Day 354	A Level Maths: A Tier 10-a-day
1 X ~ B(10, 0.3). Find P(X = 5 | X ≥ 4) to 3 significant figures.	
2 Find the sum of all the integers from 1 to 117 inclusive that are not multiples of 4.	
3 |a| = 6, |b| = 2 and the angle between a and b is 30°. Find the exact values of a·b and |a + b|.	
4 Prove that no cube number can be of the form 9k + 4, where k is an integer.	
5 $f(x) = x^2 - 13$. Show that the Newton-Raphson formula gives $x_{n+1} = \frac{1}{2}(x_n + \frac{13}{x_n})$, and use it with $x_0 = 2$ to find x_2 as an approximation to $\sqrt{13}$, to 4 d.p.	

Day 354	A Level Maths: A Tier 10-a-day
6 A 5 kg box is pulled along rough horizontal ground, $\mu = 0.25$, by a rope at angle θ above the horizontal, where $\tan\theta = \frac{5}{12}$. The tension is 60 N. Find (a) the normal reaction, (b) the acceleration of the box. Take g = 9.8. Give answers to 3 s.f. if not exact.	
7 The times in seconds of two groups: group X has n = 34, mean 57, sd 2; group Y has n = 17, mean 45, sd 5. Find the mean and standard deviation of all 51 values (3 s.f. for the sd).	
8 A particle moves on the x-axis. At time t s its acceleration is $(6t - 12)$ m s^{-2}. When t = 0 it is at O with velocity -8 m s^{-1}. Find (a) its velocity when the acceleration is zero, (b) its displacement from O then.	
9 $u_1 = 10$ and $u_{n+1} = -\frac{1}{2}u_n + 9$. (a) Find the limit L of the sequence as $n \to \infty$. (b) Find the least n for which $\lvert u_n - L\rvert < 0.1$.	
10 Water pours into a cone, vertex down, at 10 cm^{3}s^{-1}. The surface radius is always $\frac{h}{4}$. Find the rate at which the depth is rising when h = 5 cm.	