 25 kg walks from D towards B. Find how far she is from D when the plank is about to tilt. 	