Day 12 **A Level Maths: B Tier 10-a-day**

1 The table shows the number of siblings, x, of 48 students.
Calculate the mean and standard deviation (3 s.f.).

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

2 A woman of mass 70 kg stands on weighing scales in a lift. The lift decelerates at 0.25 m s^{-2} while moving upwards.
Take g = 9.8 m s^{-2}.
Find the force exerted on the woman by the scales.

3 $P(X = x) = kx^2$ for x = 1, 2, ..., 4.
(a) Find k.
(b) Find E(X) and Var(X).

4 A person of mass 80 kg stands on the floor of a lift. The lift accelerates downwards at 0.5 m s^{-2}.
Take g = 9.8 m s^{-2}.
Find the normal reaction between the person and the floor.

5 The points A, B and C are (−1, 5), (2, 3) and (6, 9).
(a) Show that angle ABC = 90°.
(b) Find the area of triangle ABC.

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6 The variables x and y satisfy $y = ab^x$. A graph of ln y against x is a straight line with gradient ln 5 that passes through (0, ln 2). Find the values of a and b.	
7 Express $\frac{-2x^2 + 26x + 64}{(x - 5)(x + 1)^2}$ in partial fractions.	
8 A closed cylinder has radius r cm and volume 16π cm^3. Show that its surface area is $S = 2\pi r^2 + \frac{32\pi}{r}$, and find the minimum S.	
9 A sequence is defined by $u_{n+1} = \frac{1}{1 - u_n}$, $u_1 = 3$. (a) Show that the sequence is periodic, stating the period. (b) Find u_{20} and $\sum_{r=1}^{20} u_r$.	
10 Line l_1: $\mathbf{r} = \begin{pmatrix} 0 \\ 5 \\ 8 \end{pmatrix} + \lambda \begin{pmatrix} -2 \\ 3 \\ 3 \end{pmatrix}$. Line l_2: $\mathbf{r} = \begin{pmatrix} -2 \\ -1 \\ 8 \end{pmatrix} + \mu \begin{pmatrix} 2 \\ 0 \\ -2 \end{pmatrix}$. Show that l_1 and l_2 intersect and find the point.	