Day 218	A Level Maths: A Tier 10-a-day
1 A lift of mass 250 kg carries a person of mass 75 kg. The cable tension is 3250 N and the lift is accelerating. Find (a) the magnitude and direction of the acceleration, (b) the force of the floor on the person. Take g = 9.8.	
2 Express $\frac{-2x^2 - 6x + 5}{(x + 2)(x - 1)^2}$ in the form $\frac{A}{(x + 2)} + \frac{B}{(x - 1)} + \frac{C}{(x - 1)^2}$, and find A, B and C.	
3 X, the score (marks), is normally distributed with mean 74 and standard deviation 12. Find (a) P(X > 64.4) (b) P(64.4 < X < 82.4), each to 3 s.f.	
4 A and B have position vectors $\begin{pmatrix} 5 \\ -3 \end{pmatrix}$ and $\begin{pmatrix} -1 \\ 3 \end{pmatrix}$. The point P lies on AB with AP : PB = 1 : 2. Find the position vector of P and the exact distance OP.	
5 The curve with equation $y = x^2 - 5x + 3$ is transformed by a stretch, scale factor 2, parallel to the x-axis, followed by a stretch, scale factor 2, parallel to the y-axis. Find the equation of the image curve.	

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6 A stone is dropped from rest from the top of a cliff. In the last 2 seconds before it hits the sea it falls 107.8 m. Find the height of the cliff. Take g = 9.8.	
7 X, the mass (g), is N(63, 5^2). Find the symmetric limits about the mean between which the central 90% of values lie (3 s.f.).	
8 Given that $\log_a 2 = p$ and $\log_a 3 = q$, express $\log_a\left(\frac{4}{\sqrt{3}}\right)$ in terms of p and q.	
9 A curve has equation $2x^2y + 2y^3 + 3x = 16$. Find $\frac{dy}{dx}$ in terms of x and y, and the gradient of the normal at (2, 1).	
10 $f(x) = x^3 + ax^2 + bx - 32$, where a and b are constants. (x + 2) is a factor of f(x). The remainder when f(x) is divided by (x + 1) is -15. (a) Find a and b. (b) Solve f(x) = 0.	