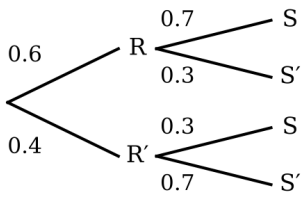
Day 141	A Level Maths: A Tier 10-a-day
1 Solve $2\cos^2 x + 3\sin x - 2 = 0$ for $0 \leq x \leq 2\pi$.	
2 Prove that $x^2 - 8x + 17 > 0$ for all real values of x.	
3 A ball is thrown vertically upwards at 4.9 m s^{-1} from a point h m above horizontal ground, and hits the ground 5 s later. Find (a) h, (b) the greatest height above the ground. Take g = 9.8.	
4 A systematic sample is taken from a numbered list of 175 items. The 6th item chosen is number 26 and the 7th item chosen is number 31. Find the sampling interval, the number of the first item chosen and the size of the sample.	
5 $y = \sec(2x)$. Find $\frac{dy}{dx}$ and its exact value at $x = \frac{\pi}{6}$.	

Day 141 **A Level Maths: A Tier 10-a-day**

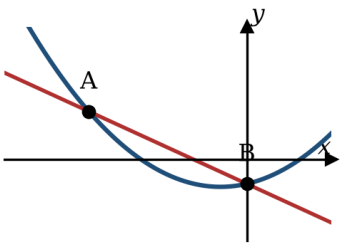
6 The tree diagram shows probabilities for events R and S.
(a) Find P(S).
(b) Find P(R | S).



7 A hemispherical bowl of radius 8 cm is filled at 60 cm^3s^{-1}. When the depth is h, $V = \pi(8h^2 - \frac{1}{3}h^3)$.

Find $\frac{dh}{dt}$ when h = 2 cm.

8 The diagram shows the curve $y = x^2 + x - 2$ and the line $y = -2x - 2$, meeting at A and B.
(a) Find the coordinates of A and B.
(b) Find the coordinates of the midpoint of AB.



9 Car A passes P at constant speed 10 m s^{-1}. 5 s later car B leaves P from rest, in the same direction, with acceleration 3 m s^{-2}. B overtakes A at Q. Find (a) the time B takes to reach Q, (b) PQ, (c) the speed of B at Q.

10 In the expansion of $(1 + kx)^n$, where n is a positive integer, the coefficient of x is -12 and the coefficient of x^2 is 60.
Find n and k.