Day 350	A Level Maths: S Tier 10-a-day

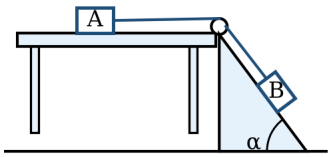
1 A golf ball is hit from a point O on horizontal ground. It lands 96 m from O, and reaches a maximum height of 18 m above the ground. Find the angle of projection and the speed of projection, to 3 s.f. Take g = 9.8 m s^{-2}.

2 Solve the simultaneous equations
$\lg x - \lg y = 1$
$x + y = 121$

3 Express $\frac{-1 - 5\sqrt{6}}{2 + \sqrt{6}}$ in the form $p + q\sqrt{6}$, where p and q are rational numbers.

4 Particle A (3 kg) lies on a rough table with $\mu = 0.2$, and is joined by a light string over a smooth pulley (see diagram) to particle B (3 kg) on a smooth slope, $\sin\alpha = \frac{4}{5}$.

Released from rest, the string is cut when B has moved 3 m. Find the further distance A slides before stopping.



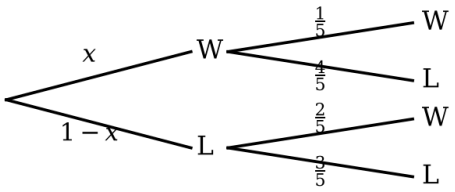
5 Find the set of values of x for which both $x^2 - x - 30 > 0$ and $2x + 6 \leq 6$.

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6 The mass of a apple is N(42, 5^2) g. A apple is 'heavy' if it exceeds 48.
(a) Find the probability that a apple is heavy.
(b) 18 apples are chosen at random. Find the probability that at least 4 are heavy.

7 A and B are acute angles with $\tan A = \frac{1}{10}$ and $\tan B = \frac{9}{11}$.
Find $\tan(A + B)$ and hence show that $A + B = \frac{\pi}{4}$.

8 The tree diagram shows two games played in turn.
Given the second is a W, P(first was a W) = $\frac{1}{4}$.
Find x.



9 Use integration by parts to find the exact value of
$\int_1^e \frac{\ln x}{x^2}\,dx$

10 $u_{n+1} = u_n + n + 2$, $u_1 = -4$.
(a) Show that $u_n = an^2 + bn + c$ and find a, b, c.
(b) Find the least n for which $u_n > 1453$.