Day 239	A Level Maths: B Tier 10-a-day
1 Expand and simplify $(-3 + 2\sqrt{5})(4 - \sqrt{5})$, giving your answer in the form $a + b\sqrt{5}$.	
2 The function $f(x) = 2\cos x - \frac{1}{2}x$. Show that $f(x) = 0$ has a root between $x = 1$ and $x = 1.5$ (x in radians).	
3 A car travelling at 16 m s^{-1} brakes and comes to rest with constant deceleration 2.5 m s^{-2}. Find (a) the distance travelled while braking, (b) the time taken to stop.	
4 A journey takes X minutes, normal with mean 30, s.d. 10. Find k (3 s.f.): (a) $P(X < k) = 0.25$, (b) $P(X > k) = 0.1$.	
5 A uniform rod AB of length 3 m and mass 6 kg hangs horizontally from two vertical strings attached 1 m from A and 1 m from B. A particle of mass 4 kg is attached 1.5 m from A. Take g = 9.8 m s^{-2}. Find the tension in each string.	

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6	The circle C has equation $(x - 2)^2 + (y - 1)^2 = 50$. The point P(3, −6) lies on C. Find an equation of the tangent to C at P, in the form ax + by + c = 0 with integer a, b, c.	
7	(a) Write $\frac{2x + 8}{(x + 1)(x + 3)}$ in partial fractions. (b) Hence evaluate $\int_0^1 \frac{2x + 8}{(x + 1)(x + 3)}\,dx$, giving the answer as a single logarithm.	
8	The line y = x + 17 meets the circle $(x - 1)^2 + (y - 3)^2 = 125$ at the points A and B. Find the coordinates of A and B, and the exact length of the chord AB.	
9	The variables x and y satisfy $y = Ae^{kx}$. A graph of ln y against x is a straight line through (0, 1.5) and (4, 2.7). Find A to 3 s.f. and k.	
10	The random variable X is normally distributed. P(X < 30) = 0.1587 and P(X > 50) = 0.1587. Find the mean and standard deviation (3 s.f.).	