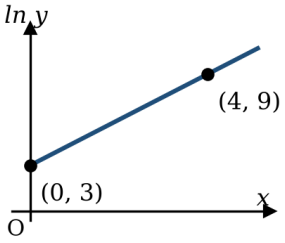
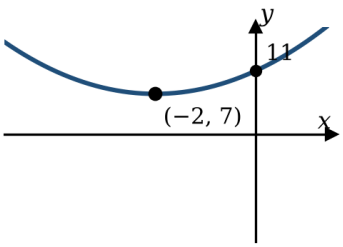
Day 55	A Level Maths: A Tier 10-a-day

1 A cyclist passes P with speed 8 m s^{-1} and accelerates uniformly. She travels 83.2 m in the next 8 s, reaching Q. Find (a) her acceleration, (b) her speed at Q, (c) her speed at the midpoint of PQ. Give answers to 3 s.f. if not exact.

2 The diagram shows the graph of ln y against x for $y = A e^{kx}$.
Find the exact values of A and k.



3 The diagram shows the curve with equation y = f(x), where f is a quadratic.
The turning point is marked, and the curve crosses the y-axis as shown.
Find f(x), giving it in the form $ax^2 + bx + c$.



4 A is acute and B is obtuse, with $\sin A = \frac{15}{17}$ and $\cos B = -\frac{4}{5}$.
Find the exact values of sin(A−B) and cos(A+B).

5 X ~ B(40, 0.4). Use a normal approximation to estimate P(X ≥ 18) to 3 significant figures.

Day 55	A Level Maths: A Tier 10-a-day
6 $f(x) = x^2 - 2x + 7$, $x \in \mathbb{R}$, and $g(x) = \frac{3}{x-4}$, $x > 4$. (a) Find the range of f. (b) Show that gf is defined and find its range.	
7 (a) Express $\frac{-x}{(x+4)(x+2)}$ in partial fractions. (b) Hence find $\int_0^5 \frac{-x}{(x+4)(x+2)}\,dx$, giving the answer in the form ln k.	
8 A uniform rod AB (6 kg, 4 m) is smoothly hinged at A to a vertical wall, with a 5 kg particle at B. A light string from B to the wall above A holds the rod horizontal, at angle θ to it, $\tan\theta = \frac{3}{4}$. Find (a) the tension, (b) the magnitude of the hinge force. Take g = 9.8. Give answers to 3 s.f. if not exact.	
9 Faults occur as a Poisson process at a mean rate of 3 per roll of cloth. After a change, the number recorded in one roll of cloth is 2. Test at the 5% level whether the mean rate has decreased.	
10 $f(x) = \frac{6x-1}{(1+2x)(1-2x)}$. (a) Express f(x) in partial fractions. (b) Hence expand f(x) up to x^2. (c) State the range of x for which the expansion is valid.	