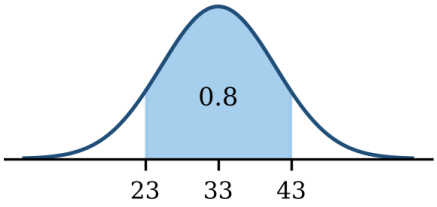
Day 44	A Level Maths: S Tier 10-a-day

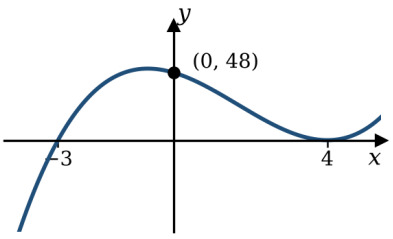
1 The pdf of $X \sim N(33, \sigma^2)$ is shown; the shaded area is symmetrical.
(a) Find σ. (b) Find $P(X > 48)$.



2 A geometric series has sum to infinity 50 and second term 12. Find the possible values of the common ratio r and the first term a in each case.

3 The curve $y = 2^x - 5x$ has one stationary point. Find its coordinates to 3 s.f. and show that it is a minimum.

4 The diagram shows the cubic y = f(x), which touches the x-axis once. Find f(x), giving your answer in expanded form.



5 A particle starts from rest at the top of a rough slope of length 12 m ($\sin\alpha = \frac{4}{5}$, $\mu = 0.15$), then slides along rough horizontal ground with the same μ.
Use energy to find (a) its speed at the foot of the slope (3 s.f.), (b) the distance it slides on the ground. Take $g = 9.8$ m s^{-2}.

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6 $X \sim B(12, \frac{3}{10})$. (a) Show that $P(X = r + 1) \div P(X = r) = \frac{12 - r}{r + 1} \times \frac{3}{7}$. (b) Find the most likely value of X and its probability (3 s.f.).	
7 The equation $x^3 = 3x + 4$ has a root α. (a) Show that the equation can be written as $x = \sqrt[3]{(3x + 4)}$. (b) Use $x_{n+1} = \sqrt[3]{(3x_n + 4)}$ with $x_0 = 3$ to find x_1, x_2, x_3 to 4 d.p., and hence state α to 3 d.p.	
8 The region bounded by $y = \frac{6}{x + 1}$, the x-axis and the lines $x = 0$ and $x = 3$ is rotated through 2π about the x-axis. Find the exact volume of the solid formed.	
9 Find the binomial expansion of $(27 + 2x)^{\frac{2}{3}}$ in ascending powers of x up to and including the term in x^3. State the values of x for which it is valid.	
10 A stone is projected from level ground with horizontal and vertical velocity components 14.7 and 53.9 m s^{-1}. Find (a) the two times at which it moves at 45° to the horizontal, (b) the horizontal distance between those two points. Take g = 9.8 m s^{-2}.	