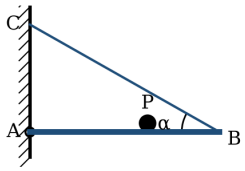
Day 255	A Level Maths: S Tier 10-a-day
1 Express $\frac{x^3 - 4x^2 + 9x - 12}{(x-2)(x-3)}$ in the form $ax + b + \frac{C}{(x-2)} + \frac{D}{(x-3)}$.	
2 Solve $2 \ln x = \ln(x + 6) + \ln 3$, stating clearly why one root is rejected.	
3 The first term of an arithmetic sequence is 2 and its common difference d is non-zero. The 1st, 2nd and 12th terms are the first three terms of a geometric sequence. Find d and the common ratio.	
4 $f(x) = e^x + 3x - 14$. (a) Show that $f(x) = 0$ has a root α with $2 < \alpha < 3$. (b) Use Newton-Raphson with $x_0 = 2$ to find x_1 and x_2 to 4 decimal places.	
5 Each component is faulty with probability 0.03, independently. Find the least number n of components that must be tested so that the probability of finding at least one faulty is greater than 0.95.	

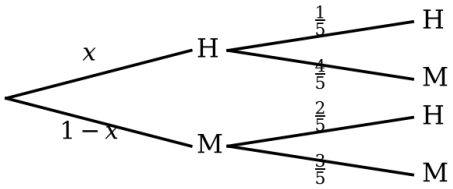
Day 255 **A Level Maths: S Tier 10-a-day**

6 A curve is given by $x = \ln y + y^2$.
Find dy/dx and d^2y/dx^2 when $y = 1$.

7 A uniform rod AB (3 m, 40 N) is hinged at A to a vertical wall and held horizontal by a string BC, C on the wall above A, with $\tan \alpha = \frac{5}{12}$, where α is the angle between string and rod. A 50 N particle hangs at P, AP = 2.25 m.
Find (a) the tension, (b) the magnitude and direction of the hinge force (3 s.f. and 1 d.p.).



8 The tree diagram shows two games played in turn.
Given the second is a H, P(first was a H) = $\frac{1}{7}$.
Find x.



9 $f(x) = \frac{2x + 9}{(1 + 2x)(1 - 2x)}$.
(a) Express f(x) in partial fractions.
(b) Hence expand f(x) in ascending powers of x up to x^3, stating the range of validity.

10 A non-uniform rod AB of length 6 m and mass 8 kg rests on supports at C and D, where AC = 1 m and AD = 5 m, with R_C = 1.5 R_D.
Find (a) the distance of the centre of mass from A. A particle of mass m kg at B puts the rod on the point of tilting about D. (b) Find m.