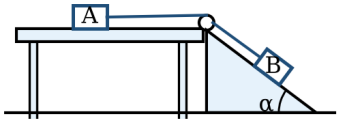
Day 114 **A Level Maths: S Tier 10-a-day**

1 Particle A (1 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 (9 kg) on a smooth slope, $\sin\alpha = \frac{3}{5}$.

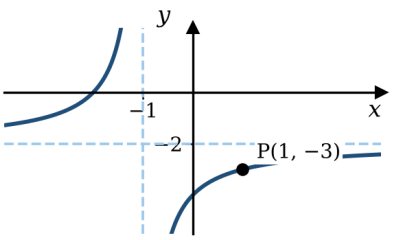
Released from rest, the string is cut when B has moved 1 m. Find the further distance A slides before stopping.



2 The curve C has equation $x^3 + xy^2 = 54$.
Find the equation of the tangent to C at the point (3, 3),
in the form $ax + by + c = 0$ with integers a, b, c.

3 15 recorded masses (grams) have mean 58 and standard deviation 6.
One value was recorded as 45 but should have been 59.
Find the correct mean and the correct standard deviation.

4 The diagram shows the curve C, its asymptotes (dashed) and a point P. C has equation $y = \frac{a}{x + p} + q$. Find a, p and q.



5 Find the exact value of
$\sin(2\cos^{-1}(\frac{5}{13}))$.

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6 A particle P moves on a straight line. At time t seconds its velocity is v m s^{-1}, where $v = t^2 - 10t + 21$ for $0 \leq t \leq 9$ Find (a) the times at which P is at instantaneous rest, (b) the total distance travelled by P in the first 9 seconds.	
7 $u_{n+1} = u_n + 4n + 1$, $u_1 = 7$. (a) Show that $u_n = an^2 + bn + c$ and find a, b, c. (b) Find the least n for which $u_n > 925$.	
8 Solve simultaneously: $x + 2y = -6$ $x^2 + xy - y^2 = 36$	
9 (a) Write $\frac{5x + 25}{(x + 4)^2}$ in the form $\frac{A}{x + 4} + \frac{B}{(x + 4)^2}$. (b) Find the exact value of $\int_0^3 \frac{5x + 25}{(x + 4)^2}\,dx$.	
10 A test of H_0: $p = 0.1$ against H_1: $p > 0.1$ uses a sample of 25 at the 5% level. (a) Find the critical region for X, the number of successes. (b) Find the actual significance level. (c) Find P(Type II error) when in fact $p = 0.3$.	