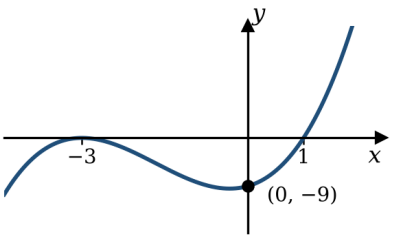
Day 219	A Level Maths: S Tier 10-a-day

1 Solve $2\sec^2\theta - \tan\theta - 3 = 0$
for $0 \leq \theta < 360°$, giving answers to 1 d.p.

2 The roots of $x^2 + kx + 4 = 0$ differ by 3.
Find the possible values of k.

3 A shell is projected from a point O on horizontal ground with speed 49 m s^{-1} at an angle α above the horizontal, where $\tan\alpha = \frac{3}{4}$. Find (a) the greatest height, (b) the speed when it is at half of this height (3 s.f.). Take g = 9.8 m s^{-2}.

4 The diagram shows the cubic y = f(x), which touches the x-axis once. Find f(x), giving your answer in expanded form.



5 A stone is projected from level ground with horizontal and vertical velocity components 14.7 and 63.7 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}.

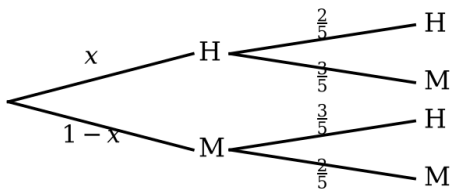
Day 219 **A Level Maths: S Tier 10-a-day**

6 Each battery is faulty with probability 0.12, independently.
Find the least number n of batterys that must be tested so that the probability of finding at least one faulty is greater than 0.95.

7 The curve $y = 2x^3\sqrt{175 - x}$, for $0 < x < 175$, has one
stationary point. Find its exact coordinates and determine its nature.

8 $f(\theta) = \dfrac{2}{18 + 8\sin\theta + 15\cos\theta}$
(a) Write $8\sin\theta + 15\cos\theta$ as $R\sin(\theta + \alpha)$, $R > 0$, $0 < \alpha < 90°$.
(b) Find the greatest and least values of $f(\theta)$, and the smallest positive θ at which the greatest value occurs, to 1 d.p.

9 The tree diagram shows two games played in turn.
Given the second is a H, P(first was a H) = $\frac{2}{3}$.
Find x.



10 The first term of an arithmetic sequence is 9 and its common difference d is non-zero. The 2nd, 4th and 7th terms are the first three terms of a geometric sequence. Find d and the common ratio.