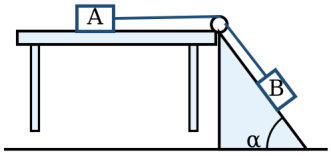
Day 61	A Level Maths: S Tier 10-a-day
1 A company claims that 25% of its customers renew their policy. A sample of 30 customers is taken, and 3 renew. Test, at the 1% significance level, the claim that the proportion is lower. Give your conclusion in context.	
2 The curve $y = ax^n$ passes through (1, 2) and (3, 54). Find the values of a and n.	
3 $f(x) = -2x - 1$ and $g(x) = x^2 - 4$. Solve $fg(x) = gf(x)$.	
4 A box of mass 10 kg is at rest on rough horizontal ground ($\mu = 0.1$). A horizontal force of 23.8 N acts on it for 7 s and is then removed. Find (a) the speed when the force is removed, (b) the total distance travelled before the box stops. Take $g = 9.8$ m s^{-2}.	
5 A curve has parametric equations $x = \ln t$, $y = 5t^2 + 3t$, $t > 0$. Find the equation of the tangent where $t = 1$, in the form $y = mx + c$.	

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6 Particle A (4 kg) lies on a rough table with $\mu = 0.1$, and is joined by a light string over a smooth pulley (see diagram) to particle B (2 kg) on a smooth slope, $\sin\alpha = \frac{4}{5}$.

Released from rest, the string is cut when B has moved 1 m. Find the further distance A slides before stopping.



7 An arithmetic sequence has $u_3 = 4$ and $S_{12} = 216$.

(a) Find the first term and common difference.

(b) Find the least n for which $S_n > 611$.

8 The scores in an aptitude test are normally distributed. 15% are less than 38 and 15% are greater than 75.

Find the mean and standard deviation, each correct to 3 significant figures.

9 A curve has parametric equations $x = t$, $y = te^{-t}$, for $0 \leq t \leq 1$.

Find the exact area under the curve between $t = 0$ and $t = 1$,

above the x-axis.

10 Given that $\sum_{r=1}^{n}(2r + 5) = 1591$, find n.