Day 205	A Level Maths: B Tier 10-a-day
1 Data are modelled by $y = ax^n$. A plot of $\log_{10} y$ against $\log_{10} x$ is a straight line with intercept 0.778 and gradient 2. Find a (2 s.f.) and n, then estimate y when x = 4 (3 s.f.).	
2 Describe the single transformation that maps the graph of y = f(x) onto the graph of: (a) y = f(2x) (b) y = −f(x) (c) y = f(x + 5)	
3 Find the exact value of cosec 135°, giving your answer with a rational denominator.	
4 A lorry travelling at 8 m s^{-1} brakes and comes to rest with constant deceleration 1 m s^{-2}. Find (a) the distance travelled while braking, (b) the time taken to stop.	
5 (a) Write $-x^2 - 12x - 37$ in the form $a(x + p)^2 + q$. (b) Write down the coordinates of the maximum point of $y = -x^2 - 12x - 37$.	

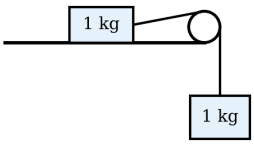
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6 Use the substitution $u = e^x + 2$ to find the exact value of

$$\int_0^{\ln 2} (e^x + 2)^3 e^x \, dx.$$

7 Packet masses are normal, s.d. 6 g. Claimed mean 120 g; 25 packets have mean 122.5 g. Test at the 5% level whether the true mean is greater than 120.

8 A particle of mass 1 kg lies on a smooth horizontal table. It is attached by a light string over a smooth pulley at the edge of the table to a particle of mass 1 kg hanging freely.
Take $g = 9.8$ m s^{-2}.
The system is released from rest. Find the acceleration and the tension in the string.



9 Solve $\tan^2 x + \sec x - 1 = 0$ for $0 \leq x \leq 360°$, giving answers to 1 d.p.

10 A geometric sequence has first term 50 and common ratio 0.75.
Find the smallest n for which the nth term is less than 1.