Day 22 **A Level Maths: B Tier 10-a-day**

1 Solve $\cos x = \frac{1}{2}$ for $0 \leq x \leq 360°$.

2 The table shows the number of siblings, x, of 51 students.
Calculate the mean and standard deviation (3 s.f.).

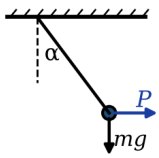
x	1	2	3	4	5	6
Frequency	9	7	9	4	11	11

3 Prove that $n^2 + n + 6$ is even for all integers n.

4 X ~ Po(4), modelling the number of calls to a helpline per minute.
Find, to 3 significant figures,
(a) $P(X \leq 4)$
(b) $P(X \geq 4)$

5 A particle of mass 6 kg hangs in equilibrium on a light string inclined at α to the vertical, held by a horizontal force P N, as shown. $\tan \alpha = \frac{3}{4}$.

Take $g = 9.8$ m s^{-2}.
Find the tension in the string and the value of P.



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6 $f(x) = 2x^3 + kx^2 - 2x - 8$. Given that $(x + 1)$ is a factor of $f(x)$, (a) find the value of k, (b) factorise $f(x)$ completely.	
7 Given that $7\cos\theta + 24\sin\theta \equiv 25\cos(\theta - 73.7°)$, solve $7\cos\theta + 24\sin\theta = -1$ for $0 \leq \theta \leq 360°$. (1 d.p.)	
8 A suitcase of mass 12 kg is dragged at constant speed along rough horizontal ground by a rope inclined at angle α above the horizontal, where $\cos\alpha = \frac{12}{13}$. The coefficient of friction is 0.2. Take $g = 9.8$ m s^{-2}. Find the tension in the rope.	
9 A cup of tea cools in a room at 20°C: $\frac{dT}{dt} = -k(T - 20)$. Initially $T = 80$ and after 5 minutes $T = 60$. Find k to 3 s.f. and the time to cool to 30°C, to 3 s.f.	
10 Express $\frac{3 - 3\sqrt{3}}{\sqrt{3}}$ in the form $p + q\sqrt{3}$, where p and q are integers.	