Day 361	A Level Maths: S Tier 10-a-day
1 The mass of a apple is N(106, 4^2) g. A apple is 'heavy' if it exceeds 109. (a) Find the probability that a apple is heavy. (b) 12 apples are chosen at random. Find the probability that at least 4 are heavy.	
2 A lift of mass 450 kg, carrying a passenger of mass 60 kg, is supported by a vertical cable. The lift is moving upwards and accelerating at 0.4 m s^{-2}. Find (a) the force the floor exerts on the passenger, (b) the tension in the cable. Take g = 9.8 m s^{-2}.	
3 A bag has 3 green counters and some white counters, n in total. Two are taken without replacement. P(at least one green) = $\frac{7}{12}$. Find n.	
4 $f(x) = x^3 - x^2 + 5x + 7$. Show that (x + 1) is a factor of f(x), and that the equation f(x) = 0 has exactly one real root.	
5 The equation $x^3 = 2x + 14$ has a root α. (a) Show that the equation can be written as $x = \sqrt[3]{(2x + 14)}$. (b) Use $x_{n+1} = \sqrt[3]{(2x_n + 14)}$ with $x_0 = 2$ to find x_1, x_2, x_3 to 4 d.p., and hence state α to 3 d.p.	

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6 A particle P moves on a straight line. At time t seconds, where $t \geq 0$, its velocity is v m s^{-1}, where $v = 10\sqrt{t} - 2t$. Find (a) the greatest speed of P, (b) the greatest displacement of P from its starting point.	
7 The curve C has equation $x^2 - xy + y^2 = 27$. Find the coordinates of the points on C where the tangent is parallel to the x-axis.	
8 A geometric series has first term 2 and common ratio 5. Find the least n for which $S_n > 46347$.	
9 The points A, B, C have coordinates $(-1, 4, 2)$, $(-3, -1, -2)$, $(1, 1, -1)$. Find angle ABC to 1 d.p., and the exact area of triangle ABC.	
10 When a polynomial f(x) is divided by $(x + 3)$ the remainder is 1; when divided by $(x + 1)$ the remainder is -1. Find the remainder when f(x) is divided by $(x + 3)(x + 1)$.	