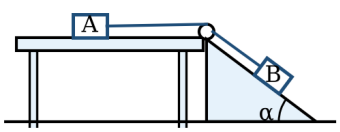
Day 42	A Level Maths: S Tier 10-a-day
1 The curve C has parametric equations $x = t$, $y = 2t^2$. The line $y = 2x + 4$ meets C at A and B. Find the exact length AB.	
2 A sector of a circle has radius r cm and angle θ radians, where $\theta < 2\pi$. Its perimeter is 10 cm and its area is 6 cm^2. Find the two possible pairs of values of r and θ.	
3 A school says that 25% of its pupils walk to school. 30 pupils are surveyed, and 13 walk. Test, at the 5% significance level, the claim that the proportion is higher. Give your conclusion in context.	
4 A curve is given by $x = e^y + 2y$. Find dy/dx and d^2y/dx^2 when $y = 0$.	
5 Particle A (2 kg) lies on a rough table with $\mu = 0.4$, and is joined by a light string over a smooth pulley (see diagram) to particle B (5 kg) on a smooth slope, $\sin\alpha = \frac{3}{5}$. Released from rest, the string is cut when B has moved 3.5 m. Find the further distance A slides before stopping. 	

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6 Prove that $4k = n^2 + 1$ has no integer solutions (k and n integers).	
7 A particle P moves with constant acceleration. At t = 0 seconds P is at $(3\mathbf{i})$ m with velocity $(5\mathbf{i} + 4\mathbf{j})$ m s^{-1}. At t = 10, P has velocity $(-5\mathbf{i} - 16\mathbf{j})$ m s^{-1}. Find (a) the acceleration of P, (b) the time at which P moves parallel to $(\mathbf{i})$, (c) the position vector of P at that time.	
8 The tangent to $y = \frac{x^2 + 7}{x + 3}$ at the point where x = 3 meets the axes at A and B. Find the exact area of triangle OAB, where O is the origin.	
9 A curve has parametric equations $x = t^2$, $y = 4t^3$. Show that $y^2 = kx^3$ and find k.	
10 Data pairs (x, y) are coded by $u = x - 6$ and $v = \frac{y}{2}$. The regression line of v on u is $v = 8 + 2u$. (a) Find the regression line of y on x in the form $y = a + bx$. (b) Use it to estimate y when x = 10.	