Day 240	A Level Maths: B Tier 10-a-day
1 Find (a) $\int 6e^{4x}\,dx$, (b) the exact value of $\int_0^1 6e^{4x}\,dx$.	
2 A and B are mutually exclusive events with P(A) = 0.4 and P(A ∪ B) = 0.8. (a) Find P(B). (b) Find P(A' ∩ B').	
3 f(x) = 3x − 4 for $-4 \leq x < -2$. Find the range of f.	
4 Given that $\sin A = \frac{40}{41}$ and $\sin B = \frac{4}{5}$, where A and B are acute, find the exact value of sin(A + B).	
5 A car of mass 800 kg moves along a horizontal road. The engine works at a constant rate of 24 kW. The resistance to motion is constant at 400 N. Find the acceleration when the speed is 20 m s^{-1}.	

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6 Solve $3^x = 53$, giving your answer to 3 s.f.	
7 A police car starts from rest and accelerates at 2.5 m s^{-2}. At that moment it is passed by a speeding van travelling at constant speed 15 m s^{-1}. Find how long it takes to catch up, and the distance travelled.	
8 (a) Expand $(1 - 3x)^{-\frac{1}{3}}$ in ascending powers of x up to and including the term in x^3. (b) State the range of values of x for which the expansion is valid.	
9 The random variable X has E(X) = 10 and Var(X) = 16. Find (a) E(4X + 3), (b) Var(4X + 3), (c) $E(X^2)$.	
10 The circle C has equation $(x - 2)^2 + (y + 1)^2 = 169$. The point P(14, −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.	