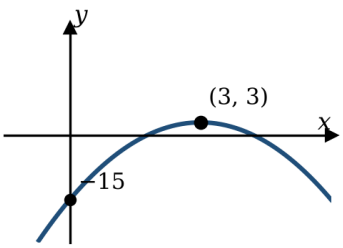
Day 18	A Level Maths: A Tier 10-a-day

1 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 $ax^2 + bx + c$.

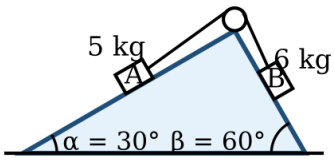


2 $y = 2 \times 5^x$.
The gradient of the curve at P is 10 ln 5. Find the x-coordinate of P.

3 Solve $|x + 2| = -2x - 7$.

4 Use the trapezium rule with 4 strips to estimate $\int_0^2 3(2^x)\,dx$, giving your answer to 3 s.f.
State, with a reason, whether your estimate is an overestimate or an underestimate.

5 A 3 kg particle moves on a smooth horizontal line. At time t s a single force of (15 − 3t) N acts along the line. When t = 0 its speed is 0 m s^{-1}. Find (a) its speed when t = 3, (b) its greatest speed.

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6 X ~ B(200, 0.4). Use a normal approximation to estimate P(X ≥ 86) to 3 significant figures.	
7 A curve has equation $3x^2y + 3y^3 + 2x = -4$. Find $\frac{dy}{dx}$ in terms of x and y, and the gradient of the normal at (1, −1).	
8 Find the set of values of k for which the line y = x + k meets the curve $y = 2x^2 - 2x + 5$ at two distinct points.	
9 The system is released from rest. Find (a) the magnitude of the acceleration and which particle moves down, (b) the tension. Take g = 9.8. Give answers to 3 s.f. if not exact. 	
10 The random variable X has pdf $f(x) = \frac{1}{18}(6 - x)$ for 0 ≤ x ≤ 6, and 0 otherwise. (a) Find the cumulative distribution function F(x) for 0 ≤ x ≤ 6. (b) Find P(X > 3). (c) Find the median of X to 3 s.f.	