Day 259 **A Level Maths: B Tier 10-a-day**

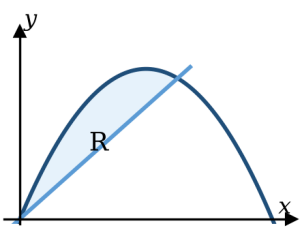
1 A summary of the ages, a years, of 7 members of a club gives $\Sigma a = 144$ and $\Sigma a^2 = 3612$.
Find the mean and the standard deviation (3 s.f.).

2 $\mathbf{a} = \begin{pmatrix} 0 \\ 2 \\ -4 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} -2 \\ 5 \\ 0 \end{pmatrix}$.
Find the angle between a and b, to 1 d.p.

3 A lift of mass 400 kg is raised and lowered by a vertical cable. The lift accelerates downwards at 2 m s^{-2}.
Take g = 9.8 m s^{-2}.
Find the tension in the cable.

4 Simplify $\frac{(4x^3)^3 \times 3x}{6x^3}$.

5 The diagram shows the curve $y = x(8 - x)$ and the line $y = 3x$.
Find the exact area of the shaded region R.



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6 A uniform rod AB of length 4 m and mass 8 kg hangs horizontally from two vertical strings attached 0.5 m from A and 0.5 m from B.
A particle of mass 5 kg is attached 2 m from A.
Take $g = 9.8$ m s^{-2}. Find the tension in each string.

7 A sequence is defined by $u_{n+1} = \frac{u_n - 1}{u_n + 1}$, $u_1 = 2$.

(a) Show that the sequence is periodic, stating the period.

(b) Find u_{30} and $\sum_{r=1}^{30} u_r$.

8 8 pairs of hours of sleep and reaction time give $r = -0.819$.
One-tailed critical value (1%): 0.7887.
Test for negative correlation.

9 Line l_1: $\mathbf{r} = \begin{pmatrix} -1 \\ -3 \\ 1 \end{pmatrix} + \lambda \begin{pmatrix} 1 \\ 1 \\ 0 \end{pmatrix}$.

Line l_2: $\mathbf{r} = \begin{pmatrix} 1 \\ -3 \\ -1 \end{pmatrix} + \mu \begin{pmatrix} 0 \\ -1 \\ -1 \end{pmatrix}$.

Show that l_1 and l_2 intersect and find the point.

10 Find the set of values of x for which
$2x - 6 > -5$ and $x^2 - 6x + 5 \geq 0$.