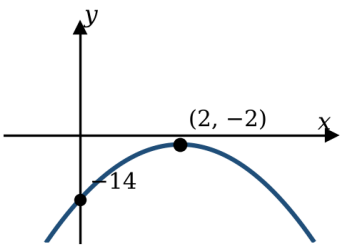
Day 122 **A Level Maths: A Tier 10-a-day**

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 Find the exact value of

$$\int_0^{\ln 4} (4e^{2x} + e^x)\, dx.$$

3 P(A) = 0.6, P(B) = 0.4 and P(A ∩ B) = 0.2.
Find
(a) P(A ∪ B)
(b) P(A | B′)
(c) P(B | A)

4 Prove that the sum of the squares of any two consecutive integers is odd.

5 Solve sin 2x = sin x for $-180° \leq x \leq 180°$.

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6 A sequence is defined by $u_1 = \frac{5}{2}$ and $u_{n+1} = 1 - \frac{1}{u_n}$. (a) Find u_2 and u_3. (b) Find u_{99} and $\sum_{r=1}^{99} u_r$.	
7 Solve $3\text{cosec}^2\theta - 15\cot\theta + 15 = 0$ for $-180° < \theta < 180°$, $\theta \neq 0$. Give answers to 1 d.p.	
8 A stone is projected from a cliff top 7.6 m above the sea at 10 m s^{-1}, at angle α above the horizontal, $\tan\alpha = \frac{3}{4}$. Find (a) the time to reach the sea, (b) the horizontal distance travelled, (c) the speed on impact. Take g = 9.8. Give answers to 3 s.f. if not exact.	
9 X ~ B(28, p). H_0: p = 0.3 is tested against H_1: p < 0.3 using a 5% significance level. (a) Find the critical region. (b) State the probability of a Type I error. (c) Find the probability of a Type II error when p = 0.1 (3 s.f.).	
10 A ball is projected from the ground at 38 m s^{-1} at angle α above the horizontal, $\tan\alpha = \frac{24}{7}$. At time T s, while in flight, it is moving perpendicular to its initial direction. Find (a) T, (b) the height of the ball then. Take g = 9.8. Give answers to 3 s.f. if not exact.	