Day 299 **A Level Maths: A Tier 10-a-day**

1 The table summarises the mass, m grams, of eggs.
Estimate the mean and standard deviation (3 s.f.).

Class	Frequency
$0 \le m < 10$	4
$10 \le m < 20$	20
$20 \le m < 30$	5
$30 \le m < 40$	7
$40 \le m < 50$	15

2 The points A, B and C have coordinates (4, 0, 3), (−3, 1, 2) and (3, 4, −2).
Find angle ABC, in degrees to 1 d.p.

3 Find the coefficient of x^3 in the expansion of $(3 - x)^8$.

4 Particles A (5 kg) and B (3 kg) hang on a light string over a smooth pulley, A being 2 m above the ground. Released from rest; A lands without rebounding. Find (a) the tension while both move, (b) the greatest height of B above its start. Take g = 9.8.

5 A is (2, −4) and B is (4, 4).
(a) Find the equation of the perpendicular bisector of AB, in the form ax + by = c.
(b) The perpendicular bisector meets the x-axis at P. Find the area of triangle ABP.

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6 X ~ B(24, 0.1). Find the smallest value of c such that $P(X \geq c) < 0.05$.	
7 The curve with equation $y = x^2 + 3x + 4$ is transformed by a reflection in the x-axis, followed by a translation of $\begin{pmatrix} 3 \\ 1 \end{pmatrix}$. Find the equation of the image curve.	
8 (a) Express $15 \sin \theta - 8 \cos \theta$ in the form $R \sin(\theta - \alpha)$, where $R > 0$ and $0° < \alpha < 90°$. Give α to 1 d.p. (b) Solve $15 \sin \theta - 8 \cos \theta = -10$ for $0° \leq \theta < 360°$, giving answers to 1 d.p.	
9 A uniform ladder AB (5 m, 20 kg) rests with A on rough ground, $\mu = \frac{1}{3}$, and B against a smooth wall, B being 3 m above the ground. A man of mass 50 kg climbs the ladder. How far along the ladder from A can he climb before it slips?	
10 A curve has parametric equations $x = 4(t - \sin t)$, $y = 4(1 - \cos t)$. Find $\frac{dy}{dx}$ in terms of t and the exact equation of the tangent at the point where $t = \frac{2\pi}{3}$, in the form $y = mx + c$.	