Day 137	A Level Maths: B Tier 10-a-day
1 Given that $y = \frac{1}{(x^2 + 6)^2}$, find $\frac{dy}{dx}$, and the gradient of the curve when $x = -1$.	
2 A crate of mass 8 kg is pulled along rough horizontal ground by a horizontal force of 31.52 N. It accelerates at 1 m s^{-2}. Take g = 9.8 m s^{-2}. Find the coefficient of friction between the crate and the ground.	
3 Find (a) $\int 2\cos 5x\, dx$, (b) the exact value of $\int_0^{\frac{\pi}{10}} 2\cos 5x\, dx$.	
4 Simplify $\frac{(2x^3)^2 \times 2x}{8x}$.	
5 Given that $y = (x + 2)e^{-x}$, find $\frac{dy}{dx}$, and its value when x = 0.	

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6 $f(x) = 2x^3 + px^2 + qx + 7$. When f(x) is divided by $(x - 3)$ the remainder is 58, and when divided by $(x + 1)$ the remainder is -2. Find p and q.	
7 X has a binomial distribution with mean 2 and variance 1.5. (a) Find n and p. (b) Find P(X = 2) to 3 significant figures.	
8 A cyclist moving in a straight line with constant acceleration increases its speed from 3 m s^{-1} to 43 m s^{-1} while covering 230 m. Find (a) the acceleration, (b) the time taken.	
9 The scores on a test are normally distributed. P(X < 76) = 0.0228 and P(X > 112) = 0.1587. Find the mean and standard deviation (3 s.f.).	
10 A circle has equation $x^2 + y^2 - 6x + 12y + 27 = 0$. Find the coordinates of its centre and its radius.	