Day 87	A Level Maths: B Tier 10-a-day
1 Solve $e^{2x} - 5e^{x} - 6 = 0$, giving any answers as exact values.	
2 A cyclist moves in a straight line with constant acceleration. Its initial speed is 3 m s^{-1}, its final speed is 23 m s^{-1} and it travels 52 m. Find the time taken.	
3 Use integration by parts to find the exact value of $\int_0^{\frac{\pi}{2}} x \sin x \, dx$.	
4 For 15 pairs of data, $S_{xx} = 150$, $S_{yy} = 150$ and $S_{xy} = -57$. Find the PMCC (3 s.f.) and describe the correlation.	
5 y = f(x) has a minimum point at (−4, 6). Find the turning point on the curve: (a) y = f(−x) (b) y = −f(x) (c) $y = f(\frac{x}{4})$	

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6 A class of width 20, frequency 20, is a bar 4 cm wide, 1.25 cm tall. (a) Find the bar height for width 20, frequency 45. (b) Find the frequency of a 1 cm by 3 cm bar.	
7 Given that $24\cos\theta + 7\sin\theta \equiv 25\cos(\theta - 16.3°)$, solve $24\cos\theta + 7\sin\theta = 4$ for $0 \leq \theta \leq 360°$. (1 d.p.)	
8 A javelin is projected from level ground with horizontal velocity component 23 m s^{-1} and vertical velocity component 39.2 m s^{-1} upwards. Take g = 9.8 m s^{-2}. Find (a) the time of flight, (b) the horizontal range.	
9 Prove by contradiction that there are no integers m and n such that $6m + 9n = 56$.	
10 Statement: "If $x^2 > 16$ then $x > 4$." Give a counter-example to show the statement is false.	