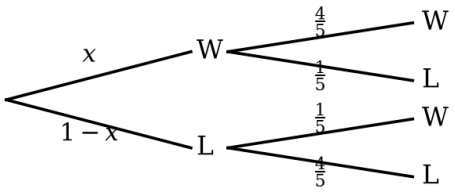
Day 118	A Level Maths: S Tier 10-a-day
1 $f(x) = 2x^3 + ax^2 + bx + 40$, where a and b are constants. $(x - 4)$ is a factor of f(x), and f(x) leaves remainder 48 when divided by $(x - 1)$. Find a and b, and hence solve $f(x) = 0$.	
2 A ball is projected from level ground with horizontal and vertical velocity components 19.6 and 29.4 m s^{-1}. Find (a) the two times at which it moves at 45° to the horizontal, (b) the horizontal distance between those two points. Take g = 9.8 m s^{-2}.	
3 Use the substitution $u = \ln x$ to find the exact value of $\int_1^{e^2} \frac{(\ln x)^2}{x}\,dx$	
4 The curve $y = x^2 - x - 4$ is translated by $\begin{pmatrix} 3 \\ -2 \end{pmatrix}$ and then a stretch, scale factor 2, parallel to the x-axis. Find the equation of the resulting curve in the form $y = ax^2 + bx + c$.	
5 (a) Express $9 \sin\theta + 12 \cos\theta$ in the form $R \sin(\theta + \alpha)$, where $R > 0$ and $0 < \alpha < 90°$. Give α to 1 d.p. (b) Hence solve $9 \sin\theta + 12 \cos\theta = -8$ for $0 \leq \theta < 360°$, giving answers to 1 d.p.	

Day 118	A Level Maths: S Tier 10-a-day
6 X ~ B(12, p). It is given that $P(X = 2) = \frac{11}{8} \times P(X = 1)$. (a) Find the value of p. (b) Find P(X = 0), correct to 3 significant figures.	
7 Solve $6\text{cosec}^2\theta + 2\cot\theta - 10 = 0$ for $0 \leq \theta < 360°$, giving answers to 1 d.p.	
8 The tree diagram shows two games played in turn. Given the second is a W, P(first was a W) = $\frac{8}{9}$. Find x. 	
9 The line $5y = 12x + k$ is a tangent to the circle $(x + 2)^2 + (y + 0)^2 = 4$. Find the two possible values of k.	
10 A golf ball is hit from a point O on horizontal ground. It lands 24 m from O, and reaches a maximum height of 15 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}.	