Day 245 **A Level Maths: B Tier 10-a-day**

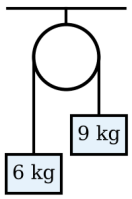
1 The table shows the number of siblings, x, of 46 students.
Calculate the mean and standard deviation (3 s.f.).

x	0	1	2	3	4	5
Frequency	10	8	8	10	3	7

2 A curve has parametric equations $x = 2t$, $y = \frac{4}{t}$, $t \neq 0$.
Find a Cartesian equation of the curve.

3 A sector of a circle has radius 6 cm and angle 270°.
Find, in terms of π, the arc length and the area of the sector.

4 Particles of mass 6 kg and 9 kg hang on a light string over a smooth fixed pulley, as shown, and are released from rest. Take $g = 9.8$ m s^{-2}.
Find the acceleration and the tension in the string.



5 $f(x) = x^3 - 3x^2 + kx + 12$.
Given that $(x - 3)$ is a factor of f(x),
(a) find the value of k,
(b) factorise f(x) completely.

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6 The mass of a radioactive sample, M grams, after t days is $M = 80\,e^{-0.15t}$. Find (a) the half-life, (b) the rate of decrease in mass when t = 5, each to 3 s.f.	
7 A journey takes X minutes, normal with mean 100, s.d. 12. Find k (3 s.f.): (a) $P(X < k) = 0.2$, (b) $P(X > k) = 0.01$.	
8 Solve $\cot^2 x - 3 = 0$ for $0 \leq x \leq 360°$, giving answers to 1 d.p.	
9 The line $y = 3x - 17$ meets the circle $x^2 + (y + 2)^2 = 25$ at the points A and B. Find the coordinates of A and B, and the exact length of the chord AB.	
10 A uniform plank AB of length 6 m and mass 20 kg rests horizontally on supports at C and D, where AC = 2 m and DB = 1.5 m. A girl of mass 20 kg walks from D towards B. Find how far she is from D when the plank is about to tilt. 