Day 283	A Level Maths: B Tier 10-a-day
1 Given that $y = e^{x^2 - 2x}$, find $\frac{dy}{dx}$, and the gradient of the curve when $x = 0$.	
2 A particle moving in a straight line with constant acceleration increases its speed from 4 m s^{-1} to 10 m s^{-1} while covering 28 m. Find (a) the acceleration, (b) the time taken.	
3 The function $f(x) = x^3 - 3x - 7$. Show that $f(x) = 0$ has a root between $x = 2$ and $x = 2.5$.	
4 The points A, B and C are $(-3, -4)$, $(0, 0)$ and $(-8, 6)$. (a) Show that angle ABC = 90°. (b) Find the area of triangle ABC.	
5 $X \sim B(20, p)$. H_0: $p = 0.2$ is to be tested against H_1: $p > 0.2$ at the 5% significance level. Find the critical region and the actual significance level.	

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6 A particle moves along a straight line so that its displacement from O after t s is $s = 3t^3 + 3t^2$ metres. Find (a) the average velocity over the first 3 seconds, (b) the velocity at t = 3.	
7 (a) Expand $(1 + x)^{-2}$ up to the x^2 term. (b) Use x = 0.03 to estimate $\frac{1}{1.03^2}$ to 5 decimal places.	
8 X ~ B(200, 0.5). Use a normal approximation to find P(X ≥ 104), to 3 significant figures.	
9 Solve $\frac{dy}{dx} = (5 + y)e^{-x}$, given that y = 2 when x = 0.	
10 $f(x) = x^3 + x^2 - 16x + k$. Given that (x + 1) is a factor of f(x), (a) find the value of k, (b) factorise f(x) completely.	