Day 276	A Level Maths: B Tier 10-a-day
1 Differentiate $y = 3\operatorname{cosec} 4x$ with respect to x, and find the exact gradient when $x = \frac{\pi}{16}$.	
2 Evaluate $\sum_{r=5}^{12}(5r - 4)$.	
3 Solve $\cos 2x = 0.8$ for $0 \leq x \leq \pi$, giving answers to 3 significant figures.	
4 A sequence is defined by $u_{n+1} = k\,u_n + 1$, $u_1 = 2$. Given that $u_3 = 4$, find the possible values of k.	
5 A particle of mass 3 kg is acted on by forces $(6\mathbf{i} - 3\mathbf{j})$ N and $\mathbf{P}$ N only. Its acceleration is $(3\mathbf{i} + 4\mathbf{j})$ m s^{-2}. Find $\mathbf{P}$, and its magnitude to 3 significant figures.	

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6 The continuous random variable X has pdf f(x) = kx^2 for $0 \leq x \leq 6$, and 0 otherwise. (a) Find the value of k. (b) Find P(X > 3). (c) Find E(X).	
7 Solve $\frac{dy}{dx} = (5 + y)e^{-x}$, given that y = 1 when x = 0.	
8 A summary of the times, t minutes, taken by 10 people to complete a puzzle gives $\Sigma t = 275$ and $\Sigma t^2 = 8579$. Find the mean and the standard deviation (3 s.f.).	
9 A curve has parametric equations $x = t^2$, $y = 3t$, $t \in \mathbb{R}$. Find a Cartesian equation of the curve.	
10 A box of mass 5 kg rests on a rough horizontal floor, with coefficient of friction 0.5. A horizontal force of 20 N is applied to the box. Take g = 9.8 m s^{-2}. Determine whether the box moves. Find the friction force, or the acceleration if it moves.	