Day 194 **A Level Maths: B Tier 10-a-day**

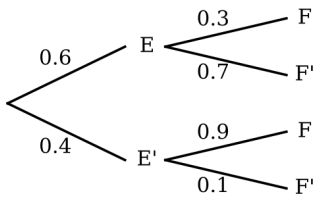
1 A remote-control car moves with constant velocity $(-40\mathbf{i} + 42\mathbf{j})$ m s^{-1}, where $\mathbf{i}$ and $\mathbf{j}$ are unit vectors east and north.
Find its speed and the acute angle its direction makes with $\mathbf{i}$, to 1 d.p.

2 The vector $\mathbf{a} = \begin{pmatrix} -12 \\ 1 \\ 12 \end{pmatrix}$.
Find $|\mathbf{a}|$ and a unit vector in the direction of $\mathbf{a}$.

3 A curve has parametric equations $x = 4t^2$, $y = 5t$, $t \in \mathbb{R}$.
Find a Cartesian equation of the curve.

4 Given that $\cot\theta = \frac{3}{4}$ and θ is acute,
find the exact value of $\sec\theta$.

5 The tree diagram shows probabilities for event E, followed by event F.
Find the probability that exactly one of E and F occurs.



Day 194	A Level Maths: B Tier 10-a-day
6 Solve $e^{2x} - 15e^{x} + 36 = 0$, giving your answers as exact values.	
7 A particle moves so that its position vector relative to O at time t s is $r = (3t^2)\mathbf{i} + (2t^3 + 2t)\mathbf{j}$ metres. Find the velocity when t = 1, and the speed at that time.	
8 A manufacturer claims that a proportion 0.3 of its sweets are red. A sample of 25 sweets has 13 red. Test, at the 5% level, whether the true proportion is higher than claimed.	
9 A geometric series has first term 5 and common ratio 4. Find the smallest value of n for which the sum of the first n terms exceeds 50000.	
10 A circle has centre (−4, 4) and passes through the point (0, 1). Find an equation of the circle.	