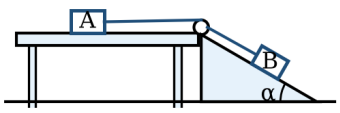
Day 296	A Level Maths: S Tier 10-a-day

1 Scores are N(84, 9^2). The highest 5% and the lowest 5% of scores are discarded.
Find the range of scores that remain, correct to 3 significant figures.

2 A particle P moves on a line. Its displacement from a fixed point O at time t seconds is s metres, where $s = 5\sin 2t + 12\cos 2t$.
Find (a) the greatest distance of P from O, (b) the greatest speed of P, (c) the first time P is at its greatest distance from O (3 s.f.).

3 A sequence is defined by $u_1 = \frac{5}{2}$ and $u_{n+1} = \frac{1}{1 - u_n}$.
Show that the sequence is periodic and find $\sum_{r=1}^{99} u_r$.

4 Particle A (4 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 (8 kg) on a smooth slope, $\alpha = 30°$.
Released from rest, the string is cut when B has moved 3 m. Find the further distance A slides before stopping.



5 A curve has parametric equations $x = 2t^2$, $y = 2t^3 - 18t$.
Find the coordinates of the points on the curve where
the gradient is 3.

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6 A and B take turns, A first, to score; the first to score wins. P(A scores) = $\frac{1}{3}$, P(B scores) = $\frac{1}{6}$ each attempt. Find P(A wins (a) on attempt 1 or 2, (b) overall).	
7 Describe a sequence of two transformations that maps the curve $y = x^2$ onto the curve $y = 5x^2 - 50x + 132$.	
8 The region bounded by $y = e^{3x}$, the x-axis and the lines $x = 0$ and $x = 1$ is rotated through 2π about the x-axis. Find the exact volume of the solid formed.	
9 Find the term independent of x in the expansion of $(2x + \frac{2}{x^2})^{12}$.	
10 (a) Write $\frac{-2x - 3}{(x + 2)^2}$ in the form $\frac{A}{x + 2} + \frac{B}{(x + 2)^2}$. (b) Find the exact value of $\int_0^3 \frac{-2x - 3}{(x + 2)^2}\,dx$.	