Day 279	A Level Maths: S Tier 10-a-day
1 A circle passes through A(−11, 13), B(−8, −8) and C(13, −5). Find its equation.	
2 A train accelerates uniformly from rest at 1 m s^{-2} to a speed of V m s^{-1}, travels at this speed, then decelerates uniformly at 3 m s^{-2} to rest. The journey takes 68 s and covers 870 m. Find V and the time spent at constant speed.	
3 Solve $x^3 - 3x^2 - 9x + 27 > 0$.	
4 (a) Express $12\sin\theta - 9\cos\theta$ in the form $R\sin(\theta - \alpha)$, where $R > 0$ and $0 < \alpha < 90°$. Give α to 1 d.p. (b) Hence solve $12\sin\theta - 9\cos\theta = 5$ for $0 \leq \theta < 360°$, giving answers to 1 d.p.	
5 A car of mass 1000 kg tows a trailer of mass 600 kg along a horizontal road, with driving force 1880 N. Resistances are 800 N on the car and 600 N on the trailer. (a) Find the tension in the tow bar. At 8 m s^{-1} the tow bar breaks. (b) Find the distance between car and trailer when the trailer stops.	

Day 279	A Level Maths: S Tier 10-a-day
6 Solve $6\text{cosec}^2\theta - 7\cot\theta - 9 = 0$ for $0 \leq \theta < 360°$, giving answers to 1 d.p.	
7 The times taken by a bus, in minutes are modelled by $N(70, \sigma^2)$. The probability of a value below 58 is 0.20. (a) Find σ. (b) Find the probability of a value below 55.	
8 Find the binomial expansion of $(25 - 5x)^{\frac{1}{2}}$ in ascending powers of x up to and including the term in x^3. State the values of x for which it is valid.	
9 X and Y are independent, X ~ Po(4) and Y ~ Po(3). (a) State the distribution of X + Y. (b) Given that X + Y = 3, find the probability that X = 1.	
10 The line l has equation $\mathbf{r} = \begin{pmatrix}5\\5\\1\end{pmatrix} + t\begin{pmatrix}3\\0\\2\end{pmatrix}$. The point P has coordinates $(-3, 7, 0)$. Find the coordinates of the foot F of the perpendicular from P to l, and the exact distance PF.	