Day 150	A Level Maths: A Tier 10-a-day
1 Solve $2\cos^2 x - 8\sin x - 8 = 0$ for $-180° \leq x \leq 180°$.	
2 P(A) = 0.8 and P(A ∪ B) = 0.82. (a) Given that A and B are independent, find P(B). (b) Given instead that A and B are mutually exclusive, find P(B). (c) In the case in (a), find P(A′ ∩ B).	
3 A(−6, 3) and B(14, 3) are the ends of a diameter of a circle. (a) Find the equation of the circle, in the form $x^2 + y^2 + ax + by + c = 0$. (b) Show that C(4, −7) lies on the circle.	
4 A 12 kg box is pulled from rest along rough horizontal ground by a horizontal force of 56.64 N and moves 10 m in 5 s. Find (a) the coefficient of friction. The force is then removed; (b) find the further distance moved. Take g = 9.8. Give answers to 3 s.f. if not exact.	
5 The sum of the first n terms of an arithmetic series is $S_n = 4n^2 + n$. (a) Find the first term and the common difference. (b) Find u_{23}.	

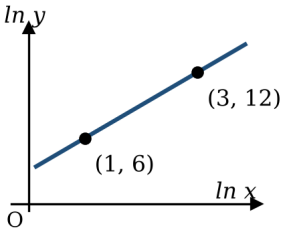
Day 150	A Level Maths: A Tier 10-a-day

6 A radioactive sample decays so that its mass is $M = M_0e^{-kt}$ grams, with t in days.

Its half-life is 5 days. Show that $k = \frac{\ln 2}{5}$ and find how long it takes for 99% of the sample to decay.

7 X ~ B(16, 0.4). Find P(X = 3 | X ≥ 2) to 3 significant figures.

8 The diagram shows the graph of ln y against ln x for $y = A x^n$.
Find the value of n and the exact value of A.



9 A ball is projected from a point O on horizontal ground at angle α above the horizontal, $\tan\alpha = \frac{12}{5}$, and passes through A, 30 m horizontally from O and 27.9 m above the ground. Find the speed of projection. Take g = 9.8.

10 A circle touches both coordinate axes and passes through the point (8, −1). Its centre lies in the fourth quadrant.
Find the equations of the two possible circles.