Day 93	A Level Maths: A Tier 10-a-day
1 A particle slides from rest down a rough plane inclined at α to the horizontal, where $\tan\alpha = \frac{8}{15}$. It moves 4.9 m in 2 s. Find (a) the coefficient of friction, (b) the speed after 2 s. Take $g = 9.8$.	
2 $f(x) = x^2 - 2\cos x - 12$. Show that the equation $f(x) = 0$ has a root α in the interval $[3, 4]$ (x in radians).	
3 Prove that no cube number can be of the form $9k + 5$, where k is an integer.	
4 $X \sim B(21, 0.3)$. Find the smallest value of c such that $P(X \geq c) < 0.05$.	
5 $f(x) = x^2 - 1$, $x \geq 0$. Find $f^{-1}(x)$ and state its domain.	

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6 X ~ Po(40). Use a suitable approximation to find P(X ≥ 37), to 3 significant figures.	
7 θ is small and measured in radians. Use small angle approximations to show that $5\sin 2\theta + \cos\theta = 1.5$ can be written as $a\theta^2 + b\theta + c = 0$ with integers a, b, c. Hence find the approximate solution with $0 < \theta < 0.8$, to 3 s.f.	
8 A stone is projected vertically upwards from the ground. It passes a ledge 3 s after projection and again 8 s after projection. Find (a) the speed of projection, (b) the height of the ledge, (c) the greatest height. Take g = 9.8.	
9 Find the coordinates of the stationary points of $y = \frac{x^2 + 12}{x + 2}$.	
10 In the expansion of $(1 + kx)^n$, where n is a positive integer, the coefficient of x is −16 and the coefficient of x^2 is 112. Find n and k.	