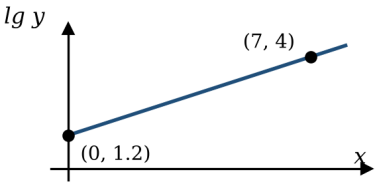
Day 201	A Level Maths: S Tier 10-a-day

1 $y = ab^x$. The graph of lg y against x is the straight line shown.
Find a and b to 3 significant figures.



2 A ladder of length 25 m leans against a vertical wall. Its foot slides away from the wall at $\frac{1}{2}$ m s^{-1}. When the foot is 24 m from the wall,
find the rate at which the top is moving down.

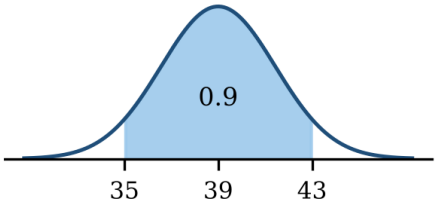
3 Solve $\sqrt{5x - 4} = x - 2$.

4 Solve $12\text{cosec}^2\theta - 5\cot\theta - 14 = 0$
for $0 \leq \theta < 360°$, giving answers to 1 d.p.

5 A ball is dropped from a height of 6 m. After each bounce it rises to $\frac{2}{3}$ of its previous height.
(a) Find the total distance it travels before it stops.
(b) After how many bounces does it rise less than 0.1 m?

Day 201 **A Level Maths: S Tier 10-a-day**

6 The pdf of $X \sim N(39, \sigma^2)$ is shown; the shaded area is symmetrical.
(a) Find σ. (b) Find $P(X > 49)$.



7 A population of bacteria is modelled by $P = P_0e^{kt}$, t in hours.
Initially P = 50 and after 3 hours P = 75.
Find k, and the time for the population to reach 300, to 3 s.f.

8 A box of weight 35 N is pulled at constant speed up a line of greatest slope of a rough plane ($\tan\alpha = \frac{3}{4}$, $\mu = \frac{3}{4}$) by a force P N at angle β above the plane.
(a) Find P when $\tan\beta = \frac{12}{5}$. (b) Find the least possible value of P as β varies.

9 A pile of logs has 16 logs in its bottom row. Each row above has 1 fewer logs than the row below, and the pile has as many rows as possible, each with at least one log. Find the number of rows and the total number of logs.

10 A particle P moves in a plane. At time t seconds its position vector relative to a fixed origin O is r metres, where
$\mathbf{r} = (2.5t^2 - 3t)\mathbf{i} + (-2t^2 + 6t)\mathbf{j}$.
Find (a) the value of t at which P is moving parallel to $(2\mathbf{i} - \mathbf{j})$, (b) the speed of P at this time (3 s.f. if not exact).