Day 284	A Level Maths: B Tier 10-a-day
1 Find (a) $\int 5\sec^2 4x\,dx$, (b) the exact value of $\int_0^{\frac{\pi}{16}} 5\sec^2 4x\,dx$.	
2 A van of mass 2000 kg moves along a straight horizontal road. The engine produces a driving force of 4000 N and the resistance to motion is 500 N. Find the acceleration of the van.	
3 A curve has parametric equations $x = 5t$, $y = \frac{7}{t}$, $t \neq 0$. Find a Cartesian equation of the curve.	
4 A seed supplier says that 0.25 of seeds germinate. In a sample of 15 seeds, 8 germinate. Test, at the 5% level, whether the true proportion is higher than claimed.	
5 A sledge of mass 10 kg is pulled across smooth horizontal ice by a rope with tension 26 N, inclined at α above the horizontal, where $\tan\alpha = \frac{3}{4}$. Take $g = 9.8$ m s^{-2}. Find (a) the acceleration of the sledge, (b) the normal reaction of the ice.	

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6 X has a binomial distribution with mean 4.8 and variance 2.88. (a) Find n and p. (b) Find P(X = 4) to 3 significant figures.	
7 Solve $2\cot^2 x + 9\operatorname{cosec} x + 11 = 0$ for $0 \leq x \leq 360°$, giving answers to 1 d.p.	
8 $f(x) = 2x^3 + px^2 + qx + 9$. When f(x) is divided by $(x - 2)$ the remainder is 9, and when divided by $(x + 1)$ the remainder is -3. Find p and q.	
9 $\mathbf{a} = \begin{pmatrix} -1 \\ -2 \\ -4 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} -4 \\ 1 \\ -1 \end{pmatrix}$. Find the angle between a and b, to 1 d.p.	
10 $f(x) = \sqrt{4x - 8} + 5$. (a) Find the largest possible domain of f. (b) Find the range of f.	