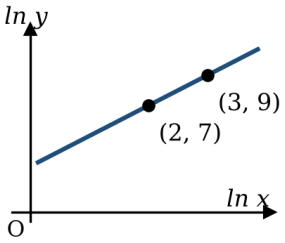
Day 157 **A Level Maths: A Tier 10-a-day**

1 Find the quotient and the remainder when $x^4 - 2x - 17$ is divided by $(x^2 + 4)$.

2 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.



3 Find the coefficient of x^2 in the expansion of $(-1 + 4x)^8$.

4 A 1000 kg car has engine power 40 kW and constant resistance 1000 N. Find (a) its greatest steady speed on a horizontal road, (b) its acceleration at 24 m s^{-1} up a hill where $\sin \alpha = \frac{1}{20}$. Take g = 10. Give answers to 3 s.f. if not exact.

5 For n = 9 pairs of (x, y): $\Sigma x = 130$, $\Sigma y = 461$, $\Sigma x^2 = 2300$, $\Sigma y^2 = 25845$, $\Sigma xy = 7586$.
Calculate the product moment correlation coefficient, and describe the correlation.

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6 Solve $e^x + 5e^{-x} = 6$, giving exact answers.	
7 A ball is projected from a point O on horizontal ground at angle α above the horizontal, $\tan\alpha = \frac{3}{4}$, and passes through A, 48 m horizontally from O and 16.4 m above the ground. Find the speed of projection. Take g = 9.8.	
8 X ~ Po(18). Use a suitable approximation to find $P(X \geq 13)$, to 3 significant figures.	
9 The second term of a geometric series is 10 and its sum to infinity is 45. Find the two possible values of the first term.	
10 l_1: $\mathbf{r} = \begin{pmatrix} -2 \\ 10 \\ -7 \end{pmatrix} + \lambda \begin{pmatrix} 2 \\ -3 \\ 2 \end{pmatrix}$ l_2: $\mathbf{r} = \begin{pmatrix} -5 \\ -2 \\ -10 \end{pmatrix} + \mu \begin{pmatrix} 3 \\ 1 \\ 3 \end{pmatrix}$ Determine whether l_1 and l_2 intersect. If they do, find the point of intersection.	